The 43rd Annual Meeting of the Japan Shoulder Society

The 13th Annual Meeting of the Shoulder Function Study Group

October 21(Fri)-22(Sat), 2016

Venue  RIHGA Royal Hotel Hiroshima, Japan

Congress President  Yu Mochizuki, M.D., Ph.D.
President, The 43rd Annual Meeting of the Japan Shoulder Society (JSS) Director, Department of Orthopaedic Surgery, Hiroshima Prefectural Hospital, Japan

Kazuhiko Kikugawa  M.D., Ph.D.
President of The 13th Annual Meeting of Shoulder Function Study Group, Department of Orthopaedic Surgery, Mazda Hospital
Welcome to Hiroshima for 43rd Annual Meeting of the Japan Shoulder Society

It is my great pleasure to welcome all of you to the peace memorial city of the world, Hiroshima!

Your participation and support is essential to the success of the Annual Meeting of the Japan Shoulder Society.

The Japan Shoulder Society is the oldest society in the world. It is a great honor for us in Hiroshima to host this tradition-rich Meeting. This marks the second time the Meeting has been held in Hiroshima, as the last time was in 1981 for the 8th Annual Meeting, chaired by Dr. Nagao Adachi. We aim to make this Meeting a fruitful one, and hope to work together with all of you to achieve that end.

The theme of the Meeting is “Ranko-Koushin” – Regeneration.” Ranko-Koushin” is a proverb taken from the Chinese historical work “Book of Han,” and has the meaning, “Survey the past to know what is to come.” I feel this concept has relevance not only to the realm of medical science but also to medical care as a whole. Furthermore, I believe tissue regeneration, as typified by the discovery of iPS cells, is an eternal proposition of future medical science and medical care. Considering that the Japan Shoulder Society should also take on this challenge, we chose the theme of “Regeneration” for the upcoming Annual Meeting.

Held in conjunction with the Annual Meeting within the same venue will be the 13th Annual Meeting of Shoulder Function Study Group, chaired by Dr. Kazuiko Kikukawa, Director of Orthopaedic Surgery at Mazda Hospital. Medical care delivered by well-organized teams of orthopedists and medical support staff is indispensable for the improvement of treatment outcome and performance, and such care is certain to contribute greatly to shoulder treatment today and in the future.

As to Hiroshima, G7 Hiroshima Foreign Ministers’ Meeting was held on April and U.S. President Obama visited Hiroshima on May. He said that seventy-one years ago, on a bright cloudless morning, death fell from the sky and the world was changed. A flash of light and a wall of fire destroyed a city and demonstrated that mankind possessed the means to destroy itself. Hiroshima has reconstructed and regenerated, become clean and beautiful city. Hiroshima should be the start of our own moral awaking.

To share the way of thinking about not only the shoulder surgery but also living and culture, sympathy could contribute to the world. We would like to send the message through this meeting from Hiroshima to the world.

Hiroshima offers beautiful weather in October and we look forward to welcoming you to enjoy both the pursuit of knowledge and touring of the sights. After engaging in vigorous discussions in what will surely be a dynamic academic conference, we hope you will relish the delicacies from the land and sea, and make your stay a fruitful one.

On behalf of the meeting, I sincerely want to thank all our staff for their continued time and efforts that make this meeting the foremost shoulder specialist experience.

Please enjoy the meeting and thank you very much!!
**Access**

![Map of Hiroshima vicinity](image)

- **From JR Hiroshima Station**
  - By JR Astramline
    - Transfer to the JR Sanyo Line or JR Kabe Line from Hiroshima Station
    - from JR "Shin-Hakushima" station and get off (about 2 minutes)
    - contact passage, Astramline "Shin-Hakushima" station
    - "Kencho-Mae" station and get off (about 2 minutes)
    - immediately out to the ground than the "exit 2"

  - By Hiroshima Dentetsu
    - Take the "Hiroshima Dentetsu" (No. 1, No. 2, No. 6)
    - "Kamiyacho-Higashi" or "Kamiyacho-Nishi" get off (about 15 minutes) → walk (about 3 minutes)

  - By Bus
    - Take the "Hiroshima bus" (No. 21, No. 22, No. 24, No. 25)
      - "Kamiya-cho" get off (about 8 minutes) → walk (about 5 minutes)
    - Take the "Hiroden bus" (No. 2, No. 3) → "Kamiya-cho" get off (about 8 minutes)
      - walk (about 5 minutes)

- **From Hiroshima Airport**
  - About a 55-minute Hiroshima Airport limousine bus (high-speed bus), "Hiroshima Bus Center" get off → next to the building

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<table>
<thead>
<tr>
<th>Hiroshima Station</th>
<th>Hiroshima Airport</th>
<th>Astramline Kencho-Mae</th>
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<tbody>
<tr>
<td>15 minutes</td>
<td>Bus 55 minutes</td>
<td>Near the station</td>
</tr>
</tbody>
</table>

**RIHGA Royal Hotel Hiroshima**
### Program at Glance  First day October 21 (Fri.)

#### The 43rd Annual Meeting of the Japan Shoulder Society

**Room 1: Red**
- **Opening Remarks**
- **Itusuhima Seminar 1**
  - International Symposium 1
  - Speakers: Joo Han On, Deny T.T. Lie (Symposium Ch-Chen, Shiy Chen, Makoto Furuhashi, Gigs Wolch Chien, Hisashi Ono, Masaaki Ono, Jiro Shiraiz, Masahiro Shiraiz)
- **Free Papers: Frozen Shoulder**
  - Chair: Jun Kuma
  - G1-D-01~G1-D-07

**Room 2: Green**
- **Opening Remarks**
- **Topics 1**
  - Operative Treatment for Rotator Cuff Tear
  - Limit and Challenge
  - Chairs: Sang-Jin Cheon, Junji Ito
- **Free Papers: Rotator Cuff Tear 1**
  - Chair: Koosaku Suemoto
  - R1-O-01~R1-O-05
- **Free Papers: Rotator Cuff Tear 2**
  - Chair: Yuichiro Nakata
  - R1-O-06~R1-O-11
- **Free Papers: Rotator Cuff Tear 3**
  - Chair: Takeshi Kokubu
  - R1-O-12~R1-O-16

**Room 3: Blue**
- **Opening Remarks**
- **Topics 2**
  - Operative Treatment for Shoulder Instability
  - Limit and Challenge
  - Chair: Katsuhiko Takanaka
- **Free Papers: Rotator Cuff Tear 1**
  - Chair: Koosaku Suemoto
  - R1-O-01~R1-O-05
- **Free Papers: Shoulder Instability 1**
  - Chair: Kazuhide Suzuki
  - B1-O-01~B1-O-07

**Room 4: Violet**
- **Opening Remarks**
- **Topics 3**
  - Knacks and Pitfalls of Treatment for Proximal Humeral Fracture
  - Chair: Toshikazu Asahara
- **Free Papers: Rotator Cuff Tear 3**
  - Chair: Takeshi Kokubu
  - R1-O-21~R1-O-23
- **Free Papers: Shoulder Instability 2**
  - Chair: Misora Tanaka
  - B1-O-08~B1-O-12
- **Free Papers: Shoulder Instability 3**
  - Chair: Tetsuya Yamazaki
  - B1-O-13~B1-O-17

**Poster Room**
- **Topics 1**
  - Role of Throwing Injury of the Shoulder in the Playing Field of Baseball
  - Chairs: Toru Motohara, Shin-Ichi Chiba
- **Free Papers: TSA/RSA**
  - Chair: Takeshi Tsuchiya
  - V1-O-07~V1-O-17

#### The 13th Annual Meeting of the Shoulder Function Study Group

**Room 1: Red**
- **General Assembly Meeting**
- **Rankokoushins Seminar 1**
  - Motoshige Nakase, Katsumi Nishihara
  - Chair: Nagoya Adachi
  - R1-R-01~R1-R-02

**Room 2: Green**
- **Free Papers: Imaging 1**
  - Chair: Mitsuaki Yamada
  - G1-D-01~G1-D-05

**Room 3: Blue**
- **Free Papers: Imaging 2**
  - Chair: Hisayuki Hasegawa
  - G1-O-16~G1-O-19

**Room 4: Violet**
- **Free Papers: Shoulder Instability 4**
  - Chair: Hiroyuki Gotoh
  - B1-O-18~B1-O-22

#### Poster Set Up
- **Topics 4**
  - Functional Assessment and QOL Assessment for Shoulder Disorders
  - Chair: Kim Maruyama, Masato Ebisu
  - R1-T4-1~R1-T4-6

**Third Day**
- **Short Talk: TSA/RSA 1**
  - Chair: Shinji Imai
  - B1-ST-01~B1-ST-07

**Fourth Day**
- **Short Talk: TSA/RSA 2**
  - Chair: Takashi Kobayashi
  - B1-ST-08~B1-ST-14

**Fifth Day**
- **Short Talk: Rotator Cuff Tear 1**
  - Chair: Shoji Fukushima
  - B1-ST-15~B1-ST-22

**Sixth Day**
- **Short Talk: Rotator Cuff Tear 2**
  - Chair: Tadano Funakawa
  - B1-ST-23~B1-ST-28

**Welcome Banquet**
# Program at Glance

**Second day October 22 (Sat.)**

## The 43rd Annual Meeting of the Japan Shoulder Society

### Room 1: Red
4F Crystal Hall

#### Topics 6
Diagnostic Imaging for Shoulder Disorders
Chair: Yuutaka Morisawa
G2-16-1–G2-16-6

### Room 2: Green
4F Royal Hall 1

#### Free Papers: Fracture 1
Chair: Hiroki Shiota
G2-0-01–G2-0-04

### Room 3: Blue
4F Royal Hall 2

#### Free Papers: Fracture 2
Chair: Yutaka Azawa
G2-0-05–G2-0-10

### Room 4: Violet
4F Royal Hall 3

#### Free Papers: Basic Research 1
Chair: Kazutoshi Hamada
B2-0-01–B2-0-07

#### Free Papers: Basic Research 2
Chair: Mitsuhiro Aoki
B2-0-08–B2-0-13

#### Educational Lecture 2
Tadanao Futatsuki, Naoki Suegawa
Chair: Naoki Suegawa
B2-12-01–B2-12-03

#### Free Papers: Motion Analysis
Chair: Yoshinori Kaj
V2-0-01–V2-0-07

### Poster Room
3F Seto, Aki
4F Matsu, Take, Ume

#### Free Papers: Fracture 3
Chair: Hisayuki Shiro
V2-0-08–V2-0-13

#### Free Papers: Basic Research 3
Chair: Koichi Yamanaka
B2-0-14–B2-0-18

#### Free Papers: Miscellaneous
Chair: Takayuki Muraki
V2-0-14–V2-0-19

#### Free Papers: Rotator Cuff Tear 1
Chair: Hiromichi Hishida
V2-0-20–V2-0-27

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### English

#### Itukushima Seminar 3
Gilles Walsh
Chair: Hiroshi Omae
R2-13

#### Itukushima Seminar 4
Mark A. Frankle, Chih-Hwa Chen
Chair: Yuutaka Morisawa
G2-14-01–G2-14-02

#### Itukushima Seminar 5
Jin-Young Park, Shyri, Chen
Chair: Yusuke Ishihara

#### Itukushima Seminar 6
Terumitsu Minato, Toru Morihara
Chair: Bijiri, Ito
V2-16

#### JPSB Seminar
Takayuki Muraki, Hiroshi Omae
Chair: Kazutoshi Hamada
G2-17-01–G2-17-03

#### Japanese Traveling Fellow Lecture
Tatsuki Sugaya
R2-15

#### Japanese Traveling Fellow Lecture
Kojiro Nishimata
R2-16

#### Japanese Traveling Fellow Lecture
Takumi Takase, Hiroshi Omae
R2-17

#### Japanese Traveling Fellow Lecture
Yutaka Morisawa
R2-18

#### Japanese Traveling Fellow Lecture
Yuutaka Morisawa
R2-19

#### Japanese Traveling Fellow Lecture
Yuutaka Morisawa
R2-20

#### Japanese Traveling Fellow Lecture
Yuutaka Morisawa
R2-21

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### Zingiri

#### Rinko Koshima Seminar 6
Hirotaka Sano, Shiro Tabata
Chair: Teruhiko Nakagawa
R2-16-11–R2-16-12

#### Itukushima Seminar 4
Mark A. Frankle, Chih-Hwa Chen
Chair: Yuutaka Morisawa
G2-14-01–G2-14-02

#### Itukushima Seminar 5
Jin-Young Park, Shyri, Chen
Chair: Yusuke Ishihara

#### Itukushima Seminar 6
Terumitsu Minato, Toru Morihara
Chair: Bijiri, Ito
V2-16

#### Poster Presentation
R2-22

#### Poster Presentation
R2-23

#### Poster Presentation
R2-24

#### Poster Presentation
R2-25

#### Poster Presentation
R2-26

#### Poster Presentation
R2-27

#### Poster Presentation
R2-28

#### Poster Presentation
R2-29

#### Poster Presentation
R2-30

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## The 43rd Annual Meeting of the Japan Shoulder Society

### Oct. 21, 2016

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<thead>
<tr>
<th>Time</th>
<th>Poster</th>
<th>Title</th>
<th>Chair</th>
<th>Room</th>
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</thead>
<tbody>
<tr>
<td>17:00</td>
<td>Poster: Rotator Cuff Tear</td>
<td>1 Chair: Takahiko Hirokoka</td>
<td>P1-001~P1-006</td>
<td>3F</td>
</tr>
<tr>
<td>17:15</td>
<td>Poster: Basic Research</td>
<td>Chair: Takahiro Hashimoto</td>
<td>P1-043~P1-047</td>
<td>3F</td>
</tr>
<tr>
<td>17:30</td>
<td>Poster: Pain</td>
<td>Chair: Kazunori Hamanami</td>
<td>P1-065~P1-070</td>
<td>3F</td>
</tr>
<tr>
<td>18:00</td>
<td>Poster: Motion Analysis</td>
<td>Chair: Yuichiro Miura</td>
<td>P1-101~P1-106</td>
<td>3F</td>
</tr>
<tr>
<td>18:15</td>
<td>Poster: Imaging</td>
<td>Chair: Yukio Mikami</td>
<td>P1-107~P1-112</td>
<td>3F</td>
</tr>
<tr>
<td>18:30</td>
<td>Poster: Rotator Cuff Tear</td>
<td>2 Chair: Makoto Enokida</td>
<td>P1-007~P1-012</td>
<td>3F</td>
</tr>
<tr>
<td>18:45</td>
<td>Poster: Shoulder Instability</td>
<td>1 Chair: Taizo Konishike</td>
<td>P1-048~P1-052</td>
<td>3F</td>
</tr>
<tr>
<td>19:00</td>
<td>Poster: Fracture, Dislocation</td>
<td>Chair: Satoshi Hosokawa</td>
<td>P1-076~P1-080</td>
<td>3F</td>
</tr>
<tr>
<td>19:15</td>
<td>Poster: Rotator Cuff Tear</td>
<td>1 Chair: Hayato Nakaji</td>
<td>P1-113~P1-118</td>
<td>3F</td>
</tr>
<tr>
<td>19:30</td>
<td>Poster: Sports Injury</td>
<td>1 Chair: Koichiro Tamura</td>
<td>P1-137~P1-142</td>
<td>3F</td>
</tr>
<tr>
<td>20:00</td>
<td>Poster: TSA/RSA</td>
<td>1 Chair: Atsushi Yamamoto</td>
<td>P1-033~P1-037</td>
<td>3F</td>
</tr>
<tr>
<td>20:15</td>
<td>Poster: Shoulder Instability</td>
<td>2 Chair: Hiroyuki Nakamizo</td>
<td>P1-053~P1-058</td>
<td>3F</td>
</tr>
<tr>
<td>20:30</td>
<td>Poster: Fracture 1</td>
<td>Chair: Yasunori Shimagawa</td>
<td>P1-081~P1-086</td>
<td>3F</td>
</tr>
<tr>
<td>20:45</td>
<td>Poster: Rotator Cuff Tear</td>
<td>2 Chair: Jun Kameda</td>
<td>P1-119~P1-124</td>
<td>3F</td>
</tr>
<tr>
<td>21:00</td>
<td>Poster: Sports Injury</td>
<td>2 Chair: Jun Sakata</td>
<td>P1-143~P1-148</td>
<td>3F</td>
</tr>
<tr>
<td>21:15</td>
<td>Poster: TSA/RSA</td>
<td>Chair: Shigeto Yamazaki</td>
<td>P1-055~P1-159</td>
<td>3F</td>
</tr>
<tr>
<td>21:30</td>
<td>Poster: Miscellaneous</td>
<td>Chair: Soichiro Yamamoto</td>
<td>P1-071~P1-075</td>
<td>3F</td>
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</tbody>
</table>

### Oct. 22, 2016

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<tr>
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<th>Title</th>
<th>Chair</th>
<th>Room</th>
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<tbody>
<tr>
<td>12:10</td>
<td>Poster: Sports Injury</td>
<td>1 Chair: Koji Midorikawa</td>
<td>P2-023~P2-027</td>
<td>3F</td>
</tr>
<tr>
<td>12:25</td>
<td>Poster: TSA/RSA</td>
<td>2 Chair: Noboru Matsumura</td>
<td>P2-038~P2-042</td>
<td>3F</td>
</tr>
<tr>
<td>12:40</td>
<td>Poster: Throwing</td>
<td>Injury of Shoulder Chair: Daigo Urata</td>
<td>P2-149~P2-154</td>
<td>3F</td>
</tr>
<tr>
<td>13:00</td>
<td>Poster: Nursing</td>
<td>Chair: Eri Mishima</td>
<td>P2-160~P2-165</td>
<td>3F</td>
</tr>
<tr>
<td>13:15</td>
<td>Poster: Rotator Cuff Tear</td>
<td>3 Chair: Takashi Suzuki</td>
<td>P2-013~P2-017</td>
<td>3F</td>
</tr>
<tr>
<td>13:30</td>
<td>Poster: Sports Injury</td>
<td>2 Chair: Toshiaki Hirose</td>
<td>P2-028~P2-032</td>
<td>3F</td>
</tr>
<tr>
<td>13:45</td>
<td>Poster: Rotator Cuff Tear</td>
<td>3 Chair: Takashi Tsutsumi</td>
<td>P2-125~P2-130</td>
<td>3F</td>
</tr>
<tr>
<td>14:00</td>
<td>Poster: Assessment</td>
<td>Chair: Hiromi Yazawa</td>
<td>P2-171~P2-176</td>
<td>3F</td>
</tr>
<tr>
<td>14:15</td>
<td>Poster: Rotator Cuff Tear</td>
<td>4 Chair: Kenshi Kikukawa</td>
<td>P2-018~P2-022</td>
<td>3F</td>
</tr>
<tr>
<td>14:30</td>
<td>Poster: Fracture 2</td>
<td>Chair: Yoichi Ito</td>
<td>P2-087~P2-091</td>
<td>3F</td>
</tr>
<tr>
<td>14:45</td>
<td>Poster: Rotator Cuff Tear</td>
<td>4 Chair: Jun-ichi Kawakami</td>
<td>P2-131~P2-136</td>
<td>3F</td>
</tr>
</tbody>
</table>

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**Poster Room** 1 3F  Seto (Poster No.001~063)  
**Poster Room** 2 3F  Aki (Poster No.065~091)  
**Poster Room** 3 4F  Matsu (Poster No.101~124)  
**Poster Room** 4 4F  Take (Poster No.125~148)  
**Poster Room** 5 4F  Ume (Poster No.149~176)
Information for Participants

Registration
Fill out an application form and submit it to the registration desk with registration fee. Please be sure to wear the name card at the conference venue.
Registration Desk Hours: Oct 20 (Thu) 15:00 ~ 18:00 (※)
    Oct 21 (Fri) 6:00 ~ 18:30
    Oct 22 (Sat) 6:00 ~ 16:00
Registration Desk Place: 1F Lobby, Rihga Royal Hotel Hiroshima
    ※ at PC Preview Center (3F Salon, Rihga Royal Hotel Hiroshima)

Registration Fee
   Registration fee is waived for foreign doctors.
   Please visit the registration desk for foreign doctors for your registration package.

Regulation for taking pictures and videos
Taking photos and videos of presentations and lectures are strictly prohibited.

Cloak Room
The cloak will be available at the 3F, Rihga Royal Hotel Hiroshima.

Light meal and Lunch
Coffee & cookies are served at 4F, Rihga Royal Hotel Hiroshima in the morning on Oct 21 & Oct 22.
Hiroshima Sweets "Momiji Manjyu" is served at "Momiji Seminar".
Lunch (Bento Box) is served at the following seminars and lectures:
   Rankokoushin Seminar 1, 3, and 6
   Itsukushima Seminar 2, 4, 5, and 6
   Educational Lecture 1 and 2
The number of Bento Box is limited. Priority is provided to the persons who paid for JOA credits.

Reception for all attendees
Date: Oct 21 (Fri) 19:30 ~ 21:00
Place: 4F Room 2 & 3, Rihga Royal Hotel Hiroshima
   Admission: Free (please wear the name card)

Poster Presentations
Date: Oct 21 (Fri) 17:00 ~ 19:00 / Oct 22 (Sat) 13:10 ~ 14:40
Place: 3F Room “Seto” and “Aki” / 4F Room “Matsu”, “Take”, and “Ume”,
Rihga Royal Hotel Hiroshima
Information for Participants

Exhibition
Date: Oct 21 (Fri) 7:00 ~ 19:30 / Oct 22 (Sat) 7:00 ~ 16:00
Place: 3F Lobby, Rihga Royal Hotel Hiroshima

Book shop
Date: Oct 21 (Fri) 7:00 ~ 19:30 / Oct 22 (Sat) 7:00 ~ 16:00
Place: 3F Lobby, Rihga Royal Hotel Hiroshima

Drink Service
Date: Oct 21 (Fri) 6:30 ~ 19:30 / Oct 22 (Sat) 6:30 ~ 16:00
Place: 4F Lobby, Rihga Royal Hotel Hiroshima
Information for Chairpersons and Speakers

Disclosure of Conflict of Interest

The presenting author is required to disclose applicable COI by displaying a COI disclosure slide at the beginning of presentation slides (the slide after the title of presentation). For poster presentation, please display COI disclosure in the lower right of the poster panel.

Information for Chairpersons

✓ Chairs for podium presentation

Chairs should take the next chairperson’s seat which is in the front row of the room, at least 10 minutes prior to the session.

✓ Chairs for poster presentation

Chairs should come to the poster chairs’ registration desk in Poster Room at least 10 minutes prior to the session.

We ask for your cooperation to ensure the session proceeds according to the prescribed time limit/schedule.

Information for Speakers

Podium Presentation

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<td>Symposium</td>
<td>Announced individually</td>
<td>English</td>
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<tr>
<td>Podium</td>
<td>Presentation 5 min, discussion 3 min</td>
<td>English</td>
<td>English or Japanese</td>
</tr>
<tr>
<td>Short talk</td>
<td>Presentation 3 min, discussion 1 min</td>
<td>English</td>
<td>English or Japanese</td>
</tr>
</tbody>
</table>
Information for Chairpersons and Speakers

✓ The yellow light will be turned on 1 minute before the end of the presentation, and the red light shows the end of the presentation. Keeping the time schedule is highly appreciated. The next speaker should take the next speaker's seat when the current speaker starts the presentation.
✓ PC presentation only.
✓ Please note that the language used in each session is different.
✓ Presentation data should be operated by speaker during the presentation.

Hardware and Software

✓ The available operation system and software of computers at the venue is: OS: Windows 7 / Windows 8
✓ Please bring your presentation data on your PC, USB flash memory or CD-ROM.
✓ Presentation data should be named like 'Presentation No.- Presenter'.
   Ex) R1-T4-3-Taro Yamada.ppt
✓ Recommended fonts: Arial, Arial Black, Century, Century Gothic, Times New Roman
✓ The video projector has a resolution of 1024 × 768 (XGA).
✓ Apple Macintosh users should use their own Macintosh computer.
✓ If your presentation data includes moving images (available software: Windows Media Player), please bring your own computer with an AC power cable.

PC Preview Center

Date: Oct 20 (Thu) 15:00 ~ 20:00
Oct 21 (Fri) 6:00 ~ 19:00
Oct 22 (Sat) 6:00 ~ 15:00
Place: 3F PC Preview Center, Rihga Royal Hotel Hiroshima
✓ Please check your data at the PC Preview Center 30 minutes prior to your presentation. If you bring your own computer, please bring the computer to your presentation room by yourself after checking your data at the PC Preview Center. The computer will be returned right after your presentation.
✓ For smooth processing, please be sure to visit the PC Preview Center.
Information for Chairpersons and Speakers

Information for Poster Presentations

Preparation

✓ Posters should be written in English.
✓ Oral presentations can be either in English or Japanese.
✓ The size of poster panel: 90cm (width) \times 180cm (height). The text should be in 160cm. Please prepare presentation title including author(s), and affiliations (70cm \times 20cm), and text yourself.
✓ Poster number and thumbtack will be prepared by the secretariat.

Poster set up and removal hours

Set Up Oct 21 (Fri) 7:00 ~ 12:00
Poster Session 1 Oct 21 (Fri) 17:00 ~ 19:00
Poster Session 2 Oct 22 (Sat) 13:10 ~ 14:40
Removal Oct 22 (Sat) 14:40 ~ 17:00

Poster Presentation

✓ All poster presenters are required to talk in front of each poster (Presentation 3 minutes, Q&A 2 minutes) in the poster session.
✓ Please be in front of your poster no later than 10 minutes prior to your presentation.
Program
Room 1

Opening Remarks 6:50 - 7:00

Itsukushima Seminar 1 7:00 - 8:00
Chairs: Eiji Itoi, Hiromichi Omae

R1-I1 Arthroscopic Approach for Irreparable Rotator Cuff Tear
- Orthopaedic Surgery Seoul National University: Joo Han Oh
- Department of Orthopaedic Surgery Singapore General Hospital: Denny TT Lie
- Centre Orthopédique Santy: Gilles Walch
- Florida Orthopaedic Institute: Mark A. Frankle
- Orthopaedic Sports Medicine Huashan Hospital: Shiyi Chen
- Orthopaedic Surgery Taipei Medical University Hospital: Chih-Hwa Chen

President Lecture 8:00 - 8:30
Chairs: Hiroyuki Sugaya

R1-PA-J Tissue Regeneration in the Field of Shoulder Surgery
Department of Orthopaedic Surgery, Hiroshima Prefectural Hospital: Yu MOCHIZUKI

R1-PA-K Fixation Methods for Full Thickness Rotator Cuff Tear Revisited
Department of Orthopaedic Surgery Pusan National University Hospital: Sang-Jin Cheon

Topics 1 8:30 - 9:40
Chairs: Sang-Jin Cheon, Junji Ide

R1-T1-1 LHB anchoring procedure for rotator cuff tears with subscapularis tendon tears
Shoulder Medical Center, Azumi Hospital: Yukihiro HATA

R1-T1-2 Partial Transfer of Subscapularis for Irreparable Massive Rotator Cuff Tear
Upper Extremity Center of Joint Replacement and Endoscopic Surgery, Hokushin Hospital: Naomi OIZUMI

R1-T1-3 The Result of Allogeneic Dermal Matrix Augmentation of Arthroscopic Repair for Large to Massive Rotator Cuff Tear: Preliminary Report
Nalgae Hospital, Seoul, Korea: Tae-Yon Rhie

R1-T1-4 Challenge of biological healing for massive rotator cuff tears
Department of Orthopaedics, Graduate School of Medicine, Hiroshima University: Shin YOKOYA

R1-T1-5 Change of MRI findings after arthroscopic rotator cuff repair with fascia lata graft augmentation
Department of Orthopaedic Surgery, Kobe University Graduate School of Medicine: Takeshi KOKUBU
R1-T1-6  Arthroscopic superior capsule reconstruction eliminates pseudoparalysis in patients with irreparable rotator cuff tears
Department of Orthopedic Surgery, Osaka Medical College  Teruhisa MIHATA

Free Papers : Rotator Cuff Tear 1  9:40 - 10:20
Chair : Kazuomi Sugamoto

R1-O-01  Risk Factors for CRPS Type 1 after Arthroscopic Rotator Cuff Repair
Department of Orthopaedic Surgery, Ouryouiji Orthopaedic Hospital  Takeshi TERATANI

R1-O-02  Prevalence of concomitant neuropathy in large to massive rotator cuff tear using needle electromyography.
Department od Orthopedic Surgery,
Chiba University after Graduate School of Medicine  Nobuyasu OCHIAI

R1-O-03  Factor affecting postoperative retear size in patients with large/massive tears who underwent arthroscopic rotator cuff repair
Department of Orthopaedics, Kurume University  Hisao SHIMOKOBE

R1-O-04  Long term structural integrity of the well repaired rotator cuff :
Mean 8-year follow up study
Department of Orthopaedic Surgery,
Osaka City University Graduate School of Medicine  Koichi ICHIKAWA

R1-O-05  Effect of rotator cuff repair tension on the cuff integrity after arthroscopic rotator cuff repair
Department of Orthopaedic Surgery, Tokushima Red Cross Hospital  Yoshitsugu TAKEDA

Free Papers : Rotator Cuff Tear 2  10:20 - 11:08
Chair : Yukihiko Hata

R1-O-06  Repair integrity and functional outcome after arthroscopic 3 rotator cuff tendons repair- indication and limitation of primary repair-
Funabashi Orthopaedic Sports Medicine and Joint Center  Kazuhiro SHIBAYAMA

R1-O-07  The outcome of ARCR for large and massive rotator cuff tear
Repair design along anatomy
Department of Orthopaedics surgery , Anshin Hospital, Kobe  Naoki YAMAGAMI

R1-O-08  The outcome of arthroscopic repair and difference between grade 1 and 2 in Hamada classification for massive rotator cuff tears
Department of Orthopaedics, Yoshioka Hospital  Nariyuki MURA

R1-O-09  Clinical results after endoscopic modified Debeyre-Patte procedure for irreparable massive rotator cuff tears
Department of Orthopaedics, Graduate School of Medical Science.
Kyoto Prefectural University of Medicine  Ryuhei FURUKAWA
R1-O-10 Short term clinical results of latissimus dorsi and teres major anterior transfer to reconstruct irreparable subscapularis tendon
The Upper Extremity Center of Joint Replacement and Endoscopic Surgery. Hokushin Higashi Orthopaedic Hospital Shintaro YAMANE

R1-O-11 Hemiarthroplasty for the re- tear of the rotator cuff
Hemiarthroplasty for the re-tear of the rotator cuff Chika YOSHIOKA

Free Papers : Rotator Cuff Tear 3 11:00 - 11:48
Chair : Takeshi Kokubu

R1-O-12 Clinical results of arthroscopic massive rotator cuff repair with superior capsule reconstruction using long head of the biceps tendon
Department of Orthopaedic Surgery, Yamatotakada City Hospital Ryohei NIKAIDO

R1-O-13 Results and indication of semitendinosus tendon and gracilis tendon graft for massive rotator cuff tear.
Department of Orthopaedics, Nagano Municipal Hospital Satoshi MATSUDA

R1-O-14 Arthroscopic patch graft procedure for irreparable massive rotator cuff tears using Teflon felt: clinical and radiological characteristics.
Shoulder & Elbow Service, Funabashi Orthopaedic Sports Medicine & Joint Center Tomoyuki MATSUDA

R1-O-15 Postoperative results of superior capsular reconstruction for unrepairable rotator cuff tears
Department of Orthopaedic Surgery, KKR Hokuriku Hospital Takashi KOBAYASHI

R1-O-16 Increase in Shoulder Muscle Strength after Arthroscopic Superior Capsule Reconstruction: Comparison with Arthroscopic Rotator Cuff Repair
Department of Rehabilitation, First Towakai Hospital Atsushi TAKEDA

Rankokoushin Seminar 1 12:00 - 13:00
Chair : Nagao Adachi

R1-R1-01 The Origin of the Idea (*)
Matsudo Orthopaedic Hospital Motohiko MIKASA

R1-R1-02 Rotator Cuff Tear and I (*)
Nobuhara Hospital and Institute of Biomechanics Katsuya NOBUHARA

General Assembly Meeting 13:00 - 13:30

※ The title was translated by editor.
Topics 4

13:40 - 14:50

Chairs: Koh Maruyama, Masao Eto

R1-T4-1 Usefulness of Shoulder 36 for the early postoperative period of the rotator cuff repair
Shoulder Medical Center, North Alps Medical Center Azumi Hospital Norio ISHIGAKI

R1-T4-2 Relationship between Shoulder 36 and Simple Shoulder Test in patients with rotator cuff tear
Department of Rehabilitation, Saiseikai Yahata General Hospital Junichi KAWAKAMI

R1-T4-3 Postoperative evaluation of the rotator cuff repair using the Japanese Orthopaedic Association Shoulder 36 Ver. 1.3 and JOA score
Department of Orthopaedic Surgery, Hiroshima-Nishi Medical Center Yoshihiko NAGATA

R1-T4-4 Outcome of arthroscopic surgery for patients with rotator cuff tear using the JOA score and shoulder 36
Department of Orthopaedic Surgery, Saiseikai Nagasaki Hospital Shinichi NAKAHARA

R1-T4-5 The usefulness of functional outcome measures for patients with shoulder arthroscopic surgery
Department of Orthopaedic Surgery, National Defense Medical College Masatoshi AMAKO

R1-T4-6 Ability to reapear results of the shoulder 36 for traumatic shoulder instability.
Evaluation Committee for the Shoulder in Japan Shoulder Society Toshitake AIZAWA

Free Papers: Rotator Cuff Tear 4

14:50 - 15:22

Chair: Yozo Shibata

R1-O-17 High Occurrence of Clinical Feature of Capsulitis on the Symptom of Rotator Cuff Tear
Dept. of Orthop. Surg., St. Luke's International Hospital, Tokyo Atsushi TASAKI

R1-O-18 The characteristics of associated lesions with rotator cuff tears in patients over 70 years old
Department of Orthopaedic Surgery, Nippon Medical School Chiba Hokusoh Hospital Atsushi OKUBO

R1-O-19 Preoperative impact of neuropathic pain in patients with ARC
Dept. of Orthop. Surg.,AGEO General Central Hospital Kazuyuki WATANABE

R1-O-20 Are anatomical severities poor prognostic factors for conservative treatment of atraumatic rotator cuff tears?
Department of Orthopedic Surgery, Tohoku University School of Medicine Takuya SEKIGUCHI
<table>
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<tr>
<th>Free Papers : Rotator Cuff Tear 5</th>
<th>15:22 - 15:54</th>
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<tr>
<td>Chair : Kenji Hayashida</td>
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R1-O-21  Preoperative factors affecting accelerated functional recovery after arthroscopic rotator cuff repair  
Department of Rehabilitation, Keishinkai  Keita HAGIE

R1-O-22  The risk factor of post arthroscopic rotator cuff repair for the anterior elevation angle at postoperative six months  
Akashi Orthopaedic Sports Medicine, Joint Surgery Center, Okubo Hospital  Masaki YAMAMOTO

R1-O-23  Factor Affecting Clinical Outcome in Patients With Structural Failure After Arthroscopic Rotator Cuff Repair  
Department of Orthopaedics, Kurume University  Hidehiro NAKAMURA

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<th>Free Papers : Rotator Cuff Tear 6</th>
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<td>Chair : Teruhiko Nakagawa</td>
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R1-O-26  Clinical outcomes and image evaluation of partial repair and retar cases after arthroscopic rotator cuff repair  
Department of Orthopaedic Surgery Graduate School of Medical and Dental Sciences, Kagoshima University  Hironori KAKOI

R1-O-27  Relation of shoulder function and image findings after rotator cuff repair  
Shoulder Medical Center, Azumi Hospital  Norio ISHIGAKI

R1-O-28  Diachronic change of the length of tendon repaired after rotator cuff surgery  
Department of Orthopaedics, Osaka Police Hospital  Hiroto HANAI

R1-O-29  Change of intramuscular tendon angle of supraspinatus in rotator cuff tear  
Matsue City Hospital  Taiki MURAKAMI

R1-O-30  Comparison of subacromial morphology of patient with and without rotator cuff tear by using 3D CT  
Department of Orthopaedic Surgery and Arthroscopy Center, Mitsubishi Nagoya Hospital  Motoshige NAKASHIMA

R1-O-31  Effusion change around HEALICOIL RG after arthroscopic rotator cuff repair  
Department of Orthopaedics, Saitama Medical University  Katsunobu SAKAGUCHI
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<tr>
<th>Session</th>
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<tr>
<td>R1-ST-01</td>
<td>Usefulness of preoperative planning for reverse shoulder arthroplasty in Japanese patients: A cadaveric study</td>
<td>Department of Orthopaedic Surgery, NHO Kochi National Hospital Shoji FUKUTA</td>
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<tr>
<td>R1-ST-02</td>
<td>Evaluation of glenoid screw insertion in reverse total shoulder arthroplasty</td>
<td>Department of Orthopaedic Surgery, Kobe University Graduate School of Medicine Takeshi KOKUBU</td>
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<tr>
<td>R1-ST-03</td>
<td>Pitfall for glenoid bone loss and deformity in reverse shoulder arthroplasty</td>
<td>Ito Clinic, Osaka Shoulder Center Yoichi ITO</td>
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<tr>
<td>R1-ST-04</td>
<td>The evaluation of reverse TSA result by glenoid model made with 3DCT</td>
<td>Orthopedic Surgery Restorative Medicine of Neuro-Musculoskeletal System Fujita Health University School of Medicine Mitsuko YAMADA</td>
</tr>
<tr>
<td>R1-ST-05</td>
<td>Measurement of D-dimer in reverse shoulder arthroplasty</td>
<td>Department of Orthopaedic Surgery, Kanazawa Medical University Shusuke UEDA</td>
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<tr>
<td>R1-ST-06</td>
<td>The clinical value of reverse shoulder arthroplasty with intraoperative O-arm Navigation</td>
<td>Department of Orthopaedic Surgery, Seirei Sakura Citizen Hospital Yu SASAKI</td>
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<tr>
<td>R1-ST-07</td>
<td>The experience of bony increased offset reverse shoulder arthroplasty with superolateral approach</td>
<td>Department of Orthopaedics, Soseikai General Hospital Hirokazu NAGAI</td>
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<tr>
<td>R1-ST-08</td>
<td>Short term results of reverse shoulder arthroplasty</td>
<td>Department of Orthopaedic Surgery, SEIKEI-KAI CHIBA MEDICAL CENTER Hironori YAMAZAKI</td>
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<tr>
<td>R1-ST-09</td>
<td>Clinical results of the cases treated by reverse shoulder arthroplasty</td>
<td>Department of Orthopaedics, Kurate Hospital Takashi HASHIMOTO</td>
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<tr>
<td>R1-ST-10</td>
<td>Reverse shoulder arthroplasty for the patients with acromial pathologies; two case reports.</td>
<td>Department of Orthopaedic Surgery, Gunma University Graduate School of Medicine Shintaro TOKUNAGA</td>
</tr>
<tr>
<td>R1-ST-11</td>
<td>Short term clinical outcome of reverse total shoulder arthroplasty for rheumatoid arthritis</td>
<td>Department of Orthopaedic Surgery, Tokyo Women’s Medical University, Medical Center East Katsuaki KANBE</td>
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R1-ST-12  Treatment of shoulder recurrent dislocations associated with massive rotator cuff tear using reverse total shoulder arthroplasty
  Department of Orthopaedic Surgery, Hyogo College of Medicine  Yohei TAKAGI

R1-ST-13  Reversed shoulder arthroplasty with modified L'Episcopo for combined loss of active elevation and external rotation
  Shoulder & Elbow Service, Funabashi Orthopaedic Sports Medicine & Joint Center  Hiroshige HAMADA

R1-ST-14  Clinical and radiographic results of Bony Increased-Offset Reverse Shoulder Arthroplasty at short term follow-up
  Department of Orthopaedics, Kyoto Shimogamo hospital  Naoki UMATANI

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<th>Short Talk : Rotator Cuff Tear 1</th>
<th>18:00 - 18:35</th>
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<tr>
<td>R1-ST-15  Early clinical results of arthroscopic anatomical Suture-Bridge Repair for large sizeComplete Rotator Cuff Tear</td>
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<td>Department of Orthopaedics, Japanese Red Cross Musashino Hospital  Hideaki ASAI</td>
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R1-ST-16  Clinical results and re-tear patterns of arthroscopic knotless suture bridge technique
  Department of orthopaedics, Morooka Orthopedics Hospital & Clinic  Takehiro KIMURA

R1-ST-17  Is the arthroscopic modified tension band suture technique suitable for all full-thickness rotator cuff tears?
  Department of Orthopaedic surgery, Wonkwang University Of Medicine & Hospital, Republic of Korea  Se Jin Kim

R1-ST-18  Functional and Structural Outcome of Arthroscopic Suture Bridge Repair for Rotator Cuff Tear
  Department of Orthopedic Surgery, Osaka Medical College  Akihiko HASEGAWA

R1-ST-19  Functional and structural outcomes of suture bridge technique compared with transosseous technique in arthroscopic rotator cuff repair
  Department of Orthopaedic Surgery, Osaka City University Graduate School of Medicine  Tomoya MANAKA

R1-ST-20  Postoperative configuration change of Bone Trough and Bone Tunnel after Arthroscopic Transosseous with Bone Trough Repair
  Department of Orthopaedic Surgery, Hiroshima-Nishi Medical Center  Yoshihiko NAGATA

R1-ST-21  Clinical outcome of arthroscopic transosseous suture (ATOS) for rotator cuff tear
  Matsudo Orthopaedic Hospital  Ryo MURATA
R1-ST-22  Arthroscopic transosseous rotator cuff repair using ULTRATAPE.
        -A report of 12 cases-
        Department of Sports Medicine and Orthopedic Surgery,
        Tohoku Rosai Hospital  Shuichi MORIYA

R1-ST-23  Effectiveness of partial arthroscopic rotator cuff repair
        for anatomically irreparable massive rotator cuff tear.
        Department of Sports Medicine,
        Fukushima Medical University School of Medicine  Takahiro KAGA

R1-ST-24  Successful outcome of arthroscopic single-row repair
        with appropriate procedure for large or massive rotator cuff tears.
        Department of Orthopaedics, Saiseikai Yahata General Hospital  Koumei MATSUURA

R1-ST-25  Is the arthroscopic suture bridge suture technique suitable for full thickness
        rotator cuff tears of any size? A comparison of clinical and
        anatomical outcomes with modified tension band suture technique
        Department of Orthopaedic surgery, Wonkwang University Of Medicine &
        Hospital, Republic of Korea  Sung Hyun Lee

R1-ST-26  Arthroscopic Rotator Cuff Repair Combined
        with Debeyre-Patte Procedure for Massive Rotator Cuff Tear
        Fukuchiyama City Hospital  Kentaro SASAKI

R1-ST-27  Clinical outcome of arthroscopic assisted pectoralis minor tendon transfer
        in irreparable anterosuperior rotator cuff tear.
        Department of Orthopaedics, Fukui General Hospital  Kotaro YAMAKADO

R1-ST-28  Results of Latissimus Dorsi and Teres Major Transfer
        for Irreparable Rotator Cuff Tears
        Department of Orthopaedic Surgery, University of the Ryukyus School of Medicine  Isoya GOYA
Room 2

Free Papers: Frozen Shoulder 7:00 - 7:56
Chair: Jun Kumagai

G1-O-01 Proteome analysis for frozen shoulder
Department of Orthopaedic Surgery,
Tohoku University School of Medicine  Yoshihiro HAGIWARA

G1-O-02 The hyper-intense inferior glenohumeral ligament reflects a period of time from the onset of frozen shoulder
Department of Orthopaedics, Juntendo University  Yoshinori GONDA

G1-O-03 Mid-term outcomes of prospective clinical trial of transcatheter arterial micro embolization (TAME) for resistant frozen shoulder
Department of Orthopedic Surgery, Edogawa Hospital  Yuji OKUNO

G1-O-04 Short-term clinical results of frozen shoulder treated with shoulder manipulation under ultrasound-guided cervical nerve root block: A case series
Fukuoka Mirai Hospital  Tomohiro SAITO

G1-O-05 Clinical Outcomes of Manipulation for Frozen Shoulder with Diabetes Mellitus
Department of Orthopaedic Surgery, Graduate School of Biomedical &
Health Sciences, Hiroshima University, Hiroshima, Japan  Katsunori SHIRAISHI

G1-O-06 Effectiveness of manipulation under ultrasound-guided brachial plexus block in patients with frozen shoulder: comparison between non-diabetic and diabetic patients
Department of Orthopaedic Surgery, Matsuda Hospital  Akira ANDO

G1-O-07 Clinical results of arthroscopic capsular release for the shoulder stiffness due to the presence or absence of diabetes mellitus.
Department of Orthopaedic Surgery, Fukuoka University Chikushin Hospital  Makoto SAKURAI

Free Papers: Assessment 8:30 - 8:54
Chair: Shinji Imai

G1-O-08 Influencing factors for shoulder pain on survivors of the Great East Japan Earthquake: a cross sectional study
Department of Orthopaedic Surgery,
Tohoku University School of Medicine  Yoshihiro HAGIWARA

G1-O-09 Shoulder evaluation after rotator cuff repair using self-assessment scoring tool, Shoulder 36
Department of Orthopaedics, Fukushima Rosai Hospital  Atsuko KANNO

G1-O-10 Treatment results of the rotator cuff tears using Shoulder 36 ver.1.3.
Department of Orthopaedic Surgery,
Chushin-mastumoto General Hospital  Kobayashi HIROKAZU
Rankokoushin Seminar 2  9:00 - 10:00
Chair : Nobuyoshi Okuhira

G1-R2-03  Classification and Treatment Strategy of Proximal Humeral Fractures (*)
           Dokkyo Medical University  Kazuya TAMAI

G1-R2-04  Scapula Fracture - Basic Knowledge and Treatment of Principle - (*)
           Eiju general hospital  Kiyohisa OGAWA

Topics 3  10:00 - 11:10
Chair : Toshitake Aizawa

G1-T3-1  Relation between proximal humerus cortical bone thickness and osteoporosis
          Department of Orthopaedics, Chugoku Rosai Hospital  Toshiya KANO

G1-T3-2  Mechanical evaluation of medial support screws for proximal humeral fractures
          Orthopedic Surgery Restorative Medicine of Neuro-Muscloskeletal System
          Fujita Health University School of Medicine  Mitsuko YAMADA

G1-T3-3  Interlocking nailing with transmedullary support screw for the treatment of
          displaced proximal humeral fracture
          Department of Orthopedics, Keio University School of Medicine  Noboru MATSUMURA

G1-T3-4  Operative pitfall of Proximal Humerus Fracture
          Department of Orthopaedics, Kaisei General Hospital  Tadashi KATAYAMA

G1-T3-5  Suture fixation versus cable cerclage of the tuberosities
          in shoulder hemi-arthroplasty
          Department of Orthopaedics, Surgical Science,
          Tokai University School of Medicine  Yoshiyasu UCHIYAMA

G1-T3-6  Short Clinical Outcomes of Reverse Shoulder Arthroplasty for
          the Treatment of Complex Proximal Humeral Fractures in Elderly Patients
          Department of Orthopaedics, Jichi Medical University  Hideyuki SASANUMA

Free Papers : Imaging 1  11:10 - 11:50
Chair : Mitsuko Yamada

G1-O-11  Evaluation by the classification of subscapularis tendon tears
          using radial-sequence MRI
          Department of Orthopaedics, Hiroshima University
          Graduate School of Medicine  Ryosuke MATSUSHITA

G1-O-12  Evaluation of Variety and Delamination of Infraspinatus
          Tendon Using Radial-sequence Magnetic Resonance Imaging
          Department of Orthopaedics, Hiroshima University Graduate School of Medicine  Hiroshi NEGI

(※ : The title was translated by editor.)
G1-O-13  Development of three-dimensional rotator cuff tear magnetic resonance imaging system ~ preliminary report ~  Department of Orthopaedic Surgery, Nobuhara Hospital and Institute of Biomechanics  Tomoyuki MUTO

G1-O-14  Quantitative evaluation of muscle volume of the Supraspinatus using 3D MRI - before and after surgery -  Department of Orthopaedic Surgery, Gunma University Graduate School of Medicine  Tsuyoshi SASAKI

G1-O-15  Quantitative analysis of the rotator cuff muscles using three-dimensional magnetic resonance imaging  Department of Orthoped Surgery, Keio University School of Medicine  Noboru MATSUMURA

Rankokoushin Seminar 3  12:00 - 13:00  Chair: Keizo Morisawa

G1-R3-05  Actual and Problems of Arthroscopic Coracoclavicular Ligament Reconstruction for Acromioclavicular Joint Dislocation (※)  Tokyo Medical University  Katsumi TAKASE

G1-R3-06  Function and Failure of the Acromioclavicular Joint (※)  Ito Orthopaedic Hospital  Kimitaka FUKUDA

Free Papers: Imaging 2  13:35 - 14:07  Chair: Hiroyuki Hashizume

G1-O-16  Relationship between Fatty Infiltration of Rotator Cuff Muscles and Postoperative Outcome of Large to Massive Tear Using MRI IDEAL Technique  Department of Orthopaedic Surgery, Chiba University after Graduate School of Medicine  Koji AKIMOTO

G1-O-17  The relationship between quantitative evaluation of fatty infiltration and muscle atrophy in supraspinatus muscle using MRI-Dixon method  Division of Radiology and Nuclear Medicine, Sapporo Medical University Hospital  Rui IMAMURA

G1-O-18  Characteristic appearance of dynamic contrast-enhanced MRI for symptomatic rotator cuff tear  Department of orthopaedics, Jichi Medical University Hospital  Yuji KANAYA

G1-O-19  MR imaging evaluation of suprascapular nerve entrapment caused by a paralabral cyst of the shoulder  Department of Orthopaedic Surgery, Fukuoka University, Faculty of Medicine  Teruaki IZAKI

(※ : The title was translated by editor.)

The 43rd Annual Meeting of the Japan Shoulder Society  The 13th Annual Meeting of the Shoulder Function Study Group
G1-O-20  Quantified Mechanical Properties of the Deltoid Muscle Using the Shear Wave Elastography: Potential Implications for Reverse Shoulder Arthroplasty
Department of Orthopaedic Surgery, Tohoku University School of Medicine  Taku HATTAG1-O-21  Shear Wave Velocity Measurement of Upper Trapezius Muscle by Color Doppler Shear Wave Imaging.
Department of Orthopaedic Surgery, Graduate School of Medicine, Gunma University  Atsushi YAMAMOTOG1-O-22  The morphological examination of cervical nerve root in rotator cuff tear, frozen shoulder, and recurrent anterior shoulder dislocation using ultrasound
Department of Orthopaedic Surgery, Aichi Medical University  Yukihiro KAJITAG1-O-23  Ultrasonographic evaluation in thoracic outlet syndrome: A preliminary report
Department of Orthopaedics, Kurume University Medical center  Hirokazu HONDA

Free Papers : Imaging 4  14:47 - 15:27

G1-O-25  The results of the air-contrast CT arthrography for the patients of the recurrent dislocation of the shoulder
Department of Orthopaedics, Nagoya University Graduate School of Medicine  Hideki HIRAIWA

G1-O-26  Three-dimensional quantitative analysis of humeral head and glenoid bone defects with recurrent glenohumeral instability
Department of Orthopedic Surgery, Keio University School of Medicine  Noboru MATSUMURA

G1-O-27  Reliability of the amount of the glenoid bony defect in patients with anterior shoulder instability
Department of Orthopaedics, Yamagata City Hospital SAISEIKAN  Kazuho AIZAWA

G1-O-28  Acromiohumeral interval: A comparative study of differences between the type of rotator cuff tears using tomosynthesis
Department of Orthopedics, Sapporo Medical University School of Medicine  Takayuki DOHKE

G1-O-29  Evaluations of the muscle strength and the cross sectional area in rotator cuff tears
Department of Othopaedic Surgery, Nakadori General Hospital  Yuji HATAKEYAMA
Free Papers: Acromioclavicular Joint Dislocation 1 15:27 - 16:07
Chair: Yusuke Iwahori

G1-O-30 Clinical Outcome After Arthroscopic Single Bundle Reconstruction for Acute Acromioclavicular Joint Separations
Shoulder & Elbow Service, Funabashi Orthopaedic Sports Medicine & Joint Center Yasutaka TAKEUCHI

G1-O-31 Clinical Results of Arthroscopic assisted Reconstruction for Acromio-clavicular joint Dislocation
SUMIYA Orthopaedic Hospital Yasuhiro NAKANE

G1-O-32 Long term clinical and radiographic outcomes of coracoclavicular ligament reconstruction using synthetic ligament for acute acromioclavicular joint dislocation
Department of Orthopaedics, Kyoto Shimogamo Hospital Daisuke MORI

G1-O-33 Arthroscopic procedures of anatomical reconstruction of coracoclavicular ligaments for acromioclavicular joint dislocations
- Comparison to modified Cadenat procedure -
Department of Orthopedic Surgery, Tokyo Medical University Katsumi TAKASE

G1-O-34 Arthroscopically assisted anatomic CC ligament reconstruction for acute AC dislocation using three cortical fixation buttons
Ewha Womans University Mokdong Hospital, Seoul, Republic of Korea Sang-Jin Shin

Free Papers: Acromioclavicular Joint Dislocation 2 16:07 - 16:47
Chair: Shin Yokoya

G1-O-35 Our minimum invasive surgery for acromio-clavicular dislocation-What should be repaired
Okayama Red Cross Hospital Taizo KONISHIIKE

G1-O-36 Clinical Results after Modified Phemister Procedure using Suture Anchor for Acute Acromioclavicular Joint Dislocation
Department of Orthopaedic Surgery, Isehara Kyodo Hospital Hiroko OMI

G1-O-37 Status of reduction and enlargement of bone tunnels after arthroscopic coracoclavicular ligament reconstruction in shoulders with acute acromioclavicular joint dislocation
Toyonaka Municipal Hospital Orthopedic Surgery Ritsuro OZAKI

G1-O-38 Arthroscopic Coracoclavicular Fixation Technique Using a Suture Knot: Biomechanical Analysis and Clinical Results
Department of Orthopedic Surgery, Hallym University Dongtan Sacred Heart Hospital, Medical College of Hallym University, Dongtan, Korea Yon-Sik Yoo
G1-O-39  Chronic acromioclavicular dislocation leads to internal impingement
Department of Orthopedic Surgery,
Hallym University Dongtan Sacred Heart Hospital,
Medical College of Hallym University, Dongtan, Korea  Yon-Sik Yoo

G1-ST-01  A case with fungal infection of shoulder becoming obvious after
arthroscopic rotator cuff repair
Department of Orthopaedic surgery, Faculty of Medicine,
University of Miyazaki  Takuji YOKOE

G1-ST-02  Severe pyogenic arthritis of sternoclavicular joint due to delayed diagnosis
and treatment; two case reports
Department of Orthopaedics, Saiseikai Gose Hospital  Shuzo MORITA

G1-ST-03  Pyogenic lesion of both shoulder girdle and lumbosacral par.: 3 cases report.
Department of Orthopaedics, Saiseikai Gose Hospital  Shuzo MORITA

G1-ST-04  Treatment for septic arthritis of the shoulder
Department of Orthopaedic Surgery, Kishiwada City Hospital  Koichi NAKAGAWA

G1-ST-05  Treatment of septic arthritis of the shoulder with arthroscopic debridement
Department of Orthopedics, Kin-ikyo Chuo Hospital  Naoto YAMAUCHI

G1-ST-06  A report of two cases : shoulder arthrodesis for paralysis shoulder
Sapporo City General Hospital  Kazuhiro UESUGI

G1-ST-07  Ultrasonographic evaluation of radial nerve palsy associated
with humeral shaft fracture: A case report
Department of Orthopaedic Surgery, Kobe Rosai Hospital  Issei NAGURA

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G1-ST-08  Acromio-clavicular joint dislocation occurred in coraco-clavicular joint:
a case report.
Department of Orthopaedics, Saiseikai Gose Hospital  Yoshihiro SAKAMOTO

G1-ST-09  Anatomic coracoclavicular ligament reconstruction with palmaris longus and
suspensory fixation device for chronic acromioclavicular joint dislocation :
a case report
Department of Orthopaedics Surgery, Nippon Kokan Fukuyama Hospital  Yusuke YOKOYAMA
G1-ST-10  Double-bundle reconstruction of coracoclavicular ligament for acromioclavicular joint separation
Department of Orthopaedic Surgery, Onomichi Municipal Hospital    Yoshimasa SAKOMA

G1-ST-11  Ultrasound guided removal of calcific deposits in calcific tendinitis of subscapularis: A case report
Department of Sports Medicine, Kameda Medical Center    Soichi HATTORI

G1-ST-12  Ultrasound therapy for calcific tendinitis of the shoulder: report of two cases
Department of Orthopaedics, Nishinomiya Municipal Central Hospital    Katsuhisa TANABE

G1-ST-13  A case of antegrade humeral intramedullary nailing required rotator cuff repair
Department of Orthopaedics, Fuji Orthopedic hospital    Takehiro KIJIMA

G1-ST-14  A case report of a frozen shoulder with contracture of deltoid muscle
Kumamoto Orthopaedics Hospital    Toshio KITAMURA

Short Talk : Tumor, et al.  18:00 - 18:30
Chair : Jun-ichiro Hamada

G1-ST-15  A case of pigmented villonodular synovitis in shoulder joint treated by arthroscopic surgery
Department of Orthopaedics., Wakayama Medical University    Takahide SASAKI

G1-ST-16  A rotator cuff tear with a lipoma in the spinoglenoid notch: A case report
Department of Orthopaedics, Nara Medical University    Yuki HIGASHI

G1-ST-17  Four cases of synovial proliferation on shoulder magnetic resonance imaging.
Department of Orthopaedics, Gifu University Graduate School of Medicine    Kenji KAWASHIMA

G1-ST-18  Arthroscopic treatment for synovial chondromatosis of the subscapular bursa; a case report
Orthopaedic Surgery of Suzuki Kaisei    Takeshi UEMURA

G1-ST-19  Arthroscopic decompression with ultrasound-guided injection of indigo carmine for paralabral cysts in the shoulder
Department of Orthopaedics, Graduate School of Medical Science,
Kyoto Prefectural University of Medicine    Yukichi KABUTO

G1-ST-20  Comparison of the Effect of Analgesics in Arthroscopic Transosseous Suture Repair of the Rotator Cuff -Second Report-
Matsudo Orthopaedic Hospital    Shuhei OGINO

G1-ST-21  Hemiplegia In Unaffected Side After Arthroscopic Rotator Cuff Repair : A Case Report
Department of Orthopaedics, Juntendo University School of Medicine    Takefumi KAKETA
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<td><strong>Free Papers : Shoulder Instability 1</strong> 7:00 - 7:56</td>
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| B1-O-01 | The proprioception of the shoulder joint for the patients with traumatic shoulder instability  
Department of Orthopaedic surgery, Minamitama Hospital  
Yoshifumi TSUDA |
| B1-O-02 | Correlations of coracohumeral ligament and range of motion restriction in patient with recurrent anterior glenohumeral instability by magnetic resonance arthrography  
Department of Orthopaedic Surgery, Iwate Prefectural Central Hospital  
Kenji KANAZAWA |
| B1-O-03 | Computed Tomography Evaluation of Osteophytes in Shoulders with Traumatic Anterior Instability  
Department of Orthopaedics, Yukioka Hospital  
Takehito HIROSE |
| B1-O-04 | Prediction of the glenoid track using the shoulder range of motion  
Dept. of Orthop. Surg., Tohoku Univ. Graduate School of Medicine  
Jun KAWAKAMI |
| B1-O-05 | The glenoid track width reduces with an increase of horizontal extension in live shoulders  
Dept. of Orthop. Surg., Tohoku Univ. Graduate School of Medicine  
Jun KAWAKAMI |
| B1-O-06 | Does "subcritical bone loss" really exist?  
Department of Orthopaedic Surgery,  
Tohoku University School of Medicine  
Nobuyuki YAMAMOTO |
| B1-O-07 | The critical bone loss of the glenoid that leads to recurrent glenohumeral instability after stabilization surgery  
Ewha Womans University Mokdong Hospital, Seoul, Republic of Korea  
Rag Gyu Kim |

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| B1-T2-1 | Analysis of failure cases after Arthroscopic Bankart Repair for Recurrent Anterior Glenohumeral Instability  
Shoulder and Elbow Service, Funabashi Orthopaedic Sports Medicine and Joint Center  
Kazutomo ONISHI |
| B1-T2-2 | Clinical outcome of the surgical treatment based on the glenoid track concept for patients with recurrent shoulder dislocation  
Department of Orthopaedic Surgery, Tohoku University School of Medicine  
Taku HATTA |
| B1-T2-3 | Clinical outcomes of open inferior capsular shift method with iliac bone graft for anterior shoulder instability with glenoid defect  
Department of Orthopaedic Surgery, Tokai University School of Medicine  
Takeshi IMAI |
B1-T2-4  Clinical Results of Arthroscopic Bankart Repair: Effectiveness of Artificial Bone Grafting for Glenoid Defect  
Department of Orhtopaedics, JCHO Hoshigaoka Medical Center  Shinichi YAMADA

B1-T2-5  Complications of Arthroscopic Bankart-Bristow procedure  
Department of Sports Medicine Asao General Hospital  Kazuhide SUZUKI

Free Papers : Shoulder Instability 2  
9:30 - 10:10  
Chair : Minoru Tanaka

B1-O-08  Osteogenesis and osteolysis of the grafted coracoid process after modified Bankart & Bristow procedure  
Department of Orthopaedic Surgery, Hitsujigaoka Hospital  Takeshi MAKIHARA

B1-O-09  Investigation of effect for muscle strength after Arthroscopic Bankart-Bristow procedure  
Department of Sports Medicine, Asao General Hospital  Suguru NAGAI

B1-O-10  Evaluation of the coracoid graft state and the complication for the modified arthroscopic Bankart & Bristow procedure.  
Department of Orthopaedics, Nihon University Hospital  Takashi HORAGUCHI

B1-O-11  Our result of the Latarjet procedure  
Department of Orthopaedic Surgery, Doai Memorial Hospital  Tetsuya SATO

B1-O-12  The comparison of the size of the coracoid process between preoperative estimation and postoperative actual measurement for Latarjet procedure  
Dept. of Orthop. Surg. Osaka Police Hospital  Makoto TANAKA

Free Papers : Shoulder Instability 3  
10:10 - 10:50  
Chair : Tetsuya Yamazaki

B1-O-13  Arthroscopic findings of the anterior shoulder instability relation with glenoid morphology  
Department of Orthopaedic surgery, Anshin Hospital  MORISHIGE MASAHIKO

B1-O-14  Postoperative recurrence after arthroscopic Bankart repair due to a new fracture of anterior glenoid rim  
Department of Orthopaedic Sports Medicine, Yukioka Hospital  Shigeto NAKAGAWA

B1-O-15  Effective glenoid width and height after anterior glenoid correction with bankart repair for the traumatic anterior glenohumeral instability  
Department of Orthopaedic Surgery, NTT East Sapporo Hospital, Sapporo, Japan  Tomoya MATSUHASHI

B1-O-16  Glenoid Osteotomy for patients with atraumatic shoulder instability  
Nobuhara Hospital & Institute of Biomechanics  Hiroaki INUI

The 43rd Annual Meeting of the Japan Shoulder Society  
The 13th Annual Meeting of the Shoulder Function Study Group
B1-O-17  Evaluation of the cases of posttraumatic posterior instability of the shoulder  
Department of Orthopaedic Surgery, Kagawaken Saiseikai Hospital  Hiroyuki NAKAMIZO

Rankokoushin Seminar 4  
10:50 - 11:50  
Chair : Masao Kurokawa

B1-R4-07  Evaluation and Treatment of Bipolar Lesion Observed in the Anterior  
Instability of the Shoulder (※)  
Tohoku University  Nobuyuki YAMAMOTO

B1-R4-08  Unstable Shoulder  
Matsudo Orthopaedic Hospital  Shigehito KURODA

Educational Lecture 1  
12:00 - 13:00  
Chair : Naoki Suenaga

B1-L1-01  Diagnostic Imaging for Shoulder Disease (※)  
Asabu Orthopaedic Hospital  Toshiaki HIROSE

B1-L1-02  Diagnosis and Treatment for Periarticular Fracture of Shoulder (※)  
Upper Extremity Center of Joint Replacement and  
Endoscopic Surgery, Hokushin Hospital  Naomi OIZUMI

Free Papers : Shoulder Instability 4  
13:35 - 14:15  
Chair : Hideyuki Gotoh

B1-O-18  Arthroscopic Bankart repair for recurrent shoulder dislocation of  
middle-age athletes  
Department of Orthopaedics, Mazda Hospital  Shunya TSUJI

B1-O-19  The postoperative bone absorption of anterior glenoid rim (BAGR) and  
the enlargement of anchor holes after arthroscopic Bankart repair.  
Department of Orthopaedic Surgery, Nagoya University  School of Medicine  Tadahiro SAKAI

B1-O-20  Analysis of the Change of the Drill Holes of Bioabsorbable and  
Non-bioabsorbable Anchors after Arthroscopic Bankart Repair Surgeries  
Medical IT center, Nagoya University Hospital  Satoshi YAMASHITA

B1-O-21  The outcome of remplissage as reinforcement  in arthroscopic Bankart repair  
Department of Orthopaedics surgery , Anshin Hospital, Kobe  Naoki YAMAGAMI

(※ : The title was translated by editor.)
B1-O-22  Clinical outcome of arthroscopic Remplissage procedure for recurrent anterior shoulder instability  
   Department of Orthopaedics, Gunma University  
   Graduate School of Medicine  
   Ryosuke MIYAMOTO

Free Papers : Sports Injury 1  
14:15 - 15:03  
Chair : Tadahiro Sakai

B1-O-23  Comparison of shoulder ROM between boys and girls in juvenile baseball players  
   Department of Orthopedic Surgery, National Hospital Organization Kyoto Medical Center  
   Shogo MUKAI

B1-O-24  Relationship between Humeral Torsion and Career of Pitcher in Elementary and Junior-high Schools  
   Department of Orthopedic Surgery, Takatsuki Red Cross Hospital  
   Hiromichi HIRAI

B1-O-25  Influences of humeral retroversion on glenohumeral internal rotation deficits in juvenile baseball players  
   Department of Orthopaedic Surgery, Nishio Municipal Hospital  
   Akira TAKAMATSU

B1-O-26  Lateral scapular slide test in young baseball players  
   Center for Hand, Elbow, and Sports Medicine, Izumi Orthopaedic Hospital  
   Mikio HARADA

B1-O-27  Comparison of glenohumeral rotation range of motion between right and left handed throwers  
   Arthroscopy Center, Meitetsu Hospital  
   Atsushi TSUCHIYA

B1-O-28  Partial-thickness rotator cuff tears does not always cause shoulder pain in university baseball players  
   Department of Orthopedic Surgery, Osaka Medical College  
   Rei MORIKURA

Free Papers : Sports Injury 2  
15:03 - 15:43  
Chair : Yasuyuki Ishida

B1-O-29  Pathophysiology of thoracic outlet syndrome in high school baseball players  
   Department of Orthopaedics, Graduate School of Medical Science, Kyoto Prefectural University of Medicine  
   Masataka MINAMI

B1-O-30  The radiographic findings of posterior aspect of glenoid hypoplasia using modified Bernageau method in 71 baseball players  
   Department of Orthopaedics, Hamamatsu city Rehabilitation Hospital  
   Kengo KIRIMURA

B1-O-31  The location of the Bennett lesions could characterized throwing shoulders  
   Hachioji Sports Orthopaedic Clinic  
   Daisuke NAKAI
B1-O-32  Intraoperative findings and postoperative results of pitching shoulder injury accompanied by impingement as a result of pulley lesions  
Showa University Research Institute for Sport and Exercise Sciences  Naoya NISHINAKA

B1-O-33  The relationship between tightness of the hip joint and Shoulder or Elbow pain in High school baseball players  
Department of Orthopaedics, Gunma University Graduate School of Medicine  Noritaka HAMANO


Topics 5  15:50 - 16:50  
Chairs : Mitsuru Nagoshi, Kentaro Kameyama

B1-T5-1  Head, upper trunk, and lower trunk axial rotation angles in young baseball players with a history of throwing-related pain  
Sagamihara Kyodo Hospital  Masashi KAWABATA

B1-T5-2  Relationships between limbs reach tests and range of motion in young baseball players with a history of throwing-related pain  
Sagamihara Kyodo Hospital  Toru MIYATA

B1-T5-3  Effects of the trunk alignment at the wind-up phase given to pitching motion  
Orthopedics Tsubasa clinic  Koichi KAMIIE

B1-T5-4  Scapulothoracic function in youth baseball players with Little League Shoulder.  
Institute for Human Movement and Medical Sciences, Niigata University of Health and Welfare  Emi NAKAMURA

B1-T5-5  Clinical results of Little Leaguer’s shoulder  
Nagoya Sports Clinic  Katsumasa SUGIMOTO

Short Talk : Sports Injury  17:00 - 17:30  
Chair : Noriyuki Ishige

B1-ST-01  A case of shoulder instability due to suprascapular nerve entrapment with paralabral cyst  
Department of Orthopaedics, Hashimoto Municipal Hospital  Tomoki IGUCHI

B1-ST-02  A rare case report, isolated rupture of the subscapularis tendon because of the sports injury.  
SUMIYA Orthopaedic Hospital  Yasuhiro NAKANE

B1-ST-03  Rotator cuff tear in young overhead sports athletes  
Department of Orthopaedic Surgery, Nobuhara Hospital and Institute of Biomechanics  Tomoyuki MUTO

B1-ST-04  A Case Report of Triceps muscle Injury which Occurred Subsequent to Latissimus Dorsi Muscle Injury in Elite Baseball Pitcher  
Department of Orthopaedics, JR Tokyo General Hospital  Takafumi MIYAKE
B1-ST-05  The effectiveness of SGHL re-tensioning in the throwing injury of the shoulder
Tokyo Asuka Hospital, Orthopaedics Surgery  Hisao KUMAMOTO

B1-ST-06  Arthroscopic excision of Bennett lesion for throwing disorder
Department of orthopedics, Yokohama Minami Kyousai Hospital  Jun YAMAKAWA

B1-ST-07  Hara-test is useful to diagnose throwing shoulder injuries
Department of Orthopedic Surgery, Osaka Medical College  Kunimoto FUKUNISHI

Short Talk : Case Report 3  17:30 - 18:00
Chair : Masafumi Gotoh

B1-ST-08  A case of osteochondritis dissecans of the humeral head
Department of Orthopaedics, Dokkyo Medical University  Yuji YAMAGUCHI

B1-ST-09  Arthroscopic-assisted core decompression for osteonecrosis of the humeral head
Department of Functional Joint Anatomy, Tokyo Medical and Dental University  Takashi MIYAMOTO

B1-ST-10  Case report; Osteochondral transfer for osteonecrosis of humeral head
Department of Orthopaedics, Sasebo Kyosai Hospital.  Yasuhiro MIZUKI

B1-ST-11  Shoulder impingement by osteonecrosis of the humeral head in a young patient
Department of Orthopaedics, Graduate School of Medical Science, Kyoto Prefectural University of Medicine  Okihiro ONISHI

B1-ST-12  A case of impression fracture of the humeral head by electrical injury
Department of Orthopaedics, Kyoto Okamoto Memorial Hospital  Katsuhiro Hori

B1-ST-13  Acute massive rotator cuff tear in young patient with electrical burn injury
Nasaret International Hospital, Korea  Jae Hyun Yoo

B1-ST-14  LHB tenodesis for pulley lesion caused trauma in 7 cases
SUMIYA Orthopaedic Hospital  Makoto HARADA

Short Talk : Case Report 4  18:00 - 18:30
Chair : Yasuaki Nakagawa

Shizuoka city Shimizu Hospital  Yusuke KAWANO
B1-ST-16  A case of Friedrich's disease
Department of Orthopaedic Surgery, Yamaguchi University
Graduate School of Medicine  Kiminori YUKATA

B1-ST-17  Huge acromioclavicular joint cyst with cuff tear arthropathy
Department of Orthopaedic Surgery, Kobe University
Graduate School of Medicine  Takashi KUROSAWA

B1-ST-18  Arthroscopic procedure for the suprascapular nerve palsy due to
a ganglion: a case report
Department of Orthopedic Surgery, Tokyo Medical University  Kei TAMURA

B1-ST-19  Clinical outcomes of arthroscopic treatments for paralabral cysts
Department of Orthopaedic Surgery, Showa University Fujigaoka Hospital  Yutaro TAJIKA

B1-ST-20  Pain of the right shoulder and paralysis of supraspinatus/
infraspinatus that took time to diagnosis.
Department of Orthopaedics, Eiju general hospital  Masamichi ONIZAWA

B1-ST-21  The musculocutaneous neuropathy after the long head of
the biceps tendon: a case report
Department of Orthopaedic Surgery, Toho University, Ohashi Medical Center  Takeo MORI
**Poster Room**

**Poster : Rotator Cuff Tear 1 17:00 - 17:30**

**Chair : Takahiko Hirooka**

**P1-001**  
Is the learning curve different by two operators of arthroscopic rotator cuff repair?  
Department of Orthopaedics, Omori Municipal Hospital  
Takayuki YOSHIIKAWA

**P1-002**  
Atrophy of deltoid muscle after arthroscopic rotator cuff repair  
Department of Orthopaedics, Sasebo Kyosai Hospital  
Taiki UCHIMURA

**P1-003**  
Symptomatic knot impingement after arthroscopic rotator cuff repair: which knot is critical?  
Department of Orthopedic surgery, Osaka Medical College  
Akihiro UCHIDA

**P1-004**  
Evaluation of the imaging and clinical outcome of arthroscopic rotator cuff repair using bioabsorbable full thread anchors  
Department of Orthopaedic surgery, Shimane University Faculty of Medicine  
Akira AOKI

**P1-005**  
Frequency of effusion around suture anchors after rotator cuff repair  
-Comparison of PEEK and Biocomposite Biodegradable anchor-  
Funabashi Orthopaedic Sports Medicine & Joint Center  
Toshihiko IZUMI

**P1-006**  
Formation of a huge bone cyst around polyetheretherketone anchors after arthroscopic rotator cuff repair: a case report  
Department of Orthopaedic Surgery, Niigata Central Hospital  
Takashi HAYAKAWA

**Poster : Basic Research 17:00 - 17:30**

**Chair : Takahiro Hashimoto**

**P1-043**  
Association of the cortical thickness of the proximal humerus and mineral bone density of the distal radius  
Department of Orthopaedic Surgery, Ikekami General Hospital  
Akiyoshi HANDA

**P1-044**  
Effect of friction of suture anchors on the "deadman theory": A biomechanical study.  
Department of Orthopaedic Surgery, Kurihara Central Hospital  
Hideaki NAGAMOTO

**P1-045**  
Comparison of the strength of four fixation procedures for Bankart repair  
Dept. of Orthop. Surg., University of Teikyo, Tokyo, Japan  
Seikai TOYOOKA

**P1-046**  
Experimental rotator cuff pain reduces the maximal isometric muscle strength around the shoulder by approximately 40%  
Department of Orthopedic Surgery, Kochi Medical School, Kochi University  
Masashi IZUMI

**P1-047**  
Isometric supination strength alterations after arthroscopic biceps surgery - Comparison between tenotomy and tenodesis -  
Department of Orthopaedic Surgery, Otaru General Hospital  
Yukinori TSUKUDA
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| **P1-065** | The Relevance between Rest, Motion, and Night Pain by Rotator Cuff Tears  
NISHIJIN Hospital  Tsuyoshi SUKENARI |
| **P1-066** | The association between rotator cuff dysfunction and night pain  
Department of Orthopaedics, Kitasato University School of Medicine  Ryo TAZAWA |
| **P1-067** | Clinical findings of the rotator cuff tear focused on the intensity of the pain  
Department of Orthopaedic Surgery, Yamagata University  Daisaku TSURUTA |
| **P1-068** | Postoperative pain after Arthroscopic Rotator Cuff Repair-Comparison of Double-row and Suture Bridge Repair-  
Department of Orthopedics, Kawaguchi Kogyo General Hospital  Katsuaki YANAGISAWA |
| **P1-069** | Features of neuropathic pain in patients with shoulder disorders  
Department of Orthopaedic Surgery, Gunma University  Tsuyoshi SASAKI |
| **P1-070** | Persistent night pain of frozen shoulder involves neuropathic pain  
Department of Orthopaedics, Juntendo University  Yoshinori GONDA |

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| **P1-007** | Relationship between subscapularis tendon tear and preoperative 3D-CT findings  
Department of Orthopaedic Surgery, Nagasaki University Hospital  Shiro KAJIYAMA |
| **P1-008** | Mid-Term Outcome of Pectoralis Major Transfer for the Treatment of Irreparable Subscapularis Tears  
Department of Orthopaedic Surgery, Nakadori General Hospital  Yuji HATAKEYAMA |
| **P1-009** | Re-arthroscopic surgery for LHB tendinitis after arthroscopic rotator cuff repair  
Shoulder & Elbow Service, Funabashi Orthopaedic Sports Medicine & Joint Center  Yuya TANAKA |
| **P1-010** | Relationship between subscapularis tendon tears and long head of the biceps tendon position on preoperative magnetic resonance imaging  
Department of Orthopaedic Surgery, Gifu University  Nobuo TERABAYASHI |
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<th>P1-011</th>
<th>Clinical characteristics and surgical results of isolated subscapularis tendon tear</th>
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<td>Department of Orthopaedic Surgery, Fukushima Medical University, School of Medicine</td>
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<td>Ryohei SATO</td>
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<th>Concomitant coracoplasty during arthroscopic subscapularis repair: is it imperative for better clinical outcomes and structural integrity?</th>
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<td>Department of Orthopaedic Surgery, Arthroscopy and Joint Research Institute, Severance Hospital, Yonsei University College of Medicine</td>
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<th>Evaluation of the coracoid graft state for the modified arthroscopic Bankart &amp; Bristow procedure using Coracoid Reamer</th>
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<td>Department of Orthopaedics, Nihon University Hospital</td>
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<td>Takashi HORAGUCHI</td>
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<th>Treatment of recurrent shoulder joint dislocation in collision sports players</th>
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<td>Department of Orthopaedic Surgery, Hyogo College of Medicine</td>
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<td>Takanori OI</td>
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<th>Outcomes of Treatment for Recurrent Dislocation of Shoulder Associated with Epileptic Seizure</th>
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<td></td>
<td>Department of Orthoped Surgery, Showa University Fujigaoka Hospital</td>
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<td>Kanji FURUYA</td>
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<th>Traumatic anterior instability of the shoulder without awareness of dislocation or subluxation</th>
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<td>Department of Orthopaedics, Kagawa University</td>
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<td>Graduate School of Medicine</td>
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<td>Shingo YOSHITAKE</td>
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<th>P1-052</th>
<th>The relationship between posterior instability of the shoulder and scapula dyskinesia - usefulness of the scapula mobility jerk test- the Health Service Center, National Institute of Fitness and Sports in Kanoya</th>
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<th>Poster: Fracture, Dislocation</th>
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<th>P1-076</th>
<th>Fracture of coracoid process associated with superior shoulder suspensory complex injury : Report of eight cases</th>
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<td>Department of Orthopaedic Surgery, Ishikawa Prefectural Central Hospital</td>
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<td>Tatsuhiro TORATANI</td>
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<th>P1-077</th>
<th>Clinical outcome of arthroscopic stabilization for acute acromioclavicular joint dislocation</th>
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<td>Hyakutake Orthopedics Sports Clinic</td>
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<td>Isao SHIRACHI</td>
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</table>
P1-078  The Primary Surgical Reduction for Acromioclavicular Joint Dislocations with a ZipTight fixation system.
Department of Orthopedics surgery, Japan Organization of Occupational Health and Safety, Sanin Rosai Hospital  Yasuto TSUKUTANI

P1-079  Experience about management of acute acromioclavicular joint dislocation
Department of Orthopaedics, National Hospital Organization Higashi-Ohmi General Medical Center  Shingo YONETA

P1-080  Postoperative outcome after coracoclavicular ligament reconstruction using artificial ligament for acromioclavicular joint dislocation
Department of Orthopaedics, Nihon University Hospital  Noriyuki ENDO

Poster : TSA/RSA 1  18:00 - 18:30
Chair : Atsushi Yamamoto

P1-033  Short Term Result of Reverse Total Shoulder Arthroplasty
Department of Orthopaedic Surgery, Kibikogen Rehabilitation Center  Yukio SHIGEYAMA

P1-034  Clinical outcome of reverse shoulder arthroplasty for massive rotator cuff tear and cuff tear arthropathy
Department of Orthopaedics, Mizushima Central Hospital  Yasuro OZE

P1-035  Reverse shoulder arthroplasty for the rheumatoid arthritis with the severe bone loss of the glenoid: A case report
Department of Orthopaedics, Jichi Medical University  Toshihiro SAITO

P1-036  Bony increased-offset reverse shoulder arthroplasty (BIO-RSA) using a pre-operative 3D template system
Fukuoka Mirai Hospital, Dept. of Orthop. Surg, Fukuoka Japan  Motoki TANAKA

P1-037  The timing of Reverse shoulder arthroplasty for patient with acute axially nerve palsy -A case report-
OKA Orthopedic Hospital  Mitsufumi NAKAWAKI

Poster : Shoulder Instability 2  18:00 - 18:30
Chair : Hiroyuki Nakamizo

P1-053  Relationship between the insertion angle of anchors and the change of glenoid rim in Bankart repair
Department of Orthopedics, Shimada Hospital  Kei SUGAWA

P1-054  Comparison of postoperative anterior glenoid bone loss between arthroscopic dual- and single-suture methods
Department of Orthopaedic Surgery, Surgical Science, Tokai University, School of medicine  Eiji SHIMPUKU
P1-055 Results of arthroscopic Bankart repair in patients with recurrent anterior dislocation of the shoulder
Dept. of Orthop. Surg., Doai Memorial Hospital, Tokyo, Japan Hiroko UEKI

P1-056 Arthroscopic treatment for the Isolated Bankart lesion and combined Bankart and Type II SLAP lesions: A Comparative Study
Department of Orthopaedic surgery, Wonkwang University Of Medicine & Hospital, Republic of Korea Jeong Woo Kim

P1-057 The long-term clinical outcomes of arthroscopic Bankart repair for rugby players
Department of Joint Surgery and Sports Medicine, Tokyo Medical and Dental University, Japan Mari UOMIZU

P1-058 Long-term results of modified inferior capsular shift for recurrent anterior dislocation of the shoulder
Department of Orthopaedic surgery, The Jikei University School of Medicine Motoki KATO

Poster : Fracture 1 18:00 - 18:30
Chair : Yasunori Shimamura

P1-081 Clinical evaluation of operative therapy for the greater tuberosity fracture of the humerus
Department of Orthopaedic Surgery, Tane General Hospital Kazuhiro UENAKA

P1-082 Clinical outcome of arthroscopic surgery for humeral greater tuberosity fracture
Department of Orthopaedic Surgery, Osaka City University Graduate School of Medicine Syunpei HAMA

P1-083 Clinical outcome of arthroscopic surgery for chronic humeral greater tuberosity fracture
Department of Orthopaedic Surgery, Osaka City University Graduate School of Medicine Shigehiro IKEDA

P1-084 Intramedullary nailing through the anterocromial portal for 2part proximal humeral fracture: a case report
Konan Hospital Orthopaedic surgery Masayasu TAKAHASHI

P1-085 The Straight Locking Intramedullary Nail for Treatment of Displaced Proximal Humeral Fractures
Department of Orthopaedic Surgery, NTT East Sapporo Hospital, Sapporo, Japan Tomoya MATSUHASHI

P1-086 The clinical and structural outcome of Minimally Invasive Plate Osteosynthesis (MIPO) for proximal humeral fractures in patients 65-years and older
Department of Orthopaedics,JA Kochi Hospital Satoshi HOSOKAWA
First day October 22 (Sat.)

Room 1

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<tr>
<th>Itskushima Seminar 3</th>
<th>7:00 - 8:00</th>
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<tr>
<td>Chair : Hiromichi Omae</td>
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<tr>
<td>R2-I3</td>
<td>Long term results of Reverse prosthesis</td>
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<tr>
<td>Centre Orthopédique Santy  Gilles Walch</td>
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Momiji Seminar

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<th>8:10 - 9:30</th>
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<tr>
<td>Chairs : Katsumi Takase, Hirotaka Sano</td>
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<tr>
<td>R2-MS</td>
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<tr>
<td>Centre Orthopédique Santy  Gilles Walch</td>
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<td>Florida Orthopaedic Institute  Mark A. Frankle</td>
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<tr>
<td>Center For Shoulder, Elbow &amp; Sports Medicine Neon Orthopaedic Clinic  Jin-Young Park</td>
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<tr>
<td>Department of Orthopaedic Surgery Singapore General Hospital  Denny TT Lie</td>
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Topics 7

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<tr>
<td>Chairs : Joo Han Oh, Kenji Takagishi</td>
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<tr>
<td>R2-T7-1</td>
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<tr>
<td>Department of Orthopaedics, Nara Medical University  Kazuya INOUE</td>
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<tr>
<td>R2-T7-2</td>
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<tr>
<td>Dept. of Orthop. Surg., Toho Univ. Sch. of Med.  Hiroyasu IKEGAMI</td>
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<tr>
<td>R2-T7-3</td>
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<tr>
<td>Department of Orthopaedic Surgery, Dokkyo Medical University  Kazuya TAMAI</td>
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<tr>
<td>R2-T7-4</td>
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<tr>
<td>Department of Orthopaedic Surgery, Matsuyama Red Cross Hospital  Hiromichi OMAE</td>
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<tr>
<td>R2-T7-5</td>
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<tr>
<td>Orthopaedic Surgery Seoul National University  Joo Han Oh</td>
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Free Papers : TSA/RSA 1

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<th>10:30 - 11:10</th>
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<tr>
<td>Chair : Yozo Shibata</td>
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<tr>
<td>R2-O-01</td>
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<tr>
<td>Department of Orthopaedic Surgery, Osaka City University</td>
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<tr>
<td>Graduate School of Medicine  Tomoya MANAKA</td>
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</table>
R2-O-02  Clinical short term results of reverse total shoulder arthroplasty with superolateral approach  
Department of Rehabilitation Medicine, Shinga University of Medical Science  Ryo NAKAJIMA

R2-O-03  Clinical results of reverse shoulder arthroplasty with delt-pectoral approach and non-detouch of subscapularis tendon.  
Department of Orthopedics, Teikyo University Graduate School of Medicine  Masaaki ITO

R2-O-04  The risk factor of Scapular notching after Reverse Total Shoulder Arthroplasty, with Scapula-45 radiograph technique  
Department of Orthopedic Surgery, Showa University Fujigaoka Hospital  MASASHI SUZUKI

R2-O-05  Cadaveric study on suprascapular nerve injury during superior screw insertion in reverse shoulder arthroplasty  
Department of Orthopaedics, Yoshinogawa Medical Center  Katsutoshi MIYATAKE

Free Papers : TSA/RSA 2  
11:10 - 11:50  
Chair : Teruaki Izaki

R2-O-06  Speed of recovery after shoulder arthroplasty: a comparison between HHR/RSA for cuff tear arthropathy and anatomical TSA for OA/RA  
The Upper Extremity Center of Joint Replacement and Endoscopic Surgery,  
Hokushin Higashi Orthopaedic Hospital  Shintaro YAMANE

R2-O-07  Sequential motion analyses of the scapula after RSA  
Department of Orthopaedic Surgery, Osaka City University  
Graduate School of Medicine  Yoshihiro HIRAKAWA

R2-O-08  Reverse Total Shoulder Arthroplasty for Cuff Tear Arthropathy  
Funabashi Orthopaedic Sports Medicine & Joint Center  Morihito TOKAI

R2-O-09  Repair Integrity of the Subscapularis Tendon after Reverse Total Shoulder Arthroplasty for Cuff Tear Arthropathy  
Department of Orthopaedic Surgery.  
Nippon Medical School Chiba Hokusoh Hospital  Go MARUYAMA

R2-O-10  Outcomes of Reverse total shoulder arthroplasty as a salvage procedure for failed shoulder operation  
Shoulder & Elbow Service, Funabashi Orthopaedic  
Sports Medicine & Joint Center  Takeshi MORIOKA
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<th>Session Title</th>
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<tr>
<td>Rankokoushin Seminar 6</td>
<td>12:00 - 13:00</td>
<td>Teruhiko Nakagawa</td>
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<tr>
<td>R2-R6-11 Transition of Rotator Cuff Repair and Pathogenesis of Re-tear Given by Stress Analysis (※)</td>
<td></td>
<td>Sendai City Hospital, Hirotaka SANO</td>
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<tr>
<td>R2-R6-12 Tracks of Treatment for Rotator Cuff Tears</td>
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<td>Iwaki Central Hospital, Shiro TABATA</td>
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<td><strong>Short Talk : Rotator Cuff Tear 3</strong></td>
<td>13:10 - 13:40</td>
<td>Norimasa Takahashi</td>
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<tr>
<td>R2-ST-01 Rotator cuff surgery in geriatric patients over 75 years old</td>
<td></td>
<td>Asan Medical Center, Seoul, Republic of Korea, Sungjoon Lim</td>
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<tr>
<td>R2-ST-02 Staged bilateral arthroscopic rotator cuff repair: Which side is better and which factors affect outcome?</td>
<td></td>
<td>Seoul National University College of Medicine, Korea, Sung Min Rhee</td>
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<tr>
<td>R2-ST-03 Evaluation of the contralateral rotator cuff in patients undergoing arthroscopic rotator cuff repair</td>
<td></td>
<td>Department of Orthopaedics, Hitsujigaoka Hospital, MASAYUKI ABE</td>
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<tr>
<td>R2-ST-04 Relevance between the JOA score and UCLA score in patients with rotator cuff repair</td>
<td></td>
<td>Department of Rehabilitation, Keishinkai Hospital, Takaki IMAI</td>
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<tr>
<td>R2-ST-05 Research and Examination about Patient Satisfaction after Arthroscopic Rotator Cuff Repair</td>
<td></td>
<td>Department of Orthopaedics, Osaka Red Cross Hospital, Saori WATANABE</td>
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<td>R2-ST-06 Effectiveness of synthetic opioids in arthroscopic rotator cuff repair</td>
<td></td>
<td>Department of Orthopaedics, Kawaguchi Kogyo General Hospital, Naoko ARAYA</td>
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<tr>
<td>R2-ST-07 Use of low-intensity pulsed ultrasound on acute small rotator cuff tears</td>
<td></td>
<td>Tahara Orthopedic Clinic, Takeo TAHARA</td>
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<td><strong>Short Talk : Rotator Cuff Tear 4</strong></td>
<td>13:40 - 14:15</td>
<td>Hiroshi Hashiguchi</td>
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<tr>
<td>R2-ST-08 Comparison of clinical results among three different surgeries for irreparable massive rotator cuff tear.</td>
<td></td>
<td>Department of Sports Medicine, Fukushima Medical University, School of Medicine, Kenichi OTOSHI</td>
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(※: The title was translated by editor.)
R2-ST-09  The results of arthroscopic partial repair of irreparable massive rotator cuff tears
Department of Orthopaedics, Hitsujigaoka Hospital  Yuichiro YAMADA

R2-ST-10  Short term clinical outcomes of subscapularis tendon partial transfer for massive rotator cuff tear.
Department of Orthopaedics, Hokkaido University Graduate School of Medicine  Daisuke MOMMA

R2-ST-11  A Limitation of Arthroscopic Rotator Cuff Repair Combined with Muscle Advancement Procedure for Irreparable Massive Rotator Cuff Tear
AR-Ex Orthopedic Clinic Tokyo Arthroscopy Center  Masazumi HIRATA

R2-ST-12  Clinical results of fascial patch graft for irreparable massive rotator cuff tears
Department of Orthopaedic Surgery Saiseikai Niigata Daini Hospital  Osamu MURAOKA

R2-ST-13  Two cases report of revision surgery after superior capsular reconstruction
Department of Orthopaedics, Mie University Graduate School of Medicine  Tomohiko SANO

R2-ST-14  Clinical outcome of superior capsule reconstruction at our institute
Department of Orthopedics, National Hospital Organization Kyoto Medical Center  Takahiko SAJI

R2-ST-15  Rotational infraspinatus muscle transfer for cuff tear arthropathy
Haebaru North Clinic  Hideki ASATO

Short Talk : TSA/RSA 3  14:15 - 14:40
Chair : Takashi Kobayashi

R2-ST-16  Predictive factors of HHR using smaller humeral head prosthesis with cuff reconstruction for Rotator cuff deficient arthropathy
Department of Orthopaedics Surgery, Asahikawa Medeical University  Naoki MIYOSHI

R2-ST-17  Postoperative Results of ASCR and RSA for Irreparable Rotator Cuff Tear
Tsuruta Orthopaedic Clinic  Shinsaku OGIMOTO

R2-ST-18  Replacement surgery for Hamada grade 4B deformation using CTA prosthesis in 2 cases
Tokai University Hachioji Hospital  Hiroki KASAMA

R2-ST-19  First report of prospective clinical trial of transcatheter arterial micro embolization (TAME) for persistent pain after shoulder arthroplasty.
Department of Sports Medicine and Orthopedics, Edogawa Hospital  Wataru IWAMOTO

R2-ST-20  The causes and results of the revision surgeries after hemiarthroplasty and total shoulder arthroplasty
The Upper Extremity Center of Joint Replacement and Endoscopic Surgery, Hokushin Higashi Hospital  Chika YOSHIOKA
R2-ST-21  Cross-sectional area and fatty infiltration of the deltoid correlate to outcomes after reverse total shoulder arthroplasty
Department of Orthopaedics, Fukuoka Shion Hospital  Eiichi ISHITANI

Japan-Korea Traveling Fellow Lecture  14:50 - 15:30
Chair : Hiroyuki Sugaya

R2-F-1  Critical value of anterior glenoid bone defect that leads to high recurrences after arthroscopic Bankart repair
Ewha Shoulder Disease Center, Ewha Womans University Mokdong Hospital  Sang-Jin Shin

R2-F-2  3D Analysis of Acromioclavicular Kinematics after Hook Plate Fixation
Kangbuk Samsung Hospital
Sunkyunkwan University, School of Medicine  Eugene Kim

R2-F-3  Returning Report from Korea
Department of Orthopedics, Fukui General Hospital  Kotaro YAMAKADO

R2-F-4  Returning Report from Korea
Shoulder and Elbow Service, Funabashi Orthopaedic
Sports Medicine and Joint Center  Norimasa TAKAHASHI

Free Papers : Rotator Cuff Tear 10  15:30 - 16:10
Chair : Takashi Hashimoto

R2-O-11  The change in the width and thickness of LHB and thickness of coracoacromial ligament correlated with rotator cuff tear pattern
Department of Orthopaedic Surgery, KKR Hokuriku Hospital  Takashi KOBAYASHI

R2-O-12  Effect of long head biceps tenotomy on muscle strength in arthroscopic rotator cuff repair
Department of Rehabilitation, Hyakutake Orthopedics Sports Clinic  Shuichirou SAKAI

R2-O-13  "Gap sign", a new indicator for small subscapularis tear, can be improved after arthroscopic rotator cuff repair
Department of Knee/Shoulder Surgery and Sports Medicine, Kyoto Shimogamo Hospital  Masahiko KOBAYASHI

R2-O-14  Repair integrity and functional outcome after arthroscopic suture bridge subscapularis tendon repair
Funabashi Orthopaedic Sports Medicine and Joint Center  Kazuhiro SHIBAYAMA

R2-O-15  Correlation of superior glenohumeral ligament injury with subscapularis tendon tear.
Department of Orthopaedic Surgery, Saiseikai Niigata Daini Hospital  Hiroyuki SHIOZAKI
Free Papers: Rotator Cuff Tear 11

R2-O-16 Effect of Mirror Therapy on Rehabilitation after Arthroscopic Rotator Cuff Repair
   Department of Orthopaedics, Kurume University  Hiroki OHZONO

R2-O-17 Return to sport after arthroscopic rotator cuff repair in middle aged and older athletes
   Department of Orthopaedics, Maebashi Red Cross Hospital  Kenta YANAGISAWA

R2-O-18 Is the high angle abduction brace necessary after rotator cuff repair for large or massive tear?
   Okubo Hospital, Akashi Orthopaedic Sports Medicine, Joint Surgery Center  Hisayoshi TACHIHARA

R2-O-19 Time-dependent changes in the Activities of the Shoulder Abductors and Glenohumeral Joint Kinematics after Rotator Cuff Repair
   Department of Rehabilitation, Tohoku University Hospital  Hiroaki ISHIKAWA

R2-O-20 The sequential analgesic effect of the tramadol-acetaminophen combination in the subjective pain after arthroscopic rotator cuff repair
   Department of Orthopaedics, Osaka Police Hospital  Hiroto HANAI

R2-O-21 The relation between clinical outcomes and pressure pain threshold in rotator cuff repair
   Department of Orthopaedics, Kawaguchi Kogyo General Hospital  Naoko ARAYA

Closing Remarks
### Room 2
**Topics 6**  
7:00 - 8:10  
Chair: Yutaka Morisawa

| G2-T6-1 | The changes of the strain ratio of rotator cuff depending on shoulder positioning monitored by ultrasound elastography  
Department of Orthopaedics, Chugoku Rosai Hospital  
Yoshihiro NAKAMURA |
| --- | --- |
| G2-T6-2 | The evaluation of the elasticity of the rotator cuff tendon by mean of share-wave ultrasound elastography  
Department of Orthopaedic Surgery, Nagoya City University  
Graduate School of Medical Science  
Hideyuki GOTO |
| G2-T6-3 | The use of MRI and ultrasonography for achieving the safe surgery for the proximal humerus fracture  
Department of Orthopaedic Surgery, Miyoshi Central Hospital  
Koji NATSU |
| G2-T6-4 | Biceps radial MRI for the novel evaluation of LHBT lesions  
Department of Orthopaedics, Tanabe Central Hospital  
Minoru TAKESHIMA |
| G2-T6-5 | Assessment of Muscle Atrophy and Fatty Infiltration of Symptomatic Rotator Cuff Tear: A Prospective Study of 150 shoulders  
Department of Orthopaedic Surgery,  
Tohoku University School of Medicine  
Nobuyuki YAMAMOTO |
| G2-T6-6 | Application of virtual reality to shoulder joint diseases  
Department of Orthopaedics, Saiseikai Yahata General Hospital  
Kunichika SHIN |

### Free Papers: Fracture 1  
8:10 - 8:42  
Chair: Hiroyuki Shiozaki

| G2-O-01 | Fractures of the glenoid of the scapula- Redefinition of Ideberg's classification type 3 and 4-  
Department of Orthopaedics, Udacity Hospital  
Yoshiyuki NAKAGAWA |
| --- | --- |
| G2-O-02 | Conservative treatment using an immobilization with external rotation position for the anterior glenoid rim fracture  
Department of Orthopaedic Surgery, School of Medicine,  
Aichi Medical University  
Yositaka MURAMATSU |
| G2-O-03 | Prognosis of proximal humeral fracture in children  
Division of Orthopaedic Surgery, Chiba Children's Hospital  
Koji AKIMOTO |
| G2-O-04 | Which classification of proximal humerus fractures leads to postoperative avascular necrosis of the humeral head?  
Department of Orthopaedic Surgery, Towakai Hospital  
Takeshi KAWAKAMI |
| G2-O-05 | Restriction of arm elevation after intramedullary fixation for proximal humeral fractures  
Department of Orthopaedics, Nobuhara Hospital  
Kotaro HASHIMOTO |
| G2-O-06 | Postoperative outcomes of open reduction and internal fixation for humeral surgical neck fractures  
Department of Orthopaedics, Suita municipal hospital  
Atsushi KOBAYASHI |
| G2-O-07 | The factor of the humeral head varus position with the locking plate  
Department of Orthopedics, Tane General Hospital  
Kenichi MATSUMURA |
| G2-O-08 | Minimally invasive plate osteosynthesis for proximal humerus fracture  
Department of Orthopaedics, Eiju General Hospital  
Takeshi MORIOKA |
| G2-O-09 | Does cortical thickness predict the loss of reduction after fixation of proximal humeral fracture with locking compression plate?  
Department of Orthopaedics, Kobe Chuo General Hospital  
Satoshi FUJITA |
| G2-O-10 | Clinical results of the hemiarthroplasty for humeral neck fractures using the cable wire system-trick and pitfall  
Okayama Red Cross Hospital  
Takaaki HIRANAKA |
| G2-O-11 | Correlation of functional and anatomical results after arthroscopic repair of middle and large rotator cuff tears: A prospective study  
Department of Orthopaedics, Tokushima Red Cross Hospital  
Koji FUJII |
| G2-O-12 | Conventional En-Masse-repair versus separate double layer double row-repair for treatment of delaminated rotator cuff tears: A prospective randomized study  
Department of Orthopedic Surgery, Seoul St. Mary’s Hospital,  
The Catholic University of Korea  
Yang-Soo Kim |
| G2-O-13 | The relationship between the postoperative muscle strength and fatty degeneration after arthroscopic large or massive rotator cuff repair  
Department of Orthopaedic Surgery, Yoshioka Hospital  
Issei YUKI |
| G2-O-14 | Clinical features of the patients with fatty degeneration in full-thickness rotator cuff tears  
Department of Orthopaedics, Nippon Medical School  
Satoshi IWASHITA |
G2-O-15  Hidden longitudinal partial-thickness rotator cuff tear causing subacromial impingement syndrome: a rare case in an adult
Department of Orthopaedic Surgery, Tonan Hospital  Yoshihiro ONADA

G2-O-16  A case of knot impingement with unusual acromion osteolysis
Department of Orthopaedics, JCHO Tokyo Shinjuku Medical Center  Takefumi SAKAGUCHI

Free Papers : Rotator Cuff Tear 8  10:18 - 10:58
Chair : Toshio Kitamura

G2-O-17  Comparison of clinical results between arthroscopic surface-holding repair and suture-bridge repair for small or middle rotator cuff tears
Department of Orthopaedic Surgery, Seikeikai Hospital  Takeshi MATSUURA

G2-O-18  Arthroscopic Repair (Suture-bridge) of Partial-Thickness Rotator Cuff Tears: Comparative Study of Articular Side Tears Versus Bursal Side Tears
Department of Orthopaedic Surgery, Asahikawa Kosei Hospital  Ryunosuke FUKUSHI

G2-O-19  The clinical results of ten years after Arthroscopic Transosseous Suture (ATOS) for rotator cuff tear
Matsudo Orthopaedic Hospital  Noriyuki ISHIGE

G2-O-21  Post-operative results of arthroscopic rotator cuff repair in diabetic patients
Dept. of Orthop. Surg., Shinseikai Toyama Hospital, Toyama, Japan  Satoru OHTA

G2-O-22  The U-shaped rotator cuff tear is perfectly repairable by using arthroscopic rotation cuff plasty
Department of Orthopaedic Surgery, Shinmachi Hospital  Kanichi SHIMOKAWA

Free Papers : Rotator Cuff Tear 9  10:58 - 11:38
Chair : Keizo Morisawa

G2-O-23  Quality of the Rotator Cuff at the Medial Mattress Suture after Arthroscopic Transosseous Suture Repair of the Rotator Cuff
Matsudo Orthopaedic Hospital  Shuhei OGINO

G2-O-24  Rotator cuff can regenerate itself in 16.1mm to the edge of greater tuberosity
Kanjo-dori Higashi Orthopaedic clinic  Tomonobu HOTTA

G2-O-25  MR evaluation of the subacromial insertion of the coracoacromial ligament for avoiding insufficient subacromial decompression
Department of Orthopaedics, Eniwa hospital  Satoshi MIYAKE

G2-O-26  Evaluations of the teres minor in patients with postero-superior rotator cuff tears with tear and atrophy of the infraspinatus.
Department of Orthopaedics, JCHO Kumamoto General Hospital  Yuko FUKUMA
G2-0-27  Sleep Disturbance Due To Nocturnal Pain Improves After Rotator Cuff Repair.
Department of Orthopaedic Surgery, Kurokawa Hospital  Ko HIMORI

Itsukushima Seminar 4  12:00 - 13:00
Chair : Yutaka Morisawa

G2-I4-01  Arthroscopic rotator cuff repair versus reverse shoulder arthroplasty for the treatment of massive rotator cuff tear without arthritis
Florida Orthopaedic Institute  Mark A. Frankle

G2-I4-02  Strategy in biological treatment after rotator cuff injury
Orthopaedic Surgery Taipei Medical University Hospital  Chih-Hwa Chen

Short Talk : Fracture 1  13:10 - 13:40
Chair : Hideyuki Gotoh

G2-ST-01  Outcomes of plate fixation for anatomical humeral neck fracture
Department of Orthopaedics, Hiroshima Citizens Hospital  Yohei HARADA

G2-ST-02  The treatment of 3 and 4-part humeral neck fracture over 70 years old
Department of Orthopaedics, Yonabaru central hospital  Takashi TOMA

G2-ST-03  Outcome of second surgery in proximal humeral fractures
Department of Orthopaedic Surgery(Ohashi), School of Medicine,Toho University  Takanori SHINTAKU

G2-ST-04  A case of bilateral lesser tubercle fracture
Department of Orthopaedic Surgery, Gunma University Graduate School of Medicine  Tsuyoshi ICHINOSE

G2-ST-05  A case report of chronic isolated lesser tuberosity fracture
Department of Orthopaedic Surgery, Komaki City Hospital  Kaneaki TAWADA

Department of Orthopaedics, Nihon University Hospital  Makoto SURUGA

G2-ST-07  Proximal humeral nonunion after shoulder arthrodesis: a case report
Department of Orthopaedics, Shizuoka City Shizuoka Hospital  Tomokazu SAWADA

The 43rd Annual Meeting of the Japan Shoulder Society
The 13th Annual Meeting of the Shoulder Function Study Group
Short Talk : Fracture 2 13:40 - 14:10
Chair : Noriyuki Ishige

G2-ST-08  2 cases outcomes of type 5 glenoid fracture treated with ORIF; case report
Asahikawa red cross hospital Kotaro KAYABA

G2-ST-09  Glenoid fracture associated with full thickness rotator cuff tear:
results of arthroscopic treatment of 2 cases.
Department of Orthopaedic Surgery, Dokkyo Medical University,
Koshigaya Hospital. Mitsuhiro ENOMOTO

G2-ST-10  Arthroscopic reduction and internal fixation for the glenoid fractures
Department of Orthopaedics, Yamagata University Faculty of Medicine Akemi SUZUKI

G2-ST-11  Arthroscopic surgical procedure is effective for fracture of coracoid process
with acromio-clavicular dislocation: a case report
Department of Orthopaedic Surgery, Yashima General Hospital Hironori MANABE

G2-ST-12  Open Reduction and Internal Fixation by Using Self-Iocking Pin and
Circumferential Wiring, "Himawari Method" for Acromion Fracture : A Case Report
Morioka Red Cross Hospital Makoto GOTO

G2-ST-13  Open reduction and internal fixation for pseudoarthrosis of the scapula
body fracture. : A case report
Department of Orthopaedic Surgery, Chiba Aoba Municipal Hospital Takeshi YAMAGUCHI

G2-ST-14  A report of three cases of complex injuries of the shoulder girdle.
Department of Orthopaedics, Tane General Hospital Hajime MORI

Short Talk : Fracture 3 14:10 - 14:40
Chair : Shuzo Mihara

G2-ST-15  Arthroscopic labrum and cuff repair in the case of intramedullary nail
fixation for the humeral fracture
Department of Orthopaedics, Hyogo Prefectural Amagasaki
General Medical Center Naoyoshi ISAKA

G2-ST-16  Concomitant ipsilateral humeral neck and shaft fractures in an elderly
patient treated with hemiarthroplasty and periprosthetic cable-plating system
Department of Orthopaedic Surgery, Matsuda Hospital Akira ANDO

G2-ST-17  A case of glenoid cavity fracture and proximal humerus fracture with
anterior shoulder dislocation
Department of Orthopaedics, Nippon Kokan Fukuyama Hospital Hisayoshi KATO

G2-ST-18  Treatment of proximal clavicle fractures.
Department of Orthopedic Surgery, Nishinomiya Kyoritsu Neurosurgical Hospital Kenji YASUI
G2-ST-19  Fracture of the proximal clavicle with locking plate  
Department of Orthopaedics, Okanami General Hospital  
Shimpei KURATA

G2-ST-20  CT analysis of the complicated midshaft clavicle fractures  
Department of Orthopedics, Keio University School of Medicine  
Satoshi OKI

G2-ST-21  Arthroscopic surgical technique with Dog Bone Button for distal clavicle fracture  
Department of Orthopaedics, Moriyama Municipal Hospital  
NAOHIKO HIGUCHI

Free Papers: Complication  
15:30 - 16:10  
Chair : Kan-ichi Shimokawa

G2-O-28  Clinical outcome in patients with complex regional pain syndrome after arthroscopic rotator cuff repair  
Department of orthopaedic, Kurume University medical center  
Yasuhiro MITSUI

G2-O-29  Complex regional pain syndrome (CRPS) after rotator cuff repair  
Department of Orthopaedic Surgery, Nara Medical University  
Takuya EGAWA

G2-O-30  Pneumothorax and subcutaneous emphysema in arthroscopic rotator cuff repair  
Department of Orthopaedics, Doai Memorial Hospital  
Teruhiko NAKAGAWA

G2-O-31  Pulmonary embolism after arthroscopic shoulder surgery: cases report and the study of D-dimer value  
Department of Arthroscopic Surgery & Sports Medicine,  
Takaoka-Seishikai Hospital  
Koichi IMADA

G2-O-32  Intraoperative neuro-monitoring in reverse total shoulder arthroplasty  
Department of Orthopaedics, Gunma University Graduate School of Medicine  
Satoshi SHINAGAWA

Free Papers: Miscellaneous  
16:10 - 16:58  
Chair : Yoshiyasu Uchiyama

G2-O-33  investigation of patients with shoulder joint palsy  
Orthopaedics and Arthroscopy Center, Mitsubishi Nagoya Hospital  
Kazutoshi KUROKOUCHI

G2-O-34  Assessment of shoulder function and morbidity of shoulder destruction in patients with rheumatoid arthritis  
Department of Rheumatology, Tokyo Metropolitan Bokutoh Hospital  
Yuichi NAGASE

G2-O-35  Study of the usefulness of the shoulder Virtual Reality Arthroscopic Trainer: Training by VRAT improves the shoulder arthroscopic surgery skills?  
Department of Orthopaedics, Mito Redcross Hospital  
Hiroshi NOGUCHI
G2-O-36  Propionibacterium acnes contamination of the suture in the shoulder arthroscopy: a prospective randomized study  
Department of Orthopaedics, Fukui General Hospital  Kotaro YAMAKADO

G2-O-37  The distance between catheter orifice and C5/C6 nerve influences the effectiveness of continuous nerve blockade after shoulder surgery  
Department of Orthopaedic Surgery, Nagayoshi General Hospital  Hayato SHIMIZU

G2-O-38  Shoulder arthroscopic surgery under ultrasound-guided interscalene brachial plexus block  
Department of Orthopaedic Surgery, Shizuoka General Hospital  Teiichi SANO
### Room 3

#### Educational Lecture 2  7:00 - 8:00

**Chair**: Naoki Suenaga

- **B2-L2-01**  
  **Title**: Pediatric Shoulder Joint Disease (※)  
  **Department**: Department of Orthopaedics, Hokkaido University  
  **Graduate School**: Graduate School of Medicine  
  **Author**: Tadanao FUNAKOSHI

- **B2-L2-02**  
  **Title**: Neuropathy around the Shoulder Joint (※)  
  **Department**: Upper Extremity Center of Joint Replacement and Endoscopic Surgery, Hokushin Hospital  
  **Author**: Naoki Suenaga

#### Free Papers : Basic Research 1  8:00 - 8:56

**Chair**: Kazutoshi Hamada

- **B2-O-01**  
  **Title**: Fascia lata augmentation for massive rotator cuff tear in a rabbit model  
  **Department**: Department of Orthopaedic Surgery, Kobe University  
  **Graduate School**: Graduate School of Medicine  
  **Author**: Takeshi KATAOKA

- **B2-O-02**  
  **Title**: Effect of osteoporosis on the tendon-to-bone healing after rotator cuff repair in a rat model  
  **Department**: Department of Orthopedics, Kurume University  
  **Author**: Ryo TANESUE

- **B2-O-03**  
  **Title**: The differentiation of bone marrow-derived cells at the tendon-to-bone insertion after rotator cuff repair  
  **Department**: Department of Orthopaedics, Graduate School of Medical Science, Kyoto Prefectural University of Medicine  
  **Author**: Haruhiko NAKAGAWA

- **B2-O-04**  
  **Title**: The effect of tendon-to-bone remodeling with the use of bone morphogenetic protein-2 delivered by beta-tricilium phosphate  
  **Department**: Department of Orthopaedic Surgery, Osaka City University  
  **Graduate School**: Graduate School of Medicine  
  **Author**: Yoshihiro HIRAKAWA

- **B2-O-05**  
  **Title**: TGF-beta1 contributes the increase of the amount of collagen in the reparative tissue during rotator cuff tendon-to-bone healing in rats  
  **Department**: Department of Orthopaedic Surgery, Faculty of Life Sciences, Kumamoto University  
  **Author**: Hitoshi ARIMURA

- **B2-O-06**  
  **Title**: Evaluation of rotator cuff tendon-to-bone healing with fibroblast growth factor-2-impregnated gelatin hydrogels in a rat chronic rotator cuff tear model  
  **Department**: Department of Orthopaedic Surgery, Faculty of Life Science, Kumamoto University  
  **Author**: Ryuji YONEMITSU

- **B2-O-07**  
  **Title**: Effect of FGF-2-impregnated gelatin hydrogel sheet incorporation into the bony trough on rotator cuff healing: A rabbit model  
  **Department**: Department of Orthopaedic Surgery, Kumamoto University Hospital, Kumamoto University  
  **Author**: Takuya TOKUNAGA

(*: The title was translated by editor.)
**Free Papers : Basic Research 2**  
8:56 - 9:44  
Chair : Mitsuhiro Aoki

**B2-O-08** Assessment of rotator cuff enthesis in a senescence accelerated mouse  
Department of Orthopaedics, Kobe University Graduate School of Medicine  
Yutaka MIFUNE

**B2-O-09** Contribution of oxidative stress in human rotator cuff tears  
Department of Orthopaedics, Juntendo University Urayasu Hospital  
Keiichi YOSHIDA

**B2-O-10** Histological assessment of the rotator cuff tendon in the rat brachial plexus palsy model  
Department of Orthopaedics, Chiba University Graduate School of Medicine  
Yasuhiito SASAKI

**B2-O-11** The effects of teriparatide and denosumab on cancellous bone metabolism in the proximal humerus  
Department of Orthopaedic Surgery, The University of Tokyo  
Toshinobu OMIYA

**B2-O-12** The effects of teriparatide and denosumab on cortical bone metabolism in the proximal humerus  
Department of Orthopaedic Surgery, The University of Tokyo  
Toshinobu OMIYA

**B2-O-13** Role of necroptosis, a novel type of cell death, in the development of steroid-induced osteocyte necrosis  
Department of Orthopaedic Surgery, Kanazawa Medical University  
Tooru ICHISEKI

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**Free Papers : Basic Research 3**  
9:44 - 10:24  
Chair : Kaoru Yamanaka

**B2-O-14** A study of relationship between expression of pain-related factors and Interleukin-1&beta (IL-1&beta) in patients with rotator cuff disease  
Department of Orthopaedic Surgery Kitasato University, School of Medicine  
Naoshige NAGURA

**B2-O-15** Targeting of PDGFR&alpha; Suppresses Fat Infiltration After Rotator Cuff Tear  
Department of Orthopedic Surgery, Keio University School of Medicine  
Hideyuki SHIRASAWA

**B2-O-16** Histological analysis on shoulder arthritis in rotator cuff patients  
Asabu Orthopaedic Hospital  
Toshiaki HIROSE

**B2-O-17** Anatomic Study and Electromyographic Analysis of the Teres Minor Muscle  
Department of Orthopaedic Surgery, Kuwano Kyoritsu Hospital  
Junichiro HAMADA

**B2-O-18** A histoanatomical study of the rotator cable  
Department of Orthopaedic Surgery, Graduate School of Medicine, Kyoto University  
Ryuzo ARAI
Topics 8

10:30 - 11:50

Chairs : Jun Kumagai, Kazuomi Sugamoto

B2-T8-1 Why dose subacromial pain relief improve arm elevation in patients with symptomatic rotator cuff tears?
Department of Rehabilitation, Tohoku University Hospital  Takayuki MURAKI

B2-T8-2 Proper Site Of Steroid Injection For The Treatment Of Idiopathic Frozen Shoulder: A Randomized Controlled Trial
Pain Research Center, Department of Orthopedic Surgery, Keimyung University Dongsan Medical Center, Daegu, South Korea  Chul-Hyun Cho

B2-T8-3 Biomechanical investigation of the shoulder kinematics by using the fresh frozen cadaver
Department of Orthopedic Surgery, Keio University School of Medicine  Yusuke KAWANO

B2-T8-4 Comparison of Scapulohumeral Rhythm, External Rotation Angle of the Humerus, and EMG Activity of Cuff Muscles between Elevation and Raising
Department of Orthopaedic Surgery, Dokkyo University School of Medicine  Yuichiro YANO

B2-T8-5 Histological evaluation of the layers in delaminated rotator cuff tear: is it purely tendon or capsule?
Department of Orthopaedic Surgery, Catholic University School of Medicine, Seoul, Korea  Sung-Ryeoll Park

B2-T8-6 The effect of gelatin hydrogel sheet with PRP after rotator cuff repair
Department of Orthopaedics, Graduate School of Medical Science, Kyoto Prefectural University of Medicine  Takashi KIBA

B2-T8-7 Histomorphometric and three dimensional ultrastructural analysis on the tendon-to-bone healing after rotator cuff repair in a rat model
Division of Microscopic and Development Anatomy, Department of Anatomy, Kurume University School of Medicine, Kurume, Fukuoka, Japan  Tomonoshin KANAZAWA

Itsukushima Seminar 5

12:00 - 13:00

Chair : Yusuke Iwahori

B2-I5-01 Reverse TSR, Medialized vs. Lateralized: When & How
Center For Shoulder, Elbow & Sports Medicine Neon Orthopaedic Clinic  Jin-Young Park

B2-I5-02 Factors affecting functional outcomes after one-stage arthroscopic manage for rotator cuff tears with shoulder stiffness
Orthopaedic Sports Medicine Huashan Hospital  Shiyi Chen
Short Talk : Anatomy, ENG, Miscellaneous  
13:10 - 13:40
Chair : Yasuyuki Ishida

B2-ST-01  A comparison of dominant and nondominant the pathway of rotator cuff intramuscular tendon for the glenoid plane in healthy subjects
Devision of Rehabilitation, Sapporo Medical University Hospital  Hajime TODA

B2-ST-02  The glenoid inclination and glenoid version in healthy subjects
Graduate School of Health Science, Sapporo Medical University  Naoya IIDA

B2-ST-03  The effect of upper arm assisting on the shoulder girdle muscle activities during abduction
Rehabilitation unit, Fushimi Okamoto Hospital  Yuichiro MIURA

B2-ST-04  The evaluation for shoulder girdle muscle activities of the patients with massive rotator cuff tear using R-muscle value in EMG
Department of rehabilitation,Fushimi Okamoto Hospital  (before the First Okamoto Hospital)  Hideaki FUKUSHIMA

B2-ST-05  The tendency of the humeral head necrosis associated with idiopathic femoral head necrosis
Department of Orthopaedics Surgery, Graduate School of Medical Sciences, Kyshu University  Go MIAKE

B2-ST-06  The actual condition of the shoulder pain by daily activities including snow shoveling and weeding
Department of Orthopedic surgery, Akita University  Graduate School of Medicine  Hiroaki KIJIMA

B2-ST-07  Postoperative clinical result and image evaluation after distal clavicle resection for the treatment of acromioclavicular joint osteoarthritis
Department of Orthopaedic Surgery, Kashiwara Municipal Hospital  Yoshinobu MATSUDA

Short Talk : Shoulder Instability 1  
13:40 - 14:10
Chair : Kenji Okamura

B2-ST-08  Surgical treatment for a recurrent posterior shoulder dislocation occurring in a 10-year-old girl-a case report
Department of Orthopaedics, Showa University Fujigaoka Hospital  Ryosuke KIMURA

B2-ST-09  Arthroscopic Revers Remplissage for Posterior Shoulder Dislocation: A report of a case
Department of Orthopaedics, Nakanoshima Iwaki Hospital  Shinya OGUMO

B2-ST-10  Corrective osteotomy for chronic unreduced posterior fracture-dislocation of the shoulder : a case report
Department of Orthopaedics, Kitasato University Medical Center  Genyo MIYAJIMA
B2-ST-11 Anterior dislocation of the shoulder in Shprintzen-Goldberg syndrome
Department of Orthopaedics, Jichi Medical University School of Medicine Naoya TAKI

B2-ST-12 Two cases report of the labrum repair for unstable painful shoulder of rugby players in top league
Department of Orthopaedic Surgery, Ogaki Municipal Hospital Keishi TAKABA

B2-ST-13 Musculocutaneous nerve injury caused by arthroscopic Bankart-Bristow procedure.-A case report-
Department of Orthopaedics, Japan Community Health care Organization Osaka Hospital Ryuji NISHIMOTO

B2-ST-14 Axillary nerve palsy occurred with arthroscopic repair of humeral avulsion of the glenohumeral ligament lesion: A case report
Department of Orthopaedics Surgery, Asahi hospital, Aichi, Japan Takashi ITO

Short Talk: Shoulder Instability 2 14:10 - 14:40
Chair: Junji Ide

Department of Orthopaedic Surgery, University of Miyazaki Noboru TANIGUCHI

B2-ST-16 Two cases of traumatic instability of shoulder joint with large bone defect in Parkinson disease
Department of Orthopaedics, Kawaguchi Kogyo General Hospital Saisei AN

B2-ST-17 Arthroscopic Bankart repair for the patient with athetoid cerebral palsy
Department of Orthopaedics, Miyazaki University Graduate School of Medicine Yasuyuki ISHIDA

Department of Orthopaedics, Saiseikai Yahata General Hospital Yu SOEJIMA

B2-ST-19 Experimental study of shoulder dislocations with rotator cuff tear
Rehabilitation Clinic Yamaguchi Hiroshi YAMAGUCHI

B2-ST-20 Short-term results of Arthroscopic Bankart Repair using Labral Tape and knotless suture anchor
Department of Orthopedics, Department of Sports & Medical Science Teikyo University School of Medicine Keisuke TSUKADA

B2-ST-21 Examination of the shoulder dislocation to need attentin.
-To avoid further iatrologic injuries-
Department of Orthopaedics, Osaka Red Cross Hospital Tomohirosutefuan TOMI
Free Papers : Motion Analysis, Thoracic Outlet Syndrome  15:30 - 16:10
Chair : Yasuaki Nakagawa

B2-O-19  In-vivo glenohumeral translation during internal and external rotation in varying degrees of abduction
Department of Orthopaedics, Osaka University Graduate School of Medicine  Wataru SAHARA

B2-O-20  In-vivo glenohumeral ligament length during internal and external rotation in varying degrees of abduction
Department of Orthopaedics, Osaka University Graduate School of Medicine  Wataru SAHARA

B2-O-21  The onset style of Thoracic outlet syndrome
Keiyo Orthopaedic Hospital, Sports Medical Center  Hiroshi KUSANO

B2-O-22  Comparison between preoperative ultrasonography and operative findings in thoracic outlet syndrome
Keiyo Orthopaedic Hospital, Sports Medical Center  Kozo FURUSHIMA

B2-O-23  Clinical outcome of trans-axillary first rib resection for thoracic outlet syndrome
Department of Orthopaedic Surgery, Aichi Medical University School of Medicine  Yusuke IWAHORI

Free Papers : Sports Injury 3  16:10 - 16:58
Chair : Shigeto Nakagawa

B2-O-24  Evaluation of center of gravity during baseball pitching and its influence on pitching kinematics
Nobuhara Hospital and Institute of Biomechanics  kohnan TSUCHIYAMA

Department of Orthopaedics, Hokkaido University Graduate School of Medicine  Daisuke MOMMA

B2-O-26  Decreased Shoulder Abduction Angle Cause Forceful Internal Impingement and Decrease Anterior Stability in a Cadaveric Model of the Throwing Shoulder
Department of Sports Orthopaedic Center, Yokohama Minami Kyosai Hospital  Masaki AKEDA

B2-O-27  Development of the pitching motion simulator aiming to achieve both performance improvement and injury prevention
Matsudo Orthopaedic Hospital  Takeo ISHII

B2-O-28  Characteristics of shoulder pain and scapula function in junior high baseball players selected by retired professional baseball player.
Department of Sports Medicine and Orthopedic Surgery, Tohoku Rosai Hospital  Shuichi MORIYA

B2-O-29  Can the shoulder injury in high school baseball players be prevented?
Department of Orthopaedic Surgery, Tohoku Rosai Hospital  Daisuke KUROKAWA
Room 4
Free Papers: Motion Analysis  7:00 - 7:56
Chair: Yoshihiro Kai

V2-O-01  Comparison between a show of hands and the elevation; glenohumeral rhythm, humeral head external rotation and rotator cuff muscle activity (※)
Koriyama Institute of Health Sciences  Kunio YOSHIZAKI

V2-O-02  Relationship of shoulder joint range of motion and scapula-thoracic spine during shoulder flexion (※)
Nishi Waseda Orthopaedic Surgery  Yuji TSURUOKA

V2-O-03  The lateral characteristics of the rib cage shape and scapula movement in the shoulder joint flexion (※)
Shinkatsushika Hospital  Hiroyuki KOBAYASHI

V2-O-04  Effect of thoracic shape on the scapula angle
-Comparison between at rest and in rotation- (※)
Hiro-o Orthopedics Clinic  Fumiya INAGAKI

V2-O-05  Measurement of Shoulder Range of Motion and Arm Motion Smoothness using Kinect v2; A Validation Study
Department of Orthopedic Surgery, Asan Medical Center,
University of Ulsan College of Medicine, Seoul, Korea  Yoon Jeong Kim

V2-O-06  Comparison of the glenohumeral rhythm in young and elderly (※)
International University of Health and Welfare  Sota NAKAMURA

V2-O-07  Study of the movement pattern of Y exercise in healthy individuals (※)
AR-Ex Oyamadai Seikeigeka Clinic/Tokyo Arthroscopic Surgery Center  Shuhei MIURA

(※ : The title was translated by editor.)
P2-023  Medical examination for baseball players in Miyazaki  
        Department of Orthopaedics, Miyazaki University  Makoto NAGASAWA

P2-024  Chronological change of shoulder and elbow pain in juvenile baseball player  
        Department of Orthopaedic Surgery,  
        Fukushima Medical University School of Medicine  Ryosuke MASHIKO

P2-025  Approach of the sports disorders prevention for high school baseball player  
        -Associated factor with shoulder pain-  
        Department of Orthopaedics, Nakadori General Hospital  Yusuke SUGIMURA

P2-026  The relationship between shoulder pain and dynamic balance ability  
        Public Tomioka General Hospital  Masataka KAMIYAMA

P2-027  Relationship between cool-down time and the pain in the body and disability of performance in high school baseball players  
        Department of Orthopaedic Surgery, Yamagata University Faculty of Medicine  Tomohiro UNO

P2-038  Latissimus dorsi transition after surgery, reverse type shoulder joint replacement surgery the elevation failure remained  
        Department of Orthopedics, Fukushima Medical University School of Medicine  Shota YOMOGIDA

P2-039  The Cause and Patient Selection to Protect the Infection after Reverse Shoulder Replacement  
        Department of Orthopaedic Surgery, Saiseikai Yahata General hospital  Koumei MATSUURA

P2-040  Radiographic evaluation of incidences of DVT and PE in total shoulder arthroplasty and associate surgeries using DVT-CT  
        Department of Orthopaedics, Jichi Medical School  Takashi FUKUSHIMA

P2-041  A case report ; periprosthetic humeral fractures with loosening of the component after total shoulder arthroplasty  
        Department of Orthopaedics, Kansai Electric Power Hospital  Yohei MARUO

P2-042  Glenoid baseplate failure of reverse shoulder arthroplasty : A case report  
        Department of Orthopaedics, Tokyo Metropolitan Bokutoh Hospital  Hisato WATANABE
Poster: Rotator Cuff Tear 3

**P2-013** Differences in young and elderly acromial morphology  
Department of Orthopaedics surgery, Ebina General Hospital  
Hiroyuki HASHIMOTO

**P2-014** Study of patients-based assessment for rotator cuff tear using Shoulder 36 (Ver1.3) evaluation form  
Department of Orthopaedics, JCHO Osaka Hospital  
Kazuki GOTO

**P2-015** Investigation of return to sports after arthroscopic rotator cuff repair in the middle-aged and elderly  
Department of Orthopaedics, Takashimadaira Chuo General Hospital  
Yoshinori KACHI

**P2-016** Postoperative outcomes of arthroscopic rotator cuff repair in patients with neuropathic pain.  
Department of Orthopaedic Surgery, Faculty of Life Sciences, Kumamoto University  
Tatsuki KARASUGI

**P2-017** Clinical results of arthroscopic rotator cuff repair in Diabetic Patients  
Department of Orthopaedics, Shinko Hospital  
Haruhiko NISHIDA

Poster: Sports Injury 2

**P2-028** Two cases of stress fracture of the first rib in baseball players  
Department of Orthopaedic Surgery, Faculty of Medicine, Saga University  
Masahiro IZUMI

**P2-029** Clinical characteristics of first rib stress fractures  
Department of Orthopaedic Surgery and Reconstructive Surgery, Toyama Municipal Hospital  
Kenichi GOSHIMA

**P2-030** Characteristics of painful shoulder without recognized instability in the rugby players  
Department of orthopaedic surgery, Juntendo University Faculty of Medicine  
Shogo SObUE

**P2-031** Malposition of rugby tackling: focus on neck orientation and scapular tilt  
Department of Orthopaedics, Juntendo University Faculty of Medicine  
Takayuki KAWASAKI

**P2-032** Overhead throw sports decrease the internal rotation of shoulder joint  
Department of Orthopedic Surgery, Yokote Municipal Hospital  
Kentaro OHUCHI
Poster: Rotator Cuff Tear 4

14:10 - 14:40
Chair: Kenshi Kikukawa

P2-018  Short term operative outcome of Arthroscopic rotator cuff tear
        The Doai Memorial Hospital  Ken SASAKI

P2-019  Clinical results of Dual-row and DAFF rotator cuff repair
        Department of Orthopaedics, Kyorin University Graduate School of Medicine  Kengo SAKAKURA

P2-020  The effect of protect anchor in arthroscopic rotator cuff repair using bone-tunnel method
        Department of Orthopaedic Surgery, Toyama Red Cross Hospital  Kazuhito SUGIMORI

P2-021  The trans-acrominal approach with locking plate for the massive rotator cuff tear
        Department of Orthopaedics, Uda City Hospital,
        Nara Shoulder and Elbow Center  Takamitsu MONDORI

P2-022  Humeral head osteonecrosis following arthroscopic superior capsular reconstruction.
        Department of Orthopaedics Surgery, AR-Ex Oyamadai clinic  Takanori KUBO

Poster: Fracture 2

14:10 - 14:40
Chair: Yoichi Ito

P2-087  The clinical outcome of arthroscopic surgery for the glenoid fossa fracture of the scapla
        Department of Orthopaedics Surgery, Faculty of Saga University  Satoshi IKEBE

P2-088  Clinical results of osteosynthesis for the distal clavicle fracture with the cable wiring and locking screw plate system
        Department of Orthopaedic surgery, Chita Kosei Hospital  Satoshi TAKEUCHI

P2-089  Treatment of Comminuted Distal clavicle fracture with locking plate and coracoclavicular ligament reconstruction
        Department of Orthopaedic Surgery, Onomichi Municipal Hospital  Yoshimasa SAKOMA

P2-090  Treatment of distal clavicle fracture by anatomical locking plate, NOW-J.
        Department of Orthopaedic Surgery, Steel Memorial Muroran Hospital  Yusuke KAMEDA

P2-091  The results of treatment for lateral clavicle fractures
        Department of Orthoped Surgery, Yamaguchi University
        Graduate School of Medicine  Takahiro HASHIMOTO
Tissue Regeneration in the Field of Shoulder Surgery

Yu MOCHIZUKI
Department of Orthopaedic Surgery, Hiroshima Prefectural Hospital

The theme of this Meeting is “’Ranko-Koushin’ – Regeneration.” “Ranko-Koushin” has the meaning, “Survey the past to know what is to come.” This concept has relevance not only to the realm of medical science but also to medical care as a whole. I believe tissue regeneration, as typified by the discovery of iPS cells, is an eternal proposition of future medical science and medical care. Considering that the Japan Shoulder Society should also take on this challenge, we chose the theme of “Regeneration” for the upcoming Annual Meeting.

We investigated the optimal scaffold for the tissue generation by experimental study and performed the clinical study using this material. We would like to emphasis that the concept of the regeneration should be introduced to the treatment concept from our clinical data.

As to Hiroshima, G7 Hiroshima Foreign Ministers’ Meeting was held on April and U.S. President Obama visited Hiroshima on May. He said that seventy-one years ago, on a bright cloudless morning, death fell from the sky and the world was changed. A flash of light and a wall of fire destroyed a city and demonstrated that mankind possessed the means to destroy itself. Hiroshima has reconstructed and regenerated, become clean and beautiful city. Hiroshima should be the start of our own moral awaking.

To share the way of thinking about not only the shoulder surgery but also living and culture, sympathy could contribute to the world.

We would like to send the message through this meeting from Hiroshima to the world.
Fixation Methods for Full Thickness Rotator Cuff Tear Revisited

Sang Jin Cheon, MD and Hyo Yeol Lee, MD
Department of Orthopaedic Surgery Pusan National University Hospital

Repair method has been developing over the generations. Single row repair is a conventional repair method but it has been suggested that double row repair such as especially trans-osseous repair or suture bridge techniques can efficiently replace single row repair with improved outcome, especially structural outcome among authors. However, using only double row repair regardless of the lesion may not be the answer and it seems that every single lesion requires a repair method that suits for each lesion.

We designed study to make comparison between two arthroscopic repair method, single row repair and suture bridge technique (double row repair), by evaluating outcomes of arthroscopic rotator cuff repair especially in patients aged 65 years or older. One hundred and twenty eight patients had been enrolled, who were older than 65 years old (mean age of 69.4). Among them, 123 patients (men:38, women:85) were followed up at least 18 months. We retrospectively reviewed arthroscopic findings and operation records to classify rotator cuff tear size by DeOrio and Cofield classification. Moreover, we analyze the suture technique used in arthroscopic surgery where single row repair techniques were used in 64 cases, while suture bridge techniques were used in 59 cases. Functional and structural outcome were compared between the single row repair group (group A) and suture bridge group (group B). The University of California at Los Angeles (UCLA) score and the Constant shoulder score, visual analog scale (VAS) were checked preoperatively and postoperatively (average; 30 months). Also, we evaluated repair integrity by performing magnetic resonance imaging (MRI) preoperatively and postoperatively. We found that both arthroscopic single row repair and double row repair achieved satisfactory result of both clinical and structural aspects even in elderly patients if it is used adequately.
Arthroscopic Approach for Irreparable Rotator Cuff Tear

**Speakers**

Joo Han Oh  
Orthopaedic Surgery  
Seoul National University

Denny TT Lie  
Department of Orthopaedic Surgery  
Singapore General Hospital

**Symposiasts**

Chih-Hwa Chen  
Orthopaedic Surgery  
Taipei Medical University Hospital

Gilles Walch  
Centre Orthopédique Santy

Mark A Frankle  
Florida Orthopaedic Institute

Shyi Chen  
Orthopaedic Sports Medicine  
Huashan Hospital

**Chairs**

Eiji Itoi  
Tohoku University  
Hiromichi Omae  
Matsuyama Redcross Hospital

Present and Future of Total Shoulder Arthroplasty

**Chair**

Minoru Yoneda  
Nippon Medical School
Itsukushima Seminar/Momiji Seminar

R2-I3  Itsukushima Seminar 3  10/22  7:00~8:00  Room 1 (Red)

Long Term Results of Reverse Prosthesis

Gilles Walch
Centre Orthopédique Santy

Hiromichi Omae  Matsuyama Redcross Hospital

R2-MS  Momiji Seminar (International Symposium 2)  10/22  8:05~9:30  Room 1 (Red)

Reverse Shoulder Arthroplasty, What’s Going On in the World

Gilles Walch
Centre Orthopédique Santy

Mark A Frankle
Florida Orthopaedic Institute

Jin-Young Park
Center For Shoulder, Elbow & Sports medicine Neon Orthopaedic Clinic

Denny TT Lie
Department of Orthopaedic Surgery Singapore General Hospital

Katsumi Takase  Tokyo Medical University Hospital

Hirotaka Sano  Sendai City Hospital
Itsukushima Seminar/Momiji Seminar

G2-I4  Itsukushima Seminar 4  10/22  12:00~13:00  Room 2 (Green)

G2-I4-01
Arthroscopic Rotator Cuff Repair versus Reverse Shoulder Arthroplasty for the Treatment of Massive Rotator Cuff Tear without Arthritis
Mark A Frankle
Florida Orthopaedic Institute

G2-I4-02
Strategy in Biological Treatment after Rotator Cuff Injury
Chih-Hwa Chen
Taipei Medical University Hospital

Chair
Yutaka Morisawa  Aki General Hospital

B2-I5  Itsukushima Seminar 5  10/22  12:00~13:00  Room 3 (Blue)

B2-I5-01
Reverse TSR, Medialized vs. Lateralized: When & How
Jin-Young Park
Center For Shoulder, Elbow & Sports medicine Neon Orthopaedic Clinic

B2-I5-02
Factors Affecting Functional Outcomes after One-Stage Arthroscopic Manage for Rotator Cuff Tears with Shoulder Stiffness
Shiyi Chen
Orthopaedic Sports Medicine Huashan Hospital

Chair
Yusuke Iwahori  Aichi Medical University
Functional Improvement of the Shoulder

Teruhisa Mihata
Osaka Medical College

Toru Morihara
Kyoto Prefectural University of Medicine

Chair

Eiji Itoi
Tohoku University
Critical value of anterior glenoid bone defect that leads to high recurrences after arthroscopic Bankart repair

Sang-Jin Shin MD
Ewha Shoulder Disease Center, Ewha Womans University Mokdong Hospital

This study aimed to analyze the critical value of anterior glenoid bone defect that led to arthroscopic Bankart repair failure in patients with symptomatic anterior shoulder instability. The study included 169 patients with erosion of the anterior glenoid rim. The percentage of glenoid erosion was calculated as the ratio of the glenoid defect width and the glenoid width to the diameter of the outer fitting circle based on the inferior portion of the glenoid contour. The critical value of the glenoid bone defect was analyzed using the receiver operating characteristic (ROC) curve analysis. Patients were divided into two groups based on the amount of glenoid bone defect: group A (less than the critical value) and group B (more than the critical value). The optimal critical value of glenoid erosion rates was 17.3% (area under the curve =0.82, 95% confidence interval: 0.73–0.91, p<0.001). Group A and B comprised 134 and 35 patients, respectively. Shoulder functional scores were significantly lower in group B than in group A (p<0.001). Five patients (3.7%) in group A and 15 (42.9%) in group B had surgical failure. (p<0.001). Failure of arthroscopic stabilization surgery and inferior clinical outcomes occurred more frequently in patients with anterior glenoid bone defect greater than or equal to 17.3%. An anterior glenoid erosion greater than 17.3% with respect to the longest anteroposterior glenoid width should be considered as the critical bone defect amount that may result in recurrent glenohumeral instability after arthroscopic Bankart repair.

Lecturer's Profile
Chief Resident (Mar, 1994)
Department of Orthopaedic Surgery, Severance Hospital, Yonsei University College of Medicine, Seoul
Resident (Feb, 1997)
Department of Orthopaedic Surgery, Severance Hospital, Yonsei University College of Medicine, Seoul
Rotating Internship (Feb, 1994)
Severance Hospital, Yonsei University College of Medicine, Seoul
Japan-Korea Traveling Fellow Lecture

3D Analysis of Acromioclavicular Kinematics after Hook Plate Fixation

Eugene Kim\textsuperscript{a}, Jaewon Hyung\textsuperscript{a}, Tsuyoshi Murase\textsuperscript{b}, Kazuomi Sugamoto\textsuperscript{b}

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Background
There are few reports of three-dimensional (3D) shoulder kinematics in acromioclavicular dislocation patients who have been treated with hook plate. The purpose of this study is to analyze the 3D kinematics among the hook plate, clavicle and scapula in vivo.

Subjects and Methods
12 cases of acromioclavicular dislocation (Rockwood type III, V) treated with hook plates without coracoclavicular repair were included in this study. Both injured and normal contralateral shoulder have undergone computed tomography in neutral and fully forward flexion positions. Rotational and movements of scapula relative to the thorax during arm elevation were analyzed in 3D. Rotational elevation/depression in coronal plane, anterior/posterior tilting in sagittal plane, and protraction/retraction in axial plane in Euler space were compared with motion of normal opposite side. Rotation and translational movement of the hook plate beneath acromion were measured using a computer simulation software.

Results
No difference of rotational elevation of the scapula which applied hook plate with normal side was revealed in the coronal plane (36.0°/36.4°). Otherwise, posterior tilting decreased in the sagittal plane (21.3°/30.9°) and internal rotation increased in axial plane (16.7°/7.1°) in hook plated scapula. Translation of the hook plate was 4.7mm, angular motion against acromion was 18.8° and shortest distance from the hook plate to the tuberosity of humeral head was 12.2mm during elevation.

Conclusion
Hook plating without coracoclavicular ligament repair changes scapular motion, which might cause scapular dyskinesis. Angular motion of the hook plate against acromion could lead to acromial osteolysis. However, the hook plate did not seem to result in subacromial impingement to the humeral head.

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R1-T1-1  LHB anchoring procedure for rotator cuff tears with subscapularis tendon tears

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[Purpose] We have performed the LHB anchoring procedure for rotator cuff tears with subscapularis tendon tears. We investigated the long-term clinical outcomes of the LHB anchoring procedure to clarify that utility.

[Methods] We investigated 113 shoulders with rotator cuff tear and more than 10 years of postoperative follow-up (follow-up rate: 78.5%). From those cases, we extracted 27 shoulders had rotator cuff tears with subscapularis tendon tears. The mean age at the time of operation was 58.7 years. The study included 17 male shoulders and 10 female shoulders. The tear sizes were large and massive tears. We compared clinical findings (ROM, MMT, UCLA score) and MRI findings (cuff integrity, fatty infiltration) between preoperatively, 6 months, 1 year, 2 years, and 10 years postoperatively.

[Results] ROM of flexion and extension was improved six months postoperatively, and CTD was improved two years postoperatively. MMT in flexion and abduction was improved two years postoperatively and that in external rotation was improved one year postoperatively. UCLA scores were improved six months postoperatively and were maintained until postoperative ten years (SI.7 +/- 39 points). Cuff integrity was improved one year postoperatively and was maintained until postoperative ten years. Fatty infiltration was worsened ten years postoperatively. The re-tear rate was 33.3% ten years postoperatively.

[Conclusion] The LHB anchoring procedure improved shoulder function, MMT, and cuff integrity maintained those until ten years postoperatively. Fatty infiltration was maintained until two years postoperatively, but it was worsened postoperative ten years postoperatively. The LHB anchoring procedure was seemed to be a useful therapy.

R1-T1-2  Partial Transfer of Subscapularis for Irreparable Massive Rotator Cuff Tear

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PURPOSE: Since 2009, we have performed partial transfer of subscapularis for irreparable massive tear of supraspinatus and infraspinatus tendon. The objective of this study was to evaluate 2-years outcomes of this procedure.

MATERIALS AND METHODS: Seventeen shoulders of 17 patients that underwent partial subscapularis transfer were included in this study. There were 12 men and 5 women, and the average age was 63.5 years old (range: 47-79). Previous cuff surgery was performed in 4 shoulders. JOA score, active ROM, cuff integrity on MRI (Sugaya’s classification) osteoarthritis and upper migration of humeral head on plain X-ray; and complications were evaluated. The average follow-up period was 28.6 months (range: 24-69).

RESULTS: Since 1 shoulder had re-tear and revised with reversed shoulder arthroplasty, clinical results and X-ray findings were evaluated in 16 shoulders. The average postoperative JOA score improved from 56.1 points to 85.8 points. Postoperative ROM was flexion:144&0;ardm, and external rotation: 390&0;ardm. Sugaya’s classification was Type 1: 9 shoulders. Type 2: Type 3: 3, Type 4: 0, and Type 5. 3. Re-tear occurred in 18%, 1 revision case and 2 rheumatoid arthritis. Osteoarthritis progressed in 1 shoulder with re-tear. Upper migration of humeral head progressed in 2 shoulders and improved in 4 shoulders. There were no complications.

CONCLUSION: The current procedure is relatively low invasive and safe, and satisfying outcomes can be expected if re-tear does not occur. It is considered to be one of the useful options for irreparable massive rotator cuff tear without osteoarthritis.

R1-T1-3  The Result of Allogeneic Dermal Matrix Augmentation of Arthroscopic Repair for Large to Massive Rotator Cuff Tear: Preliminary Report

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Introduction: A significant percentage of large to massive rotator cuff tears fail to completely heal after repair surgery. Purpose of this study was to evaluate the effectiveness of arthroscopic allogeneic human dermal matrix augmentation of large to massive cuff tear repairs using improved augmentation technique. The hypothesis was that this augmentation would enhance the healing of a significant rotator cuff repair, resulting in fewer retears.

Methods: From October 2013 to September 2014, seventeen patients with large to massive rotator cuff tears (>3cm) who had rotator cuff repair with acellular dermal matrix patch graft (MegaDerm, 2mm thickness, L&C Bio) augmentation, and who were followed more than 6 months with an available postoperative 6 months magnetic resonance images (MRI) were included in this study. Primary outcome measure was repair integrity on postoperative 6 months MRI.

Results: Pain visual analog scale, American Shoulder and Elbow Surgeons score and Simple Shoulder Test score improved from 8.0 to 1.6, from 18.4 to 81.2 and from 16 to 83, respectively. Repair integrity on postoperative 6 months MRI according to Sugaya’s classification was type I in 2 patients, type II in 5 patients, type III in 3 patients, type IV in 1 patients and type V in 6 patients. Retear rate including type IV and V was 41%. There was no remarkable postoperative complications. In a comparison between healed patients and retear patients, there was no significant differences in clinical and anatomical factors except for the larger retraction in retear patients.

Discussion: We could get good clinical outcomes using acellular human dermal matrix augmentation for patients with large to massive rotator cuff tears in spite of inability to decrease the retear rate to a satisfactory level. Patch augmentation might best be reserved for patients with large tears that are reparable without severe retraction as retear patients had larger degree of retraction.
R1-T1-4  Challenge of biological healing for massive rotator cuff tears
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Background: We performed ARCR aiming for biological healing with rotator cuff muscle advancement or using absorbable artificial biomaterial augmentation for the massive rotator cuff tears (mRCTs). We report the postoperative clinical outcomes and failure rate after this procedure.

Methods: 39 patients (average age was 68.5 years old) diagnosed with mRCTs and underwent ARCR with supraspinatus and infraspinatus muscle advancement and/or polyglycolic acid (PGA) sheet augmentation with a minimum follow-up of 1 year after surgery were included in this study. 38 patients underwent ARCR with muscle advancement, and 23 underwent with PGA augmentation. These procedures were performed in cases whose mRCTs were too massive to cover the footprint entirely by the tendon stump. We evaluated the pre- and postoperative ROM, isometric muscle strength, acromio-humeral interval (AHI), and clinical outcomes using Japanese Orthopaedic Association (JOA) score, and compared statistically. Furthermore, cuff integrity by MRI one year after surgery were assessed, and failure rate was calculated.

Results: ROM of flexion, isometric muscle strength of abduction, external and internal rotation, AHI, and JOA score were significantly improved after surgery from 129 degrees, 227 N, 284 N, 61.0 N, 69 mm, and 66.3 points to 147 degrees, 346 N, 44.2 N, 83.9 N, 9.5 mm, and 87.6 points, respectively. Ruptures were found in 8 cases, and the failure rate was 20.5%.

Conclusions: Good outcomes and low failure rate of ARCR aiming for biological healing are expectable with muscle advancement and/or PGA augmentation even if the tear sizes were too massive to repair.

R1-T1-5  Change of MRI findings after arthroscopic rotator cuff repair with fascia lata graft augmentation
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We have reported a low retear rate and excellent clinical outcomes for fascia lata graft augmentation after single row repair in large and massive rotator cuff tears. The purpose of this study was to evaluate MRI findings until two years after the fascia lata graft augmentation. Eighteen fascia lata graft augmentations for large and massive rotator cuff tears have been performed from December 2011 to April 2014. Four cases who had retears by postoperative 6 months and four cases who could not be followed by MRI examinations were excluded from the study. Ten patients (7 males, 3 females, average age 65.1 years old, 6 large tears, 4 massive tears) without retears who were able to undergo MRI follow-up during two years were included in this study. MRI was taken at 3, 6, 12, and 24 weeks after the surgery. Cuff integrity according to Sugaya’s classification and muscle atrophy of the supraspinatus were analyzed. Clinical outcomes were also evaluated using JOA score, UCLA score, and Constant score. MRI revealed that the cuff integrity had improved until one year and no retear occurred during two years, but the muscle atrophy of the supraspinatus has not changed during the two-year follow-up. Each clinical outcome score significantly improved at the final follow-up. The clinical outcomes of the fascia lata graft augmentation in large and massive rotator cuff tears which were repaired with good integrity.

R1-T1-6  Arthroscopic superior capsule reconstruction eliminates pseudoparalysis in patients with irreparable rotator cuff tears
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Objective: The objective of this study was to evaluate whether arthroscopic superior capsule reconstruction (ASCR) reversed preoperative pseudoparalysis in patients with irreparable rotator cuff tears. 

Materials and Methods: Ninety consecutive patients with irreparable rotator cuff tears underwent ASCR. They were allocated into 3 groups according to their preoperative active shoulder elevation: (1) no pseudoparalysis: more than 90 degrees of active shoulder elevation; (2) moderate pseudoparalysis: no shoulder stiffness, less than 90 degrees of active shoulder elevation, patients maintained more than 90 degrees elevation once the shoulder was elevated passively; and (3) severe pseudoparalysis: no shoulder stiffness, less than 90 degrees of active shoulder elevation, patients had a positive drop-arm sign. The JOA score, active shoulder range of motion, and healing rate were compared between patients with and without pseudoparalysis as well as between before surgery and at the final follow-up by using the t and chi-square tests. 

Results: JOA score and active elevation increased significantly after ASCR in patients with no pseudoparalysis, moderate pseudoparalysis, or severe pseudoparalysis. Postoperative JOA score, active elevation, and healing rate did not differ among the 3 patient groups. Pseudoparalysis was reversed in 96% of patients with moderate pseudoparalysis and in 93% patients with severe pseudoparalysis. Patients with residual moderate or severe pseudoparalysis had graft tears postoperatively.

Conclusions: ASCR improved shoulder function in patients with previously irreparable rotator cuff tears both with and without pseudoparalysis. Providing that the graft did not tear postoperatively, ASCR reversed preoperative pseudoparalysis.
R1-O-01  Risk Factors for CRPS Type 1 after Arthroscopic Rotator Cuff Repair

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The purpose of this study was to investigate the risk factors for CRPS Type 1 who underwent arthroscopic rotator cuff repairs (ARCR). The patients with RCT from 2012 to 2015 available for minimum of 1 year follow up after ARCR were enrolled. A comparative investigation was performed between the patients who diagnosed CRPS Type 1 (CRPS group) according to the classification by the Ministry of Health, Labour and Welfare and rest of the patients (control group). Prevalence, epidemiology including age, gender, affected shoulder side, past history, smoking status and traumatic events in the both groups were evaluated. Size of the rotator cuff tear (RCT), clinical outcomes according to JOA score and rehabilitation program were evaluated. Also presence of night pain and number of injection of the steroid into the subacromial space or glenohumeral joint before surgery were counted. Twenty two patients (138%) in CRPS group (male 15, female 7, average age 62.1 years) and 138 patients (86.2%) in control group (male 74, female 64, average age 66.0 years) were included in this study. There were no significant differences in all category of epidemiology except the average age, the size of RCT, clinical outcomes, presence of night pain and the number of steroid injection between the both groups. Younger age and slowly rehabilitation program were significant risk factors for CRPS type 1 after ARCR.

R1-O-02  Prevalence of concomitant neuropathy in large to massive rotator cuff tear using needle electromyography.

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There were few studies to evaluate the prevalence of other neuropathy such as cervical spondylotic amyotrophy (CSAM) with rotator cuff tear (RCT). The purpose of this study was to define the prevalence of neuropathy combined with large to massive RCT using needle electromyogram. Three hundred and forty one patient who had symptomatic RCT were enrolled in this study. Three cases of massive cases and massive tear cases (129 cases) All cases were examined needle electromyogram before surgery. Prevalence of neuropathy was as follows. Large tear: 26 cases of suprascapular neuropathy (12.3%), 1 case of axillary nerve palsy (0.5%) and 18 cases of cervical spondylotic amyotrophy (8.5%). Massive tear: 31 cases of suprascapular neuropathy (24.0%), 1 case of axillary nerve palsy (0.8%) and 51 cases of CSAM (39.5%). Furthermore, there were 68 cases of pseudo-paralyzed shoulders in massive RCT. Among 68 shoulders, 38 shoulders (55.9%) had CSAM, 10 shoulders (14.7%) had suprascapular neuropathy and 1 shoulder (1.5%) had axillary nerve palsy. Prevalence of neuropathy combined with massive RCT in pseudo-paralyzed shoulders was thought to be very high (72%). The prevalence of massive RCT concomitant with CSAM was very high. Our results showed that the fatty infiltration of rotator cuff muscle became worsen in large to massive RCT because of the combination of disuse due to the RCT and paralysis due to neuropathy. Careful neurogenic screening is recommended in patients with large to massive RCT, especially in patients who cannot actively elevate shoulders less than 90 degree.

R1-O-03  Factor affecting postoperative retear size in patients with large/massive tears who underwent arthroscopic rotator cuff repair

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Introduction:Retear after arthroscopic rotator cuff repair (ARCR) is a critical issue, especially in large/massive cuff tears; however, factors affecting postoperative retear size in these patients remains unknown. The aim of this study was to identify the factor affecting retear size in patients with large/massive tears who underwent ARCR.Methods:102 patients with large/massive cuff tears underwent ARCR. Of whom, 26 patients who had types IV or V in Sugaya's classification were subjects for this study (average age: 65±/-8.5 years). According to MRI one year after surgery, the patients were divided into 2 groups: Individuals who had one facet involved in retear (single group) and those who had 2 or more facet (multiple group).

Results:Multiple group consisted of 16 cases(13 cases with middle + superior facets and 1 case with lesser tuberosity + superior facet) and single group of 10 cases (4 cases with superior facet and 6 cases with middle facet). JOA /UCLA scores in both group significantly improved postoperatively (P<0.05, respectively). Step-wise multivariate analysis revealed that the infraspinatus fatty degeneration is a unique risk factor (Cut off value: Grade 2 by Gotzaller classification, odds ratio 11.5, AUC = 0.87, 95% CI: 0.51 - 5.72, P<0.004).

Conclusion:The infraspinatus fatty degeneration is a significant risk factor affecting postoperative retear size in patients with large/massive cuff tears who underwent ARCR.
R1-O-04  Long term structural integrity of the well repaired rotator cuff :  
Mean 8-year follow up study

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Introduction: Long-term postoperative radiographic change and clinical results of well-healed rotator cuff repairs are unclear in the patients considering their affected shoulders as asymptomatic. The purpose of this study was, by use of serial MRI evaluation, to identify the integrity and re-tear rate of repaired tendon after arthroscopic rotator cuff repair in the long-term follow up at least 5 years. Materials and Methods: Seventy-eight shoulders were included in this study. All the patients verified as healing at 6 month postoperative magnetic resonance imaging (MRI) were included in this study. All patients were assessed both preoperatively, 6 month postoperatively and minimum of five years after surgery at active range of motion and the Japan Orthopedic Association (JOA) score. Structural integrity of repaired tendons was also examined by MRI and results were classified according to the Sugaya’s classification. Results: The average follow-up period was 94.8 (range, 60-174) months. The number of re-tear at final examination was 11 and re-tear rate was 14%. Statistically significant clinical improvements were observed after surgery. Range of motion and JOA scores improved from preoperatively to at six months. Paired analyses showed no differences between the clinical scores at six months and mean eight years. There were no significant differences between re-tear group and healed group at clinical scores over an entire period. The size of rotator cuff tear, the extent of retraction of torn tendons and the degree of fatty infiltration of the supraspinatus and infraspinatus muscles were severe in the re-tear group.

R1-O-05  Effect of rotator cuff repair tension on the cuff integrity after arthroscopic rotator cuff repair

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Objectives: Purpose of this study was to investigate the correlation between the preoperative MRI findings and intraoperative repair tension (RT) during arthroscopic rotator cuff repair (ARC) and to investigate the effect of RT on the postoperative cuff integrity

Methods: Prospective evaluation of 79 consecutive patients with 79 full-thickness RC tears was performed. All tears were repaired arthroscopically with double-row or suture-bridge techniques by one surgeon. RT was measured according to Davidson with the arm placed in 30 degrees of abduction in the scapular plane. Preoperative MRI studies were evaluated for medial to lateral length (L) and anterior to posterior width (W) of the tear, fatty infiltration and muscle atrophy of supraspinatus. Postoperative RC integrity was evaluated on MRI at 3 months after surgery. Pearson and Spearman correlation coefficients were calculated to determine the degree of linear correlation between the RT and the preoperative findings. A receiver operating characteristic (ROC) analysis was performed to analyze the discriminatory power of RT to predict retear and to determine the cutoff value between healing and retear.

Results: Mean RT was 25.9N and retear was found in 20 shoulders (25%). Among the preoperative MRI findings, L showed the greatest correlation with RT (r=0.58). The ROC analysis revealed a moderate discriminatory power for the repair tension (AUROC=0.70), with a cutoff value of 28.9N.

Conclusions: Tear size in the medio-lateral dimension was strongly correlated with the repair tension. ROC curve indicated that RT demonstrated moderately good performance in the prediction of rotator cuff integrity after surgery.

R1-O-06  Repair function and functional outcome after arthroscopic 3 rotator cuff tendons repair- indication and limitation of primary repair-

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Background: The purposes of this study were to assess cuff integrity for some tendons and superior migration of the humeral head and whether transverse force couple mechanism was broken or not. Material and methods: From September 2010 to May 2014, a consecutive series of 40 patients with full-thickness rotator cuff tear including subscapularis tendon and infraspinatus tendon were included retrospectively. 10 patients lacked complete follow-up data or were lost to follow-up. This study subjects included 15 men and 15 women, with an average age of 65.3 years. We defined Sugaya type 1 as no tear, type 4 as re-tear, Acromio-humeral distance (AHI) was measured using magnetic resonance imaging (MRI) coronal view. Less than 8mm was defined severe, rupture of transverse force couple was assessed using MRI axial view. If joint congruency is not good, we defined it as rupture. Results: The average clinical outcome scores all improved significantly at the time of the final follow-up. At a mean of fourteen months post-operatively, MRI revealed that 17 shoulders had a non-tear’s shoulders, one tendon tear, 6 shoulders two tendon tears. According to AHI: Severes were 12 cases preoperatively, 7 post-operatively. Rupture of transverse force couple was 20 cases preoperatively, 4 cases post-operatively. Conclusion: Arthroscopic rotator cuff repair for three tendon tears can result in improved repair integrity and superior migration of the humeral head and transverse force couple.
The outcome of ARCR for large and massive rotator cuff tear along anatomy

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Background: Large or massive rotator cuff tear (RCT) are sometimes difficult to handle how to fix torn cuff effectively at surgery and obtain good results. There are many reports about rigid fixation and nuture way of torn cuff, but a few reports about repair design. We evaluated the outcome of ARCR for large and massive RCT along anatomical repair design.

Objects and methods: objects are consisted of 90 shoulders followed-up more than 2 years. There are male 52 shoulders, and female 38 shoulders with average age at surgery 66.4 years old. Repair design was performed along anatomical cuff insertion. Surgical method: footprint was medialized. After CII capsule, SAB all released, SSP fixed by single row, ISP was pulled out to antero-laterally and fixed by bridging suture. We evaluated the outcome by JOA score, cuff integrity postoperatively using MRI and re-tear rate. Also investigated relation of Goutalliars classification before surgery.

Results: JOA score was significantly improving after surgery. Cuff integrity type4 & 5 were seen in 9 shoulders. Re-tear rate was 10%. Goutalliars classification grade of re-tear group had no deference compared with no-tear group.

Conclusion: The outcome was much better than other reports. Anatomical repair design was one of important factor to obtain restore function and avoid re-tear.

The outcome of arthroscopic repair and difference between grade 1 and 2 in Hamada classification for massive rotator cuff tears

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Purpose: To clarify the outcome of arthroscopic repair and difference between Grade 1 and 2 in Hamada classification and for massive rotator cuff tears.

Methods: This study included 42 patients who underwent arthroscopic repair with Netlike DAFM procedure for type 3b massive contracted rotator cuff tears in Davidsson classification. Grade 1; acromio-humeral intervals (AHII) more than 6 mm on preoperative plain x-rays in neutral position in standing. Grade 2; AHII less than 5 mm. Grade CT2: AHII more than 6mm on x-ray and less than 5mm on CT. JOA score and postoperative cuff integrity on MRI, preoperative MRI findings and operative findings were evaluated among 3 groups.

Results: Mean follow-up period was 17 months (12-33). In order of Grade 1, Grade CT2, and Grade 2, there were 15, 16, 11 cases, mean age at surgery was 67, 67, 68 years. JOA score was 93, 94, 93 points, and the rate of retear was 13, 31, 9 %. There was no significant difference among 3 groups in the operative outcomes, preoperative MRI and operative findings. However, there were significant differences between Grade 1 and Grade CT2 combined with Grade 2 in fatty infiltration of infraspinatus and detachment of superior labrum.

Conclusions: difference between grade 1 and 2 in Hamada classification for massive rotator cuff tears was related into fatty infiltration of infraspinatus and detachment of superior labrum. There was no difference in the operative outcomes of arthroscopic repair with Netlike DAFM procedure and the rate of retear.

Clinical results after endoscopic modified Debreyre-Patte procedure for irreparable massive rotator cuff tears

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Purpose: The purpose of this study was to evaluate the clinical results after the endoscopic modified Debreyre-Patte procedure for irreparable massive rotator cuff tears.

Materials and Methods: Thirty patients who underwent endoscopic modified Debreyre-Patte procedure. Nine males and four females with an average age of 66.6 years old were followed for 31.0 months on average. The supraspinatus and infraspinatus muscle origin were exfoliated using endoscopy from the portal on the medial border of the scapular. Rotater cuff repairs were performed after advancement of the supraspinatus and infraspinatus muscle. Clinical results were evaluated using JOA scores and repair integrity were evaluated by Sugaya's classification.

Results: The mean postoperative JOA scores improved from 88.0 to 91.5. Repair integrity was type I in 7 shoulders, type II in 2 shoulders, type III in 1 shoulder, type IV in 1 shoulder, and type V in 2 shoulder.

Conclusions: Using endoscopy for the detachment of the supraspinatus and infraspinatus muscle origin, this method could be performed a low invasion for trapezium and a detachment safely keeping the fascial continuity of rhomboides and the supraspinatus or infraspinatus. Endoscopic modified Debreyre-Patte procedure offers useful method for irreparable massive rotator cuff tears.
R1-O-10  Short term clinical results of latissimus dorsi and teres major anterior transfer to reconstruct irreparable subscapularis tendon

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Purpose: The purpose of this study was to evaluate short term clinical results of latissimus dorsi and teres major anterior transfer to reconstruct irreparable subscapularis tendon tear.

Materials: We evaluated 10 shoulders in 9 patients. Average age at surgery was 74.3(66-84) and follow-up period was 9 months(6-24). We analyzed active range of motion and JOA shoulder score for 7 shoulders treated with small size humeral head replacement and rotator cuff reconstruction for cuff tear arthropathy, 1 shoulder treated with reverse shoulder arthroplasty for cuff tear arthropathy, 2 shoulders treated with small size humeral head replacement, humeral head bone graft to the glenoid and rotator cuff reconstruction for chronic anterior shoulder dislocation and 1 shoulder treated with open rotator cuff repair for massive rotator cuff tear. All cases were performed latissimus dorsi and teres major anterior transfer to reconstruct irreparable subscapularis tendon tear.

Results: There was no complication during and after surgery. Active flexion was improved from 49.0±16.0 (121.5±30-155) to 121.5±30-155 and external rotation was improved from 28.0±20-60 to 37.0±20-60, JOA score was improved from 49.4±points(30-65) to 78.2±points(65-89), postoperatively. Improvements of flexion and JOA score were statistically significant (p<0.001, p<0.005).

Discussion and conclusion: Pectoralis major transfer has been performed for irreparable antero-superior rotator cuff tears. We expect that latissimus dorsi and teres major anterior transfer is more effective to stabilize the humeral head than pectoralis major transfer. Improvement of motion was observed for short term period. Longer follow-up will be necessary to evaluate this procedure.

R1-O-11  Hemiarthroplasty for the re-tear of the rotator cuff

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The purpose of this study was to evaluate outcomes of small-head hemiarthroplasty (HHR) with rotator cuff repair for the re-tear of the rotator cuff. We investigated 10 shoulders (four males, six females) that were treated by HHR for a re-tear after rotator cuff repair. The mean age was 72.5 years old. The previous surgeries before HHR were 5 open rotator cuff repair (ORCR), 1 twice ORCR, 2 arthroscopic rotator cuff repair (ARCR), 2 twice ACRCR. The clinical outcomes was evaluated by range of motion of the shoulder and JOA score pre and postoperatively. The mean follow-up period was 36.9 months. In the 10 shoulders, there were two shoulders treated by HHR with primary rotator cuff repair, six by HHR with partial subscapularis tendon transfer, one by HHR with latissimus dorsi muscle transfer and one by HHR with pectoralis major muscle transfer. All patients had improvement in preoperative severe or moderate pain. The mean active flexion was improved postoperatively. The mean JOA score was improved from 49.1 points to 70.9 points. In the seven shoulders which JOA score was less than 70 points, four were in Seebauer type IA and IIB. The results suggested that although HHR with rotator cuff repair could be useful treatment for re-tear of rotator cuff, it is necessary to consider a treatment using reverse total shoulder arthroplasty for the shoulders with a superior translation and an insufficient joint stabilization.

R1-O-12  Clinical results of arthroscopic massive rotator cuff repair with superior capsule reconstruction using long head of the biceps tendon

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Purpose: The purpose of this study was to evaluate the clinical results of arthroscopic partial repair of massive rotator cuff tears with superior capsule reconstruction using LHB tendon.

Methods: 8 shoulders were involved in this study. 4 males and 4 females were included. Their mean age was 71.5 years old, and mean follow-up period was 20.4 months. There were 4 cases with 3-tendon involvement, and 4 cases with supraspinatus and infraspinatus tendons. An intact LHB tendon was fixed to the greater tuberosity using one suture anchor. And then, partial repair of massive rotator cuff tear was performed. Pre and postoperative JOA score, Acromio-Humeral Index (AHI) by XP, and postoperative cuff integrity by MRI findings were investigated.

Results: Mean JOA score improved significantly from 52.7 to 89.3 points. AHI improved from 38.3cm to 4.3cm. Postoperative tear size became smaller in 5 shoulders. 1 shoulder could not improve active forward elevation.

Conclusion: Arthroscopic partial repair of irreparable massive rotator cuff tears with superior capsular reconstruction using LHB tendon would be one of the useful options.
R1-O-13  Results and indication of semitendinosus tendon and gracilis tendon graft for massive rotator cuff tear.

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Repair of massive rotator cuff tear is very difficult problem. We use semitendinosus tendon and gracilis tendon graft (ST/G graft) for massive rotator cuff tear. Purpose of this study is to reveal the results and indication of the ST/G graft. Fifty-five patients were studied shoulder score of Japanese Orthopedic Association (JOA score), shoulder ROM, quick DASH, muscle power, rotator cuff defect and classified according to Sugaya's classification by 1 year after operation MRI. There are 11 patients of Sugaya1, 27 patients of Sugaya2, 7 patients of Sugaya3, 2 patients of Sugaya4, 8 Patients of Sugaya5. Muscle power was decreasing from Sugaya1 to Sugaya5. JOA score and quick DASH were worse in the grope of Sugaya3.5. Re-tear rate of rotator cuff after 1 year of ST/G graft was 18.1%. Wider defect of rotator cuff tear make more incident of re-tear after ST/G graft. So indication of ST/G graft for wider defect patients of massive rotator cuff tear will not be good.

R1-O-14  Arthroscopic patch graft procedure for irreparable massive rotator cuff tears using Teflon felt: clinical and radiological characteristics.

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(Purpose) This study investigates the outcomes of primary arthroscopic patch graft procedure using Teflon felt for irreparable massive rotator cuff tears.

(Methods) We retrospectively analyzed 23 patients treated by primary arthroscopic patch graft procedure using Teflon felt between April 2003 to June 2007. The age at operation was 63.1 years old (range:40-74), including 11 males and 12 females. After a tendon mobilization procedure, a Teflon felt patch was introduced to the gleno-humeral joint through the standard anterior portal and fixed arthroscopically with metal anchor. The average postoperative follow-up period was 8.5 years. Clinical findings and diagnostic imaging findings were investigated.

(Results) Shoulder joint range of motion, manual muscle strength testing at external rotation, and clinical scores improved during 1 year postoperatively, and the improvement was maintained until final follow-up. The preoperative JOA, UCLA, and ASES scores were 64.1, 15.2, and 44.4. These scores improved significantly to 87.5, 29.8, and 82.8 at 1 year postoperatively. The final follow-up scores were 814, 28.5, and 79.5. The shoulder osteoarthritis worsened significantly with time. Cuff integrity improved during 1 year postoperatively and remained improved until final follow-up. Incidence of re-tear cases at final follow-up was 46.7%.

(Conclusions) The shoulder osteoarthritis progressed, but shoulder function still remained at medium to long follow-up. Arthroscopic patch graft procedure using Teflon felt may be considered as an alternative procedure for these difficult patient populations.

R1-O-15  Postoperative results of superior capsular reconstruction for unreparable rotator cuff tears

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(Purpose) We performed superior capsular reconstruction (SCR) for unreparable rotator cuff tear without humeral antero-superior escape and glenohumeral arthritis. These post-operative results were evaluated.

(Methods) Fifteen shoulders performed SCR out of 409 rotator cuff surgeries for three years were enrolled in this study. These were 13 males, 2 females, average age at operation was 67.7 years old, and average follow-up period was 17 months. Preoperative and postoperative JOA score, ROM, muscle power, muscle fatty infiltration, cuff integrity, and preoperative direction of humeral head were evaluated.

(Results) Preoperative JOA score (66.1) was improved to 80.9 postoperatively. Postoperative flexion was 139.2 and ER 39.2, and the average period for obtaining 90 degrees flexion was 5.3 months. Postoperative cuff integrities by Sugaya classification were type1 for 6 shoulders, type3 for 2, type4 for 3, and type5 for 4. The grafted fascia latae were well fixed to greater tuberosities but ruptured between grafts and teres minor in type 4. The preoperative JOA score and postoperative ER muscle power had positive correlation with postoperative JOA score. Postoperative JOA score in type 5 was lower than that in type 1, 3, 4. All four shoulders those had centripetal positioned humeral heads preoperatively acquired type1 cuff integrity. Preoperative flexion power, fatty infiltration, active flexion over 90 degrees, and bony erosion had no correlation with JOA score.

(Results) Centripetal humeral head to the glenoid and preserved ER muscle power are the optimal factors for SCR, and postoperative rerupture of graft should be prevented.
Increase in Shoulder Muscle Strength after Arthroscopic Superior Capsule Reconstruction: Comparison with Arthroscopic Rotator Cuff Repair

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Introduction: Arthroscopic superior capsule reconstruction (ASCR), which is a new surgical treatment for irreparable rotator cuff tears, restores shoulder function. The objective of this study was to investigate if shoulder muscle strength increases after ASCR by comparing with arthroscopic rotator cuff repair (ACR).

Methods: Twenty-one patients with reparable rotator cuff tears (mean age 63 years) underwent ACR. Thirteen patients with irreparable rotator cuff tears (mean age 68 years) underwent ASCR. Muscle strength was evaluated with digital handheld dynamometer before surgery and at final follow up after surgery. Shoulder abduction, external rotation, and internal rotation strengths were measured at 0 and 90 degrees shoulder abduction positions.

Results: Preoperative muscle strength did not differ between ACR and ASCR. All muscle strength except internal rotation at side significantly increased after ACR (0 degrees abduction position: abduction strength 90% relative to the contralateral shoulder, external rotation 89%, internal rotation 90%, 90 degrees abduction: abduction 86%, external rotation 84%, internal rotation 95%). After ASCR, all muscle strength was significantly improved (0 degrees abduction position: abduction strength 99% relative to the contralateral shoulder, external rotation 82%, internal rotation 96%, 90 degrees abduction position: abduction 72%, external rotation 71%, internal rotation 87%). There was no significant difference in postoperative muscle strength between ACR and ASCR.

Conclusion: ASCR significantly increased shoulder muscle strength in abduction, internal rotation and external rotation, similarly to ACR, although any rotator cuff muscles were not reattached to the greater tuberosity. This result suggests that shoulder muscle strength increases by restoring shoulder stability after ASCR.
R1-T4-1  Usefulness of Shoulder 36 for the early postoperative period of the rotator cuff repair
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Purpose: Presently, JOA score and UCLA score are used for the postoperative evaluation of the rotator cuff repair. On the other hand, there is a few reports of the evaluation using Shoulder36 (Sh36) which is patients basis evaluation. The purpose of this study is to identify a usefulness of Sh36 for the early postoperative period of the rotator cuff repair.

Methods: We examined 44 shoulders after rotator cuff repair, and researched Sh36, JOA score and UCLA score in preoperative and postoperative 3-month, 6-month. We compared preoperative score to postoperative score, and assessed the correlation of these cases between Sh36 and other scores in each period.

Results: About JOA score and UCLA score, there were a significant improvement postoperatively. About SF36, all domain were significantly improved in postoperative 6-month. In postoperative 3-month, there was a significant improvement about pain, ROM, power, but there was no significant improvement about general health, ADL and ability for sports. There was a significant positive correlation between Sh36 and JOA score, UCLA score in all periods.

Conclusion: Because Sh36 correlated with other score, Sh36 is useful as a postoperative evaluation after the rotator cuff repair, particularly postoperative six months later.

R1-T4-2  Relationship between Shoulder36 and Simple Shoulder Test in patients with rotator cuff tear
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Background: Shoulder36 (Sh36) is a patient-based rating system for patients with shoulder disorder, as Simple Shoulder Test (SST) used in the world. The purpose of the present study was to examine the relationship between SST and Sh36 in patients with rotator cuff tear.

Methods: 230 patients with rotator cuff tears were candidate for this study. Of whom, SH36, SST and JOA score at initial visit in our hospital were evaluated and analyzed simultaneously. Pearson's correlation coefficient was used for statistical analysis.

Results: Values in JOA score and SST showed 72.52 ± 12.76 and 5.28 ± 0.96 points, respectively. Values in each domain of Sh36 demonstrated 2.88 ± 0.96 points in Pain, 2.85 ± 0.96 points in ROM, 2.46 ± 1.33 points in Power, 3.01 ± 0.86 points in General Health, 2.87 ± 0.96 points in ADL, and 1.93 ± 1.32 points in Ability of Sport. There were significant correlation between each domain of Sh36 and SST: Pain (r = 0.73, P <0.01), ROM (r = 0.70, P <0.01), Power (r = 0.73, P <0.01), General Health (r = 0.67, P <0.01), ADL (r = 0.69, P <0.01), Ability of Sport (r = 0.62, P <0.01).

Conclusion: The present study found significant correlation between Shoulder 36 and SST in patients rotator cuff tear.

R1-T4-3  Postoperative evaluation of the rotator cuff repair using the Japanese Orthopaedic Association Shoulder 36 Ver. 1.3 and JOA score
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The purpose of this study was to evaluate the postoperative result of the rotator cuff repair using Shoulder 36 Ver. 13 (Sh36) and JOA score. 68 shoulders in 68 patients who underwent arthroscopic rotator cuff repair were included in this study. 58 shoulders without postoperative re-tear included 30 shoulders with preoperative small-medium tear (SM group) and 28 shoulders with preoperative large-massive tear (LM group). 10 shoulders had postoperative re-tear (re-tear group). Sh36 and JOA score were evaluated at pre-operation, postoperative 3, 6 and 12 months. Postoperative scores were evaluated among 3 groups and among 4 time points, statistically. The relations between JOA score and Sh36 were statistically evaluated in every time points. The JOA score at postoperative 12 month statistically significantly improved in comparison with those at pre-operation in all groups. However, JOA score of the re-tear group statistically significantly lower than those of SM and LM groups at postoperative 12 months. All domains of Sh36 at postoperative 12 months statistically significantly improved in comparison with those at pre-operation, except of the general health in the re-tear group. Almost domains showed statistically significantly improvement at postoperative 6 months in SM and LM groups, however, at postoperative 12 months in the re-tear group. Preoperative pain of JOA score did not have relations with preoperative pain, ROM, ADL of Sh36, however, other pain, function, ROM of JOA score had relations all domains of Sh36. Sh36 and JOA score were useful for the postoperative evaluation of the rotator cuff repair.
R1-T4-4  Outcome of arthroscopic surgery for patients with rotator cuff tear using the JOA score and shoulder36

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Purpose: The purpose of this study was to evaluate the Japanese Orthopaedic Association shoulder scoring system (JOA score) and Shoulder36(Sh36) about the patients with rotator cuff tear after arthroscopic surgery.

Methods: We evaluated 58 shoulders (43 males, 15 females: group of all the patients: Group A) at pre and 12 months postoperatively. The mean age at the operation was 64.5 years old. 53 shoulders were underwent arthroscopic rotator cuff repair and 5 shoulders (group of incomplete repair: Group I) were underwent arthroscopic partial repair or subacromial decompression. There were 5 shoulders (group of retear: Group R) with torn tendon by postoperative MRI. We investigated JOA score (total, pain, ADL and ROM) and Sh36(pain, ROM, Muscle strength, General health and ADL) about Group A, I and R.

Results: All the JOA score and Sh36 increased significantly in group A. The ROM of Sh36 in Group I and total score and pain of JOA score in Group R increased significantly.

Conclusion: Clinical outcomes after arthroscopic surgery about rotator cuff tear were almost satisfactory. Although clinical outcomes of the patients with torn tendon were good in JOA score, they were unsatisfactory according to Sh36. In order to evaluate the results actually, it is necessary to investigate both JOA score and Sh36.

R1-T4-5  The usefulness of functional outcome measures for patients with shoulder arthroscopic surgery

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The purpose of this study was to assess the usefulness of shoulder functional outcome measures for patients who underwent shoulder arthroscopic surgery.

Methods: Shoulder function of patients who underwent arthroscopic surgery for rotator cuff tear (RCT, n=58) and Bankart lesion (BL, n=112) were evaluated using Sh36, Disability of the Arm, Shoulder and Hand (DASH), and Japan Orthopaedic Association Shoulder Functional Score (JOA score) pre- and 3, 6, 9, 12, 18, 24 month postoperatively. We assessed correlations among Sh36, DASH and JOA score.

Results: Six domains of Sh36 gradually increased in patients with RCT during the study periods, and there were significant correlations among Sh36, DASH and JOA score (r=0.61-0.92). On the other hand, in patients with BL the power and ability of sports domains improved significantly at 6 months after surgery, however, there was no change in the pain, ROM, general health, and ADL domains during the study periods in Sh36. The correlation between Sh36 and JOA score was weak.

Conclusions: Sh36 was a very effective measure to evaluate QOL function in patients with RTC after surgery, on the other hand, in patients with BL 4 domains of Sh36 did not change. Further adjustment of Sh36 is required to appropriately evaluate patients with BL.

R1-T4-6  Ability to reapear results of the shoulder36 for traumatic shoulder instability.

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(Purpose) We investigate the ability to reappear results of the shoulder 36 by identifying characteristics and process of the evaluation questionnaire for traumatic shoulder instability.

(Methods) We investigated 28 shoulders with traumatic shoulder instability. The average age was 26yrs(15-45). At the start we investigated the patient using the shoulder 36, Rowe score, JSS shoulder instability score. At the next time(after 2 weeks), we investigated the patients using the shoulder 36, Interclass Correlation Coefficient(ICC) of test-retest in each domain of the shoulder 36 was calculated

(Results) In Each domain point was as follows; pain was 36, Range of motion (ROM) was 34. Muscle strength was 29, General Health was 37. Ability of daily living (ADL) was 36. Ability for sports was 29. ICC of pain was 0.641, ROM was 0.712, muscle strength was 0.795, general health was 0.591, ADL was 0.727, ability for sport was 0.773. there was slight and mild correlation between the shoulder 36 and other two scores.

(Conclusion) The shoulder 36 is thought to be the useful tool in evaluation of the patients with traumatic instability.
R1-O-17  High Occurrence of Clinical Feature of Capsulitis on the Symptom of Rotator Cuff Tear

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Background: The clinical symptom of rotator cuff tear (RCT) often similar to the one of idiopathic frozen shoulder (IFS). Recent studies have suggested that the high-intensity change of the capsule using non-contrast-enhanced MRI is remarkable findings in IFS with a diagnostic significance. The hypothesis of this study is that high-intensity change of the capsule which coexist with RCT could influence the clinical presentations.

Methods: Three hundred and two cases who had undergone pMRI for shoulder pain and limited range of motion (ROM) were reviewed. Cases with shoulder instability, rotator cuff tear and trauma were excluded. Subjects were divided into full RCT, partial RCT and nonRCT (IFS), the relationship between the presence of the high intensity signals and clinical symptom were investigated.

Results: One hundred thirty patients, 103 males and 120 females with a median age of 68 (range 29-85) years were included. The high-intensity change of the capsule was seen in 162 cases (70%) with significant relationship to both the loss of ROM and the night pain. The high-intensity change was observed in 35 cases (78%) of full RCT, 64 cases (60%) of partial RCT and 63 cases of IFS without significant difference of occurrence. MMT in full RCT had significant weakness.

Conclusions: This result may be indicated that the improvement the symptoms such as loss of ROM and night pain in RCT by conservative treatment were induced from the IFS which can be expected spontaneous recover.

R1-O-18  The characteristics of associated lesions with rotator cuff tears in patients over 70 years old

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(Purpose) The purpose of this study was to analyze characteristics of rotator cuff tears (RCTs) and clinical outcomes of Arthroscopic rotator cuff repair (ARCR) in patients over 70 years old.

(Methods) The subjects of 241 patients (251 shoulders) treated by ARCR were divided into two groups. Elderly group were 71 patients (75 shoulders) of over 70 years old whose mean age of 73.9 years old, included 37 females and 34 males. Control group were 170 patients (176 shoulders) of younger than 70 years old whose mean age of 60.1 years old, included 82 females and 88 males. Clinical outcomes were assessed on the basis of the JOA score. The average follow-up period was 8.56 months.

(Results) A subacromial spur was observed in 65.3% patients of elderly group, glenohumeral joint (GH) osteoarthritis in 46.7%, acromioclavicular joint (AC) osteoarthritis in 36.0%, LHB lesion in 24.0% and delamination in 29.3%. A subacromial spur was observed in 43.8% patients of control group, the GH osteoarthritis in 19.3%, AC osteoarthritis in 13.6%, LHB lesion in 17.6% and delamination in 19.3%. The average JOA score improved from 62.6 points preoperatively to 91.1 points postoperatively in the control group, and from 61.6 points to 89.2 points in the elderly group.

(Conclusion) This study suggests that ARCR for the elderly patients can provide significant improvement clinical outcomes. Elderly patients have various lesions associated with RCTs. ARCR with appropriate treatment for associated lesions could provide satisfactory outcomes in elderly patients with RCTs.

R1-O-19  Preoperative impact of neuropathic pain in patients with ARCR

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Neuropathic pain (NP) is recently focussed. In this study, we used pain DETECT to classify NP, Noceptive pain (NoP) and unclear pain (UC) in ARCR patients. All ARCR were 33 cases, NoP were 20 cases, UC were 8 and NoP were 5 preoperatively. Preoperative flexion in NoP, is 83.0 degree, in UC is 105.0 degree and in NoP is 114.5 degree. Resting NRS showed 4 in NoP, 1.8 in UC and 0.5 in NoP. Although pain in ARCR is due to NoP, some of ARCR have NeP. There may be limitation of flexion because NeP shows resting pain and high NRS score preoperatively.
R1-O-20 Are anatomical severities poor prognostic factors for conservative treatment of atraumatic rotator cuff tears?
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Background: The purpose of this study was to investigate whether anatomical severities of rotator cuff tears (RCT) were poor prognostic factors in conservative treatment for atraumatic RCTs.
Methods: This study included 102 shoulders in 101 patients with atraumatic RCT. Fifteen patients were classified into partial-thickness tears, whereas 87 patients were of full-thickness tears (22 small, 41 medium, and 24 large and massive tears). Three patients were combined tears of the subscapularis tendon (SSC). All the patients were treated conservatively with administration of non-steroidal anti-inflammatory drugs and physical therapy. We measured the VAS, Constant scores, and active range of motion as clinical outcomes at the initial and final visits.
Results: Larger tears did not improved well in VAS among 4 tear size groups (repeated measures ANOVA; p=0.032). Both at the initial and final visits, the larger tear group showed lower Constant scores (ANOVA; p=0.014 and p=0.0001, respectively) and restricted forward elevation (FE) (ANOVA; p=0.042 and p=0.013, respectively). Seven shoulders had no improvement for the conservative treatment and the arthroscopic surgery was performed. Operated shoulders have no difference among tear size groups. There were no significant differences in clinical outcomes between the partial- and full-thickness tear groups. Shoulders with SSC tear showed higher VAS, lower Constant scores, and lower FE at the final visit (ANOVA; p=0.002, p=0.001, and p=0.019).
Conclusion: Larger tears and combined SSC tear would be deteriorating factor for the conservative treatment of RCTs.

R1-O-21 Preoperative factors affecting accelerated functional recovery after arthroscopic rotator cuff repair
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Introduction: In JOA score, “Satisfactory” is set when 80 points or more is made (i.e., Good or Excellent). The present study sought the preoperative factor affecting the “Satisfactory” at 3 months after arthroscopic rotator cuff repair (ARCR).
Methods: 188 patients who underwent ARCR were subject for this study. They were divided into 2 groups according to their JOA score at 3 months after surgery: Individuals who had 80 or more (Group M) and those who had less than 80 points (Group L). The JOA score in both group was evaluated preoperatively to 24 months after surgery. Preoperative factors responsible for obtaining 80 points or more were evaluated by multivariate analysis. Results: The JOA score in Group M showed significant greater values than those in Group L throughout the periods; for Group L, it took one year to obtain 80 or more score after surgery. Multivariate analysis using ROC curve revealed that active elevation more than 120 degrees (AUC = 0.71, odds ratio 1.02, 95% Cl: 1.01-1.04), VAS at rest less than 32 (AUC = 0.61, odds ratio 0.79, 95% Cl: 0.64-0.96) and absence of contracture (odds ratio 29, 95% Cl: 1.08-8.53) were significant factor.
Conclusions: Active elevation more than 120 degrees and reduced pain level at rest , the absence of contracture were found to be important preoperative factors to obtain 80 or more score at 3 months after surgery.

R1-O-22 The risk factor of post arthroscopic rotator cuff repair for the anterior elevation angle at postoperative six months
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Background: We have experienced that comparatively small rotator cuff tears(RCT) are difficult to improve the anterior elevation(AE) after arthroscopic rotator cuff repair(ARCR). The purpose of this study is to extract AE failure factors from the data at 6months after ARCR.

Materials and methods 25 subjects who had undergone ARCR for small or moderate RCT were evaluated. We classified failure group(PG: 12cases 12shoulders) and good group(GG: 13cases 13shoulders) from based on AE average of post-operated(PO) 6months. We were examined items, gender, age, RCT size, and rest pain(FP), night pain, motion pain, ROM(AE, external rotation(ER), ER at 45degrees abduction(ER45), internal rotation at 45degrees abduction(ER45)) in preoperative and PO 1 to 4weeks, 3 and 6months.

Results It’s was a significantly worse ER45 at preoperative. RP at PO 1week, AE at PO 2 to 4weeks, AE and ER45 at PO 3 and 6months at FG.

Conclusion The results of this study indicate that limit of ER45 at preoperative, RP at early postoperative, limit of AE at until PO 4weeks, limit of AE and ER45 at PO 3months influence the AE failure factors at PO 6months. These were considered that stretching and gliding of the shoulder anterior tissues are involved in the outcome because the results of AE and ER45 were failure, in PO 3months.Consequently, the results suggested the importance of the approach to the shoulder anterior tissues and early pain control for the acquisition of good AE in PO 6months.
R1-O-23  Factor Affecting Clinical Outcome in Patients With Structural Failure After Arthroscopic Rotator Cuff Repair

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Purpose: To identify factors associated with clinical outcomes in patients with postoperative structural failure (re-tear after complete or partial repair) after arthroscopic rotator cuff repair (ARC). Methods: We conducted a retrospective study of consecutive patients with large or massive cuff tears who underwent ARC at our institution between 2005 and 2012. The patients were divided into three groups: healed group, retear group (after complete repair), and partial-repair group. The outcome measures comprised the Japanese Orthopaedic Association (JOA) and University of California, Los Angeles (UCLA) scores, muscle strength, and range of motion. The tear length/width, muscle atrophy, and fatty degeneration were evaluated by MRI. The extent of tendon reattachment to the superior, middle, and inferior facets and the lesser tuberosity was examined on MRI at final follow-up. Results: In total, 74 patients (healed, 41; retear, 19; and partial repair, 14) were included in this study. The mean age was 63.8 years, with a mean follow-up period of 36 years. The postoperative JOA and UCLA scores significantly improved in all three groups, but the differences were not significant. In the retear and partial-repair groups, postoperative tendon preservation at the middle facet significantly affected the JOA and UCLA scores (P = .003 and P = .014, respectively). Conclusion: The JOA and UCLA scores were significantly improved in patients with large/massive tears who had structural failure after ARC. In these patients, tendon preservation at the middle facet was a predictor of good clinical outcomes after surgery.

R1-O-26  Clinical outcomes and image evaluation of partial repair and retear cases after arthroscopic rotator cuff repair

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(Purpose) We evaluated the factors which influence clinical outcomes of partial repair or retear cases undergoing arthroscopic repair for rotator cuff tears. (Methods) 97 rotator cuff tears were included followed up more than 1 year postoperatively. We separated into 3 groups according to tear size. Partial tears and small tears were included Group S, middle tears were included Group M, large tears and massive tears were included Group L. (Results and Discussion) We used Japan orthopaedic association (JOA) score for the evaluation of clinical results. JOA score of 3 groups improved significantly and there were not significant differences among 3 groups. The retear rate was 0% in group S, 32% in group M and 24% in group L by MRI study. Then group L was separated into 3 groups furthermore, repair group, retear group, and partial repair group. Partial repair group included repaired partially and repaired with patch graft. JOA score of these 3 groups improved significantly and there were not significant differences among 3 groups, too. MRI evaluation, tear size of rotator cuff in coronal plane did not change, but in sagittal plane the size became small significantly in retear and partial repair groups. These suggested that reconstruct of force couple anterior-posterior is important. So, in rotator cuff repair completely or partially, we have to consider the method that maintain sagittal force couple even if the repaired cuff tear again.

R1-O-27  Relation of shoulder function and image findings after rotator cuff repair

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Purpose: We use MRI for evaluation after the rotator cuff repair, but these results does not conform to the clinical outcome. On the other hand, there are few reports of the evaluation using the ultrasonography postoperatively, and the relations with the clinical outcome are not clear. The purpose of this study is to identify a relation of shoulder function and image findings after the rotator cuff repair. Methods: We examined 642 shoulders after rotator cuff repair, and researched UCLA score. MRI findings and ultrasonographic findings in postoperative 6-month, 1-year and 2-years. MRI findings were classified in three groups by the cuff integrity, and ultrasonographic findings were classified in three groups according to border echo existing between the rotator cuff surface and deltoid muscle inferior surface by a dynamic evaluation. We assessed the correlation of these cases between UCLA score and image findings in each period. Results: About all cases, there was a significant negative correlation between UCLA score and ultrasonographic findings, but no correlation between UCLA score and MRI findings in all periods. Furthermore, in the cases that a rotator cuff restored in MRI, there was a significant negative correlation between UCLA score and ultrasonographic findings in all periods. Conclusion: Because this dynamic evaluation by the ultrasonography correlated with a postoperative shoulder function, our method is useful as a postoperative evaluation after the rotator cuff repair.
R1-O-28  Diachronic change of the length of tendon repaired after rotator cuff surgery
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We sometimes have seen the muscle-tendon junction moved medial by MRI in the patients with well repaired cuff after arthroscopic rotator cuff repair (ARC). The purpose of this study is to evaluate the incident and time of tendon elongation after ARC. Of 77 cases that underwent ARC in our hospital in 2013, 49 cases were elected in which supraspinatus tendon (SSP) was well repaired (Sugaya type 1 or 2) by MRI at 12 months. Out of this, 30 cases were included in this study which could measure the distance from lateral side of tendon footprint to muscle-tendon junction of SSP by T2 oblique coronal view of MRI at 1, 3, 6, 12 months after operation. In 9 cases, more than 3mm elongation on SSP was seen at 12 months compared with 1 month after operation. 3 were medium tear, 5 were large, 1 was massive tear at preoperative tear size evaluation. In 8 cases, more than 3mm elongation on SSP was already seen at 3 months compared with 1 month after operation. The mechanism of tendon retraction was still unclear in the past study. However, it was shown that some cases had tendon elongation in well repaired tendon after ARC. The analysis that tendon elongation is seen what kind of mechanism and in which cases will be required in future study.

R1-O-29  Change of intramuscular tendon angle of supraspinatus in rotator cuff tear
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Background: Ruptures of tendon of the rotator cuff causes various architectural muscle changes, for example retraction, atrophy and fatty degeneration. The aim of this study is to evaluate the change of intramuscular tendon angle (ITA) of supraspinatus muscle in rotator cuff tear.

Methods: 89 shoulders which underwent arthroscopic rotator cuff repair and 18 controls which intact rotator cuff enrolled in this study. Shoulder MRI scan was analyzed in the T2-weighted axial, oblique coronal and oblique sagittal planes. ITA was defined as the angle subtended by intramuscular tendon in supraspinatus and the articular surface of glenoid. Fatty degeneration of supraspinatus was classified according to the method of Goutallier et al. Repaired cuff integrity was evaluated using the criteria established by Sugaya et al. The configuration of the rotator cuff tear was observed under arthroscopic visualization. The correlation between ITA and other factors were determined statistically.

Results: Mean ITA was 88.7 degrees in control (n=18), 90.0 degrees in partial (n=19), 92.6 degrees in single supraspinatus (n=26), 95.3 degrees in posterosuperior (n=20), 94.9 degrees in massive tear (n=15). ITA increased significantly with enlargement of the tear. The ITA of re-tear group (95.3 degrees) was significantly increased than repair group (92.3 degrees) (p = 0.002). There was a tendency for increase of ITA to be caused by progression of fatty degeneration.

Conclusion: ITA of supraspinatus is directly correlated with the tear configuration and can be useful to predict repaired cuff integrity.

R1-O-30  Comparison of subacromial morphology of patient with and without rotator cuff tear by using 3D CT
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Subacromial spurs are frequently found at acromions of rotator cuff tear patients. We classified subacromial spurs of patients who underwent three-dimensional CT scans for pairs of shoulders. The patients with rotator cuff tears (121 shoulders) and without rotator cuff tears (44 shoulders) had evaluated the subacromial morphologic change by using CT and the cuff tear size measured by using MRI. Morphological characteristic of subacromial spur was evaluated by the shapes of inferior surface, and classified into tree types, anterior type, anterolateral type, and medial type by Ueno’s classification. We classified the cuff tear size measured using MRI by Cofield classification of rotator cuff tears. The proportion of medial type spur in patient with rotator cuff tears and without rotator cuff tears were 60.3% and 20.5%, respectively. We divided medial type spurs into two groups, Remora type and Tongue type. The proportion of large and massive tear of rotator cuff in Remora type spurs was significantly higher than in Tongue type (p = 0.021). Medial type spurs and Remora type spurs are suggested to be related to rotator cuff tears.
R1-O-31  Effusion change around HEALICOIL RG after arthroscopic rotator cuff repair

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Background: The purpose of this study was to evaluate effusion around HEALICOIL RG suture anchor after arthroscopic rotator cuff repair. Methods: A total of fifteen rotator cuff tear were arthroscopically repaired with a total of 37 HEALICOIL RG suture anchors. The mean age of all cases was 56.5 years old. The distribution of size of cuff tear was five partial and small size tears, seven medium tears, two large tears, one massive tear. The effusion around suture anchors was evaluated on MRI at 3 months and 6 months, 12 months after the repair. Results: High signal intensity change around the suture anchors on T2 weighted MRI scan showed 2 of 37 (5%) the suture anchors at 3 months and 13 anchors (33.1%) at 6 months, 20 anchors (54.1%) at 12 months respectively. The enlargement of effusion around the suture anchors at 12 months on T2-weighted image was 30.8% in 13 high intensity changes at 3 or 6 months and the reduction was 30.8%. On the other hand, the effusion around the suture anchors at 12 months was 62.9% in partial and small tear, 46.7% in medium tear, 50% in large tear and 66.7% in massive tear. Conclusion: The number of effusion changes around the suture anchor increased with time due to osteolysis. There was a possibility of reduction of the effusion around the suture anchor.
R1-ST-01 Usefulness of preoperative planning for reverse shoulder arthroplasty in Japanese patients: A cadaveric study
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Preoperative planning is important for optimizing baseplate position in reverse shoulder arthroplasty in small sized Japanese patients. The purpose of this study was to determine usefulness of preoperative planning in implanting baseplate in the appropriate location. Reverse shoulder arthroplasty was performed in 11 whole body fresh frozen cadavers. There were 6 males and 5 females. The average height and width of the glenoid was 35.2mm and 29.7mm in male and 28.2mm and 22.6mm in female. On the preoperative CT image 12 to 13mm superior to the inferior glenoid margin, template of the baseplate was superimposed where the central peg did not perforate posterior cortex. The distance between the anterior margin of the glenoid and center of the baseplate was measured. During the surgery, baseplate was implanted according to the preoperative plan. Superior screw was inserted adjacent to the base of the coracoid process under fluoroscopic control. The central peg did not perforate the cortex in any shoulder. The superior screw always came out inferior to the scapular notch without any damage to the supraspinal nerve. The angle between central peg and screw was 154 degrees in male and 69 degrees in female, which was smaller in female. In conclusion, preoperative plan optimized baseplate position in Japanese patients with small glenoid. Supraspinal nerve injuries can be avoided by inserting superior screw under fluoroscopic control.

R1-ST-02 Evaluation of glenoid screw insertion in reverse total shoulder arthroplasty
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Glenoid component of reverse total shoulder arthroplasty (RSA) is fixed by some screws. Therefore, it is important to insert the screws appropriately to prevent from loosening of the glenoid component. The purpose of the study was to evaluate insertion angles of the superior and inferior screws for the glenoid component fixation. Twenty cases who underwent RSA since July 2014 were included in the study. Diagnoses were cuff tear arthropathy in 12 cases, irreparable rotator cuff tears in 7 cases, and rheumatoid arthritis in 1 case. All surgeries were performed in deltopectoral approach. Equinoid Reverse (Tornier) were used in 9 cases, and SMR Reverse (Lima) were used in 11 cases. Length of the superior and inferior screws for the glenoid component fixations were analyzed and insertion angles to long axis of center peg were evaluated in AP view of radiographs. The mean lengths of the superior and inferior screws were 26.7 mm and 25.2 mm, respectively. The mean insertion angles of the superior and inferior screws were 85 degree upward and 0.7 degree downward, respectively. Three of the superior screws penetrated cortex of the glenoid neck, and their mean length was 23.3 mm and insertion angle was 160 degrees. The mean insertion angle of the other 17 superior screws was 72 degree. Since the supraspinal nerve and the axillary nerve run around the glenoid, the screws for glenoid component fixation should be inserted carefully to avoid injury of the nerves. The superior screws would be better to be inserted more parallel.

R1-ST-03 Pitfall for glenoid bone loss and deformity in reverse shoulder arthroplasty
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PURPOSE: The purpose of this study was to examine the pitfalls of reverse shoulder arthroplasty (RSA) in the cases of severe glenoid bone loss and deformity.
METHODS: We retrospectively evaluated 14 shoulders in 13 patients with severe glenoid bone loss and deformity who had undergone RSA. Glenoid cavity defects were recognized in 10 shoulders, anterior glenoid rim defects were recognized in 2 shoulders and Favard E3 type glenoid deformity was observed in 2 shoulders. We examined preoperative 3DCT evaluation and postoperative clinical results.
RESULTS: 3DCT evaluations were useful for accurate imaging of glenoid bone loss and deformity in all the cases. BIO-RSAs by using humeral head cancellous bone graft were performed in 10 shoulders with glenoid cavity defects. In 2 shoulders of anterior glenoid rim defects, humeral head graft was performed in one case; coracoid bone transfer was performed in one case. Angled BIO-RSAs with long pegged glenoid component were performed in two cases of Favard E3 type glenoid deformity. Postoperative clinical results were relatively excellent in all the cases.
CONCLUSION: Accurate preoperative evaluation with 3DCT in the cases of severe glenoid bone loss and deformity and appropriate surgical planning in each case is crucial for postoperative excellent clinical results with minimum complication.
R1-ST-04 The evaluation of reverse TSA result by glenoid model made with 3DCT

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(Aim) We made glenoid model by 3DCT image to place the best position for reverse TSA base plate.

(Method) 8 cases 10 shoulders were operated in our hospital. Preoperative CT images were measured; inferior angle and anterior angle of glenoid. Each glenoid model was fabricated with 3DCT image. After putting on base plate each screw was inserted and the length of it was measured. Postoperative 3DCT, each angle and screw length was compared with preoperative one.

(Results) About mean glenoid inferior angle and anterior angle there were significant difference between before and after operation preperation. About each screw there was not significant difference between preoperative one and postoperative one.

(Conclusion) Glenoid model which was made with preoperative 3DCT image was useful material to put base plate on the best place of glenoid at the reverse TSA operation.

R1-ST-05 Measurement of D-dimer in reverse shoulder arthroplasty

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Purpose: Pre- and postoperative D-dimer values were investigated in low-invasive shoulder arthroscopic surgery (arthroscopic rotator cuff repair: ARCR, arthroscopic subacromial decompression: ASD), and reverse shoulder arthroplasty (RSA).

Methods: The subjects were 30 cases (10 cases each in RSA, ARCR, and ASD groups: 18 men, 12 women) who underwent RSA. ARCR, or ASD in our department. Age was 51-79 years, mean 67.4. Compression stockings and foot pumps were attached intra- and postoperatively in all, and in RSA group after drainage tube removal edoxaban was administered for 14 days. Serum D-dimer values were compared preoperatively, 4th postoperative day, 1 week, and 2 weeks.

Results: Deep vein thrombosis (DVT) did not develop in any case. Preoperative D-dimer values were less than 1.0 &mu;g/ml in all groups. At the 4th day and postoperative 2 weeks as compared with RSA group in ASD group D-dimer values were significantly lower, while at postoperative 1 week D-dimer values in ARCR and ASD groups were significantly decreased. In one case in which RSA had been planned surgery was postponed because the preoperative D-dimer value was 7.54 &mu;g/ml and ultrasound revealed thromboses in the left common femoral and bilateral soleal veins.

Conclusion: In RSA group as compared with ARCR and ASD groups postoperative D-dimer values were significantly increased. DVT after RSA has been reported, and pre- and postoperative D-dimer measurement is useful for DVT screening.

R1-ST-06 The clinical value of reverse shoulder arthroplasty with intraoperative O-arm Navigation

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The correct implantation of the glenoid component is important in reverse shoulder arthroplasty (RSA). However, glenoid replacement remains challenging due to the difficult joint exposure and visualization. The purpose of this study was to evaluate the clinical value of reverse shoulder arthroplasty with intraoperative O-arm navigation (Medtronic, USA). 5 patients with a mean age of 77.0 years (5 shoulders) that underwent RSA with O-arm navigation were evaluated in this study. All patients underwent RSA by a deltopectoral approach. The reference frame was placed in the tip of the coracoid process. After CT scans were obtained by O-arm for navigation, the glenoid component placements were performed under O-arm navigation. A retrospective analysis of the time from the placement of the reference to start navigation, glenoid version angle, intraoperative and postoperative complications was evaluated. Glenoid version angle was measured on axial computed tomography scans preoperatively and one week postoperatively. The time from the placement of the reference to start navigation was 27.6 ± 2.4 minutes. From preoperatively to postoperatively, we found an average glenoid version angle from 6.8 ± 8.2°(range, -150 to 23.0) preoperatively to 0.6 ± 3.2°(range, -11.0 to 8.0) postoperatively. No intraoperative or postoperative complications occurred in this study. The main advantage of using intraoperative navigation has been reported to provide intraoperative guidance with high accuracy. The validity of the study is limited by the small number, our date suggested the accuracy of the glenoid component positioning in the transverse plane using an intraoperative navigation system.
R1-ST-07 The experience of bony increased offset reverse shoulder arthroplasty with superolateral approach

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Two surgical approaches including superolateral(SL) and deltopectoral(DP) are utilized for implantation of the reverse shoulder prosthesis(RSA). We used these different approaches depending on the condition of the subscapularis tendon. Since January 2016, we introduced bony increased offset reverse shoulder arthroplasty (BIO-RSA) for lateralization of the center of rotation. We report the short time clinical results of BIO-RSA with the superolateral approach compare with the standard RSA. There are 13 patients who had sufficient pre and postoperative radiographs to evaluate, including 3 males and 10 females with an average age of 77.1 years old at the time of surgery. 5 patients underwent BIO-RSA with the superolateral approach (SL-BIO+) group, 4 patients underwent standard RSA with superolateral approach (SL-BIO0 group), 4 patients underwent standard RSA with deltopectoral approach (DP-BIO0 group). The Aequalis Reversed Shoulder Prosthesis was used in all patients. We examined pre and postoperative radiographs to know the inferior tilt of the glenoid implant by measuring the glenopolar angle. A mean inferior tilt of the glenoid implant was minus 1 degree in SL-BIO0 group, 55 degrees in SL-BIO+ group, 14 degrees in DP-BIO0 group postoperatively. In SL-BIO0 group, an average time of the surgery wasn’t longer than others, and an average blood loss wasn’t more than others. Measuring the glenopolar angle of pre and postoperative radiographs was useful for evaluating the inferior tilt of the glenoid implant.

R1-ST-08 Short term results of reverse shoulder arthroplasty

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The purpose of this study was to evaluate the short term results of reverse shoulder arthroplasty in our institute. 11 shoulder (7 male, 4 female) with a mean age of 76 years old were included in this study. Etiologies of the shoulders were as follows. Cuff tear arthropathy 9 cases and massive rotator cuff tear 2 cases. JOA score, active elevation, active abduction, active external rotation and internal rotation were evaluated before and after surgery. Average follow up period was 11 months. JOA scores were 47 points before surgery, 81 points after surgery. Active elevation, active abduction, active external rotation were 41, 40, 18 degrees before surgery, 122, 118, 30 degrees after surgery. Although JOA score, active elevation, active abduction were significantly improved after surgery, external rotation was slightly improved after surgery, there were no difference in internal and rotation. There was no complication during and after surgery. A short term result of reverse shoulder arthroplasty in our institute was on the whole very good. We think that longer-term studies are required.

R1-ST-09 Clinical results of the cases treated by reverse shoulder arthroplasty

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(Purpose) The study design was a retrospective analysis of patient outcome data treated by reverse shoulder arthroplasty (RSA). 
(Patients and Methods) RSA was performed for 5 cases with irreparable massive rotator cuff tear, osteoarthritis, and proximal humeral fracture. There were 5 female patients and the mean patient age at the time of operation was 79 years old and the mean duration of follow-up was 94 months. We performed the operation by deltopectoral approach, and used Aequalis Reversed model made in TORNIER company. Clinical outcomes at final follow-up time were evaluated with Japanese orthopedic association (JOA) score. Pre-operative muscle fatty degeneration, glenoid morphology and bone loss was evaluated.

(Results) The quantity of operative haemorrhage was an average of 356.8cc for an average of 171 minutes for the operative time. As for the postoperative complications, manual numbness from the upperarm developed on 2 shoulders, but almost disappeared at the time of the follow-up. In addition, an acromial spine fracture was seen in 1 shoulder, but this got bone union conservatively. The mean JOA score was significantly improved from 51.8 points preoperatively to 79.9 points postoperatively. Postoperative dislocation or infection was not seen.

(CoConclusion) As for the case that deltoid atrophy due to cervical radiculopathy was seen preoperatively, the postoperative improvement of function by RSA was hard to be provided. It was thought that RSA was useful for pain reduction and functional improvement for degenerative arthritis or the comminuted fracture of the proximal humerus complicated such as rheumatoid arthritis at 70 years or older.
R1-ST-10  Reverse shoulder arthroplasty for the patients with acromial pathologies; two case reports.
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[Introduction] Deltoid muscle dysfunction is a contraindication of reverse shoulder arthroplasty (RSA); however, indication of RSA for the patients with acromial pathologies such as fracture, pseudoarthrosis, fragmentation and Os acromiale has been controversial. In this study we report two cases of massive rotator cuff tears accompanied by acromial pathologies, which treated with RSA and showed satisfactory progress one year after the operation.

[Case 1] 80-year-old women presented with severe pain and pseudoparalysis of the shoulder. She had a cuff tear arthroplasty accompanied by fragmentation of the acromion. RSA was performed without any operation for the acromion. One year after surgery, the patient had pain-free active forward elevation of the shoulder without a radiographic progression of the acromial lesion.

[Case 2] 70-year-old women presented with pain and pseudoparalysis of the shoulder. She had massive rotator cuff tear accompanied by Os acromiale. RSA was also performed without surgery for acromion. One year after surgery, the patient had pain-free active forward elevation of the shoulder.

[Discussion] A previous research reported that both acquired and congenital preoperative lesions of the acromion were not a contraindication to RSA. Our two cases of massive rotator cuff tears accompanied by acromial pathologies also showed a good clinical course without any operation for the acromion.

R1-ST-11  Short term clinical outcome of reverse total shoulder arthroplasty for rheumatoid arthritis
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[Purpose] Short period outcome of RSA in our institute was investigated to compare RA and cuff tear arthropathy (CTA).

[Methods] 16 patients of RSA were devided to RA group of 6 patients including mean age of 74.83 years, mean follow up periods of 7.83 months with 3 TORNIER , 3 BIOMET, on the other hand CTA group of including mean age of 75.2 years, mean follow up periods of 7.5 months with 5 TORNIER , 4 BIOMET, 1 ZIMMER. Clinical outcome was evaluated and compared with two groups statistically by JOA score.

[Results] JOA score before RSA was 30.83 in CTA group and 35.45 (p=0.1385) in RA group, then that after RSA was 22.80 in CTA group and 20.33 (p= 0.3324) in RA group. ROM score after RSA was correlated negatively with age significantly (r=-0.597, p=0.0146). Adverse event was one case of surgical site infection that was cured by debridement.

[Conclusion] Complication of RSA in RA is reported relatively high rate in 11-17 % depending to the patient condition before surgery. In this study, one case out of 6 cases of RA in 16.7% was SSL ROM improvement after RSA was recognized younger patients after 70 years significantly. BIOMET RSA was useful for RA in bone graft for glenoid because of easy procedure with central guide pin at the center of glenoid which is thick enough to fix the central screw.

R1-ST-12  Treatment of shoulder recurrent dislocations associated with massive rotator cuff tear using reverse total shoulder arthroplasty
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We report two cases of recurrent dislocations of the shoulder associated with massive rotator cuff tear treated with reverse total shoulder arthroplasty (reverse TSA).The patients were a 77-year-old and an 85-year-old females. Each patient presented with recurrent shoulder dislocation after reduction of glenohumeral joint dislocation. In each patient, massive rotator cuff tear (Hamada classification Grade4, respectively) was detected on radiographs and MRI. Surgical procedure: An approximately 7 cm incision from antero-lateral of the shoulder was made. Because the irreparable massive rotator cuff tear was identified, reverse TSA was performed. Each patient had not experienced recurrence of dislocation after reverse TSA. We conclude that reverse TSA can be one of the treatment options for recurrent dislocations of the shoulder associated with massive rotator cuff tear.
R1-ST-13  Reversed shoulder arthroplasty with modified L’Episcopo for combined loss of active elevation and external rotation

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Since November 2014, we have performed L’Episcopo procedure in addition to reverse total shoulder arthroplasty (RSA) for cuff tear arthropathy (CTA) with combined loss of elevation & external rotation (CLEER). The purpose of this study is to report the clinical outcomes for RSA with L’Episcopo procedure. Methods: Subjects consisted of 12 shoulders in 11 patients, including 7 males and 5 females with a mean age of 72.5 years old. Surgery was performed using extended delto-pectoral approach. After placed the glenoid component, most proximal part of pectoralis major tendon was released from the humerus. The latissimus dorsi(TM) and teres major(TM) tendon were detached from the origin and transferred to postero-lateral humerus. After reattaching both LD/TM and pectoralis major tendon, humerus component was inserted. Clinical outcomes were assessed using Constant and JOA score. Range of motion, Hornblower’s sign, Complications were evaluated. Results: The mean active forward elevation improved from 76.3 degrees (preop) to 155 degrees (12months). The mean Active/passive external rotation improved from -125/-208 degrees (preop) to 250/380 degrees (12months). Hornblower’s sign improved in all patients at 6 months. Constant score and JOA score were significantly improved after surgery. Radial nerve palsy was occurred in a patient. Conclusions: RSA with L’Episcopo procedure can improve both active forward elevation and external rotation, which is excellent procedure for CLEER patients.

R1-ST-14  Clinical and radiographic results of Bony Increased-Offset Reverse Shoulder Arthroplasty at short term follow-up

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Purpose: This study aimed to evaluate one-year postoperative clinical and radiographic outcomes of bony Increased-Offset Reverse Shoulder Arthroplasty (BIO-RSA) for cuff tear arthropathy.

Methods: We prospectively followed four cases in three patients with rotator cuff deficiency treated with BIO-RSA. Of the three patients, one case had baseplate migration at 3 months postoperatively after primary BIO-RSA and then underwent revision BIO-RSA. Patients underwent Constant score, radiographic, and CT assessment at 3, 6, 12 months postoperatively. Mean age at surgery was 76.7 years. Follow-up period ranged from 14 to 17 months. Based on the Favad classification of pathologic glenoid morphology, two cases were the Favad E2, and one case was the E3. Scapular notching was based on the system of Sirveaux et al.

Results: Of the two patients without revision surgery, there were no graft resorption, glenoid loosening after surgery. The patients had significantly improved Constant score from 12 and 10 preoperatively to 52 and 32 at final follow-up, respectively. The Constant score of the revision RSA patient improved from 30 preoperatively to 44 at final follow-up. Two patients had Sirveaux grade 0 scapular notching, and one did the grade 1. Discussion and Conclusion: CT images taken at 3 months postoperatively on the revision patient showed short screws without reaching to the opposite cortex of the native glenoid. This study can warrant orthopaedic surgeons to pay attention to rigid graft and implant fixation by monitoring screw length.

R1-ST-15  Early clinical results of arthroscopic anatomical Suture-Bridge Repair for large sizeComplete Rotator Cuff Tear

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We reported re-tear rate of arthroscopic rotator cuff repair (ARCBR) using anatomical suture-bridging technique (a-SB) for large size rotator cuff tear. We compared the re-tear rate using MRI Sugaya classification after 1 year surgery. 10 shoulders of suture-bridge technique (SB) and 5 shoulders of aSB were compared. Re-tear rate of SB was 70%, and the rate of aSB was 0%. We insert small anchor between middle and lateral row to control the excessive stress to the repaired rotator cuff when doing suture-bridge technique. Our study was small number but our technique has possibility to control the stress to the rotator cuff.
R1-ST-16 Clinical results and re-tear patterns of arthroscopic knotless suture bridge technique

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Purpose: The purpose of this study was to evaluate the clinical results and re-tear patterns of arthroscopic knotless suture bridge technique for rotator cuff tear. Material and Methods: We involved 65 patients treated by arthroscopic knotless suture bridge technique. There were 30 male and 35 female. The average age was 67.3 years old, and average follow-up period was 128 months. We evaluated the JOA score and cuff integrity by MRI using Sugaya's classification. Furthermore, using MRI, we classified the re-tear patterns in two types, re-tear at footprint (type1) and medial reattachment of tendon (type2). Results: The average post-operative JOA score improved from 61.7 to 86.6 points. According to post MRI finding, re-tear was found in 12 patients (18.5%). According to re-tear patterns' classification, type1 was found in 6 patients and type 2 was found in 6 patients. The fatty degeneration of muscle was more frequent in type1. Discussion: The clinical results of arthroscopic knotless suture bridge technique was almost good. Although without medial knot tying, type2 re-tear pattern was occurred. So it seemed unpreventable. On the other hand, type1 re-tear pattern was probably occurred by cut through of the low quality tendon. So, we must consider techniques such as not strongly holding tendon and adding medial not tying.

R1-ST-17 Is the arthroscopic modified tension band suture technique suitable for all full-thickness rotator cuff tears?

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Introduction: We aimed to identify the clinical and structural outcomes after arthroscopic repair of full thickness rotator cuff tears of all sizes with a modified tension band suture technique. Methods: Among 63 patients who underwent arthroscopic rotator cuff repair for a full-thickness rotator cuff tear with the modified tension band suture technique at a single hospital between July 2011 and March 2013, 47 were enrolled in this study. The mean follow-up period was 29 months. Visual analog scale scores, range of motion, American Shoulder and Elbow Surgeon scores, Constant scores, and Shoulder Strength Index were measured preoperatively and at the final follow-up. For radiologic evaluation, we conducted magnetic resonance imaging 6 months postoperatively and ultrasonography at the final follow-up. We allocated the small and medium tears to group A and the large and massive tears to group B and then compared clinical outcomes and repair integrity. Results: Postoperative clinical outcomes at the final follow-up showed significant improvements compared with those seen during preoperative evaluations (P < .001). However, group B showed worse clinical results than group A. Evaluation with magnetic resonance imaging performed 6 months postoperatively and ultrasonography taken at the final follow-up revealed that group B showed a significantly higher retear rate than did group A (69% vs. 6%, respectively; P < .001). Discussion: Arthroscopic repair with the modified tension band suture technique for rotator cuff tears was a more suitable method for small to medium tears than for large to massive tears.

R1-ST-18 Functional and Structural Outcome of Arthroscopic Suture Bridge Repair for Rotator Cuff Tear

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Objectives: The introduction of knotless anchors such as SwiveLock SP facilitated the Suture Bridge technique. The objectives of this study was to compare the functional and structural outcomes after arthroscopic rotator cuff repair (ARCR) among single-row Suture Bridge (SRSB) technique using SwiveLock, double-row Suture Bridge (DRSB) technique using a suture anchor and SwiveLocks, and compression double-row (CDR) technique. Methods: A consecutive series of 90 shoulders in 88 patients with rotator cuff tear repaired using Suture Bridge techniques were included in this study. Functional outcome was evaluated using the rating scale of the Japanese Orthopaedic Association (JOA) scores after ARCR. Thirty-nine shoulders were repaired using SRSB, 26 shoulders were repaired using DRSB, and 25 shoulders were repaired using CDR. Postoperative cuff integrity and failure mode was examined by magnetic resonance imaging. Results: The average JOA score improved significantly after the arthroscopic rotator cuff repair in all 3 techniques. The re-tear rates after ARCR were 10.3%, 7.7%, and 12.0%, respectively, for the SRSB, DRSB, and CDR techniques. There was no significant difference in re-tear rates among 3 techniques. All failures were observed at the musculotendinous junction or footprint after CDR or DRSB, while early pullout of SwiveLock was observed in two old female shoulders after SRSB. Conclusions: The functional and structural outcomes after three arthroscopic suture bridge repair techniques for rotator cuff tear was almost excellent. We recommend that caution should be exercised when placing SwiveLock into greater tuberosities with suspected osteopenia, particularly in cases of old female patients.
R1-ST-19  Functional and structural outcomes of suture bridge technique compared with transosseous technique in arthroscopic rotator cuff repair
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PURPOSE: The purpose of this study was to compare the functional and structural outcomes after arthroscopic rotator cuff repair (ARCR) between suture bridge technique (SB) and transosseous technique (TO).
METHODS: We retrospectively evaluated 36 shoulders who had ARCR (SB group: 16 shoulders, TO group: 20 shoulders). All patients were operated on the same surgeon. The average age at the surgery was 66 years old in SB group and 67 years old in TO group. The size of rotator cuff tear was 1 small, 6 medium, 4 large and 5 massive in SB group and 7 medium, 7 large and 6 massive in TO group. We compared operation time, clinical outcomes and cuff repair integrity between two groups.
RESULTS: Operation time of TO group was significantly shorter than that of SB group (105 minutes vs 166 minutes). Average active ROM in flexion was improved from 119 degrees to 147 degrees in SB group and from 112 degrees to 143 degrees in BR group. Average active ROM in abduction improved from 119 degrees to 149 degrees in SB group and from 106 degrees to 139 degrees in BR group. The rate of successful repair evaluated by postoperative MRI was 88% in SB group and 89% in TO group. No significant differences in functional and structural outcomes were observed between two groups.
CONCLUSION: Our study showed that TO group had equal functional and structural outcomes to SB group and shorter operation time.

R1-ST-20  Postoperative configuration change of Bone Trough and Bone Tunnel after Arthroscopic Transosseous with Bone Trough Repair
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The purpose of this study was to evaluate the postoperative configuration change of bone troughs and bone tunnels after the arthroscopic transosseous with bone trough repair for the rotator cuff tear. 22 shoulders of 22 patients who underwent rotator cuff repair in this method were included. In all of 22 shoulders, the MRI findings at postoperative 12 months did not show re-tear of the rotator cuff tendon. 22 shoulders underwent the CT analysis at postoperative 2 weeks, 5 or 6 weeks, 3 months, 6 months and 12 months. In the CT findings, postoperative configuration changes of the depth and width of bone troughs and the depth of the postoperative widen bone tunnels located at the lateral wall of greater tuberosity were evaluated. The depth of bone troughs at postoperative 12 months increased the average of 1.33 mm in comparison with those at postoperative 2 weeks. The depth of troughs increased statistically from postoperative 2 weeks until postoperative 3 months. The depth of bone troughs didn’t increase after the appearance of the osteosclerosis of bone troughs. The width of bone troughs increased outwards due to the wide of bone tunnels. The width of troughs statistically increased the average of 206 mm from postoperative 2 weeks until postoperative 3 months. The depth of widen tunnels statistically increased the average of 1.50 mm from postoperative 5 or 6 weeks until postoperative 6 months. These changes of bone tunnels might be affected by the tension of suture strings.

R1-ST-21  Clinical outcome of arthroscopic transosseous suture (ATOS) for rotator cuff tear
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Purpose: To investigate the clinical outcome of Arthroscopic transosseous suture (ATOS) for rotator cuff tear.
Material and Methods: Five hundred seventy live cases (282 males/ 293 females) were included. The average follow-up period was 249 months. The clinical outcome of ATOS was statistically analysed using JOA score (except for X-ray finding and stability; total 80 points), the tear size and MRI. Results: The average JOA score was significantly improved from 49.9 to 73.0 after ATOS. In the large tear cases, the average JOA score after ATOS was significantly lower than the middle tear cases. There was no significant difference among the incomplete tear, the small tear and the middle tear regarding the average JOA score after ATOS. The retear rate expressed by Sugaya grade 4 and 5 at MRI was 5.7% (3/57) in total. No retear was found in the incomplete/ small tear (0/61). The retear rate of the middle tear and the large/massive tear were 2.7% (10/374) and 16.4% (23/140), respectively. The average JOA score of the retear cases was 61.7 and significantly lower than the residual cases. Discussion: The current results have shown the encouraging clinical outcome of ATOS for rotator cuff tear. The retear rate was equivalent to the past reports regarding arthroscopic rotator cuff repair. Despite of the higher retear rate in the large/massive tear cases and the worse clinical outcome in the retear cases, ATOS have provided the significant clinical improvement and deserve for the surgical option of rotator cuff tear regardless the tear size.

The 43rd Annual Meeting of the Japan Shoulder Society
The 13th Annual Meeting of the Shoulder Function Study Group
R1-ST-22 Arthroscopic transosseous rotator cuff repair using ULTRATAPE. -A report of 12 cases-
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[Purpose]The aim of this study was to introduce arthroscopic transosseous rotator cuff repair technique using ULTRATAPE and evaluate short-term clinical outcomes of this surgical method.

[Method] We identified 12 patients with an average age of 67 years who underwent arthroscopic transosseous rotator cuff repair using ULTRATAPE. Surgical procedure was as follows: bone tunnels were created using the ArthroTunneler technique. The number of suture were 3-4 each tunnel: One or two ULTRATAPE and two or three stong suture. The sutures were passed through the rotator cuff and tied by simple stitch. The clinical results were assessed by range of motion (ROM) of the shoulder (flexion, external rotation), JOA score and MRI. The MRI assessment was performed on repair integrity according to Sugaya’s classification. Postoperative outcome scores were obtained at an average of 3 months.

[Results] There were four middle size tear and eight large size tear. Preoperative ROM was 130 degrees in active flexion and 39 degrees in ER. and preoperative JOA score was 68 points. Postoperative ROM was 139 degrees in active flexion and 29 degrees in ER and postoperative JOA score was 73 points.

[Conclusion] ULTRATAPE increased in more tendon to bone contact area than conventional braid. Further investigation is needed to elucidate the advantage of this surgical procedure.

R1-ST-23 Effectiveness of partial arthroscopic rotator cuff repair for anatomically irreparable massive rotator cuff tear.
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Purpose
Arthroscopic partial rotator cuff repair (APRCR) has been reported to be one of the treatment for massive, anatomically irreparable rotator cuff tear. The purpose of this study is to investigate the functional and clinical results of APRCR.

Materials and Methods
Of 68 subjects who received arthroscopic rotator cuff repair, 59 subjects were anatomically repaired (ARCR group), and 9 subjects were partially repaired because of their poor cuff condition (APRCR group). Pre operative conditions and post operative results were compared between two groups to evaluate the effectiveness of APRCR.

Results
With regards to the preoperative condition, tear size of APRCR group were significantly large compared with that of ARCR group. There was no significant difference between two group about incidence of concomitant subscapularis tendon tear and degree of muscle fatty degeneration. Active range of motion was significantly improved in both group, whereas the power of abduction was not improved in APRCR group. Each domains of shoulder 36 were significantly improved after surgery, and APICR group achieved good clinical result as well as ARCR group.

Conclusion
APCR for irreparable massive rotator cuff tear might have a similar clinical result to anatomical ARCR whereas irreparable muscle function was not sufficiently recovered.

R1-ST-24 Successful outcome of arthroscopic single-row repair with appropriate procedure for large or massive rotator cuff tears.
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Background: Double row or suture bridge repair are becoming increasingly popular. Repair methods and surgical skill are thought to be important, too. The purpose of this study is to evaluate an arthroscopic single row fixation with lower tensile strength of rotator cuff in patients with large or massive tear.

Methods: We reviewed the medical records of the patients admitted to Saiseikai Yahata General Hospital from January, 2014 to May, 2015. Among them, we chose the cases as below, Rotator cuff stumps of all patients were unable to be drawn to medial edge of footprint in their preliminary examinations, but reached to the medial edge with sufficient mobilization. In these cases, we performed single row repair paying close attention especially to following points. 1. Sufficient cuff mobilization, 2. Medialization of footprint, 3. Bone marrow stimulation at the footprint, 4. Appropriate repair design avoiding excessive tension of rotator cuff, 5. Appropriate point for single suture to avoid excessive tension. We retrospectively analyzed the return rate on MRI of the patients with the SR repair.

Results: The cases repaired by this operative method were 30 cases (Male 24 cases, Female 6 cases). Average of the age was 66.1 years old (49.8-74 years). The case of recurrent rupture was 3 cases (10.0%) at 12months after the repair on MRI.

Conclusions: Our results suggests the single row cuff repair paying close attention especially to details as being stronger and less likely to tear again than we have expected.
R1-ST-25  Is the arthroscopic suture bridge suture technique suitable for full thickness rotator cuff tears of any size? A comparison of clinical and anatomical outcomes with modified tension band suture technique

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Introduction: The purpose of this study was to compare the clinical outcomes and repair integrity of arthroscopic rotator cuff repair between the SB technique and MTB technique.

Methods: The MTB and SB techniques were used from June 2011 to December 2012 and December 2012 to January 2014, respectively (MTB group: 69 patients, SB group: 49 patients, 22 men). The mean age at the time of surgery was 59.9 (41.68) years and 60 (41.78) years in the MTB and SB groups, respectively. The mean follow-up period was 43.6 (27.56) months and 30.2 (24.43) months in each group, respectively. The pain visual analog scale (VAS), Constant, and American Shoulder and Elbow Surgeons (ASES) scores were measured preoperatively and at the final follow-up. Rotator cuff atrophy was quantified by the occupation ratio (OR). Rotator cuff integrity and the global fatty degeneration index (GF DI) were determined by magnetic resonance imaging at 6 months postoperatively.

Results: The average VAS, Constant, and ASES scores showed significant improvement at the final follow-up in both groups (p<0.05 for all scores). The re-tear rate of small-to-medium tears was similar in the MTB and SB groups (7.0% vs 6.8%, respectively; p=0.909). In large-to-massive tears, the re-tear rate was significantly lower in the SB group than in the MTB group (33.3% vs 70%; p=0.035). The SB technique had significantly better outcomes in terms of fatty infiltration (postoperative GF DI, p=0.022) and muscle atrophy (postoperative OR, p=0.038).

Discussion: The re-tear rate was lower with the SB technique than with the MTB technique in large-to-massive rotator cuff tear cases. Additionally, better functional and anatomical outcomes may be achieved with the SB technique. For the repair of rotator cuff tears of all sizes, the SB technique was a more reasonable method than the MTB technique.

R1-ST-26  Arthroscopic Rotator Cuff Repair Combined with DeBeyre-Patte Procedure for Massive Rotator Cuff Tear

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Purpose: The purpose of this study was to evaluate the outcomes of arthroscopic rotator cuff repair combined with DeBeyre-Patte procedure for irreparable massive rotator cuff tear.

Material and Method: 7 shoulders in 7 patients (4 males and 3 females, average age: 71.7 years) with massive rotator cuff tear were underwent arthroscopic rotator cuff repair combined with DeBeyre-Patte procedure. They were followed up for more than 6 months. A short skin incision was made on the medial edge of the scapular spine. Medial detachment and advancement of the supraspinatus and infraspinatus muscle keeping the continuity with the rhomboid was performed. The torn cuff were repaired with suture-bridging technique. The clinical outcomes were evaluated using the JOA score. The cuff integrity was evaluated by Sugaya’s MRI classification.

Result: The mean postoperative JOA score improved from 65.7 to 77 points. Postoperative MRI showed type 1 in 1 case, type 2 in 1 case, type 3 in 2 cases and type 5 in 3 cases.

Conclusion: This procedure could be the good technique for massive rotator cuff tear.

R1-ST-27  Clinical outcome of arthroscopic assisted pectoralis minor tendon transfer in irreparable anterosuperior rotator cuff tear.

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Purpose: The purpose of this study was to evaluate the results of an arthroscopic pectoralis minor tendon transfer for irreparable cuff tears.

Methods: Ten patients with a mean age of 70.3 (sd. 4.2) years underwent arthroscopic pectoralis minor tendon transfer and were available for follow-up evaluation. All patients had irreparable anterosuperior massive cuff tear and an arthroscopic partial repair was attempted. The pectoralis minor tendon was harvested via mini-open incision over the coracoid process with a flake bone and fixed at the lesser tuberosity with Versalock anchor arthroscopically. All patients were evaluated preoperatively and postoperatively using a modified University of California Los Angeles (UCLA) scoring system and active range of motion (elevation and external rotation).

Results: At a mean of 15 months after arthroscopic pectoralis minor transfer, the mean UCLA score increased from 14.8 (sd. 6.1) preoperatively to 29.2 (sd. 7.8) postoperatively (P = 0.004). The mean active forward elevation increased from 78 (sd. 49) preoperatively to 143 (sd. 31) postoperatively (P = 0.0031). The mean active external rotation did not change significantly from 41.5 (sd. 20) preoperatively to 45.5 (sd. 14) postoperatively (P = 0.91). One shoulder was revised with the reverse shoulder arthroplasty at 15 months postoperatively due to ongoing pain and retear of the repaired cuff.

Conclusions: Arthroscopic pectoralis minor tendon is a technically demanding procedure, however, can lead to significant improvements in overall shoulder pain and function.
Results of Latissimus Dorsi and Teres Major Transfer for Irreparable Rotator Cuff Tears

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Introduction: We’ve performed the modified latissimus dorsi (LD) transfer reported by Gerber et al. for irreparable massive rotator cuff tear with external rotation lag. Purpose of this study is to investigate clinical results of LD transfer for irreparable rotator cuff tear.

Materials and Methods: 24 patients who underwent LD transfer from 2002 to 2014 and were followed-up for more than 2 years postoperatively. 12 patients who underwent rotator cuff repair with LD transfer for massive rotator cuff tear (ORCR) and 12 patients who underwent small humeral head replacement with LD transfer for cuff tear arthropathy (HHR). ORCR mean age was 65.0 (range 50 to 73) years. Averaged follow-up period was 38.3 (range 24 to 57) months. HHR mean age was 69.3 (range 55 to 84) years. Averaged follow-up period was 50.5 (range 24 to 113) months. Pre- and postoperative JOA score, active ROM were evaluated. And osteoarthritis and upper migration of humeral head on plain X-ray in ORCR.

Results: JOA score significantly improved from 38.8 to 80.5 in ORCR, and from 33.7 to 80.2 in HHR. Flexion/external rotation(degrees) increased from 49.1/15.4 to 135.9/33.3 in ORCR. Flexion/external rotation(degrees) increased from 55.0/15.8 to 137.5/34.6 in HHR. 4 patients showed progress of osteoarthritic change and 4 patients showed progress of upper migration of the humeral head. Suprascapular nerve palsy occurred in 1 patient at 6 years post-operation in HHR.

Conclusion: LD transfer is considered to be useful as cuff reconstruction in patients with both massive rotator cuff tear and cuff tear arthropathy.
G1-O-01 Proteome analysis for frozen shoulder
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Aim: To elucidate pathogenesis of frozen shoulders with proteome analyses.

METHODS: Samples (rotator interval, RI, middle glenohumeral ligament: MGHL, and inferior glenohumeral ligament: IGHL) were collected from 12 idiopathic and 2 diabetic frozen shoulders with severe stiffness and 8 shoulders with rotator cuff tears as a control. The samples were immediately immersed in liquid nitrogen. They were sonicated with specialized buffers and digested with enzymes. The extraction liquid was analyzed with linear iontrap mass spectrometer. The relative expression levels of peptides were calculated by intensity on each liquid chromatography-mass spectrometry.

Gene ontology analyses were applied for estimate biological process.

RESULTS: A total of 1826 peptides were detected. Comparing with the control group in the three lesions (RI, MGHL, and IGHL) 133, 106, and 19 peptides increased, but 49, 79, and 166 decreased in idiopathic frozen shoulder, respectively. Relative to idiopathic frozen shoulder, 112, 96, and 73 peptides increased, but 5, 6, and 26 decreased in diabetic frozen shoulder, respectively. From Gene Ontology analyses, response to wounding, inflammatory response, and oxidation reduction were estimated. The increased pattern were similar in RI and MGHL, but decreased pattern were in MGHL and IGHL.

Conclusion: Inflammation and ischemia might induce excessive wounding repair in idiopathic frozen shoulder. These conditions were gotten worse in diabetic frozen shoulder, which might relate to be resistant for treatments.

G1-O-02 The hyper-intense inferior glenohumeral ligament reflects a period of time from the onset of frozen shoulder
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BACKGROUND. A few studies have reported characteristic magnetic resonance imaging (MRI) findings in patients with frozen shoulder. However, a correlation between radiological findings and clinical factors and stages in frozen shoulder remains unclear. We believe that it is crucial to identify the radiological findings related to the clinical stages and these findings are useful for treatment selection according to the stage.

PURPOSE. To evaluate the correlation between MRI findings and the clinical stage of patients with frozen shoulder.

MATERIALS AND METHODS. Consecutive series of MR images of 49 shoulders with a final clinical diagnosis of frozen shoulder were enrolled, except for the cases with diabetes. The male-to-female ratio was 1:2.1 and the mean age was 58.8 years. The hyper-intense inferior glenohumeral ligament (I). Subcoracoid fat triangle obliteration (2) and Superior subscapularis recess sign (3) were evaluated qualitatively and the thickness of the coracohumeral ligament (4) and capsule in auxiliary recess (5) were evaluated quantitatively. A period of time from the onset to a MRI examination was converted into binary variables and 2 groups was divided: early phase and late phase. Statistical analyses were calculated by Pearson &chi-square for qualitative evaluation and by student t for quantitative evaluation.

RESULTS. The hyper-intense inferior glenohumeral ligament was much observed in early phase group than in late phase group (p=0.02). There was no significance between 2 groups with another 4 findings.

CONCLUSION. The hyper-intense inferior glenohumeral ligament reflects a period of time from the onset of frozen shoulder.

G1-O-03 Mid-term outcomes of prospective clinical trial of transcatheater arterial micro embolization (TAME) for resistant frozen shoulder
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Background: No consensus has been reached regarding treatment for resistant frozen shoulder. Based on the notion that abnormal neovessels and accompanying nerves are possible sources of pain and inflammation, we conducted prospective clinical trial of transcatheter arterial micro-embolization (TAME) of abnormal neovessels for patients with frozen shoulder and reported its feasibility and short-term results. The present study examined more patients and continued assessment up to mean 30-years follow-up.

Methods: Our institutional review board approved this prospective study. The criteria for inclusion included night shoulder pain, painful restriction of passive elevation to less than 100 degrees, external rotation to less than 50% of the contralateral side, a normal radiologic findings, previous conservative therapies for at least three months, and persistent moderate-to-severe pain. Patients with full thickness rotator cuff tears were excluded.

Results: Consecutive 25 patients (7 males; mean age, 54 years; 6 diabetes) received TAME. 24 patients were available to the final follow-up (mean 36.1 months). The mean nighttime VAS significantly improved between before and at one, three, six, and 12 months after treatment and at final follow-up (68 vs. 32, 11, 3, 2, and 1 mm, respectively). Compare with before TAME, the mean ROM of anterior elevation gradually increased at each follow-up visit (77 degrees vs. 88, 119, 150, 166, and 176 degrees, respectively). Twenty two out of 24 patients had no residual pain at final follow-up.

Conclusion: The mid-term outcomes of TAME for frozen shoulder who were resistant to conservative treatments is encouraging and warrant further evaluation.
G1-O-04 Short-term clinical results of frozen shoulder treated with shoulder manipulation under ultrasound-guided cervical nerve root block: A case series
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Background: We evaluated the short-term clinical outcomes of shoulder manipulation under ultrasound-guided cervical nerve root block (MUC) to treat frozen shoulder.
Methods: Thirteen patients with frozen shoulder were included. Their average age was 59 years and 54% were female. Patients with a rotator cuff tear, calcifying tendinitis, osteoarthritis or any other shoulder disorder were excluded following X-ray, ultrasound and magnetic resonance imaging evaluation. Patients who did not respond to a combination of intra-articular steroid injections and physical therapy for at least 6 months were included. We measured shoulder motion pain, shoulder range of motion (ROM) and American Shoulder and Elbow Surgeons (ASES) shoulder scores immediately prior to, 1 week after and 1 year after MUC. A Short-Form 36-Item Health Survey (SF-36) was administered before and 1 year after MUC. We used the Friedman and Wilcoxon signed-rank tests to identify statistical differences.
Results: MUC significantly improved shoulder motion pain, ROM and ASES scores 1 week after MUC. This improvement persisted at the 1-year follow-up. Seven of the eight SF-36 measures were significantly improved 1 year after MUC. One patient (7.7%) developed Horner’s syndrome, although symptoms resolved within several hours without treatment.
Conclusion: MUC for frozen shoulder was safe and resulted in a significant improvement in shoulder motion pain and range of motion 1 week after the procedure. This improvement persisted at the 1-year follow-up.

G1-O-05 Clinical Outcomes of Manipulation for Frozen Shoulder with Diabetes Mellitus
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Purpose: The purpose of this study is to compare the consecutive clinical outcomes of silent manipulation (SM) under C5 and C6 nerve block for frozen shoulder with and without diabetes mellitus (DM) Subjects and Methods: Twenty-five patients with DM (DM+ group, 7 patients) and without DM (DM- group, 18 patients) who underwent SM were enrolled in this study. We evaluated the active range of motion (aROM) in flexion, external rotation (ER), and internal rotation (IR), Japanese Orthopaedic Association score (JOA score) and Visual analog scale (VAS) before SM, at 6 months after SM and over a year (1Y) after SM, respectively.
Results: Both group showed significant improvement of the mean aROM in flexion, ER, IR, and JOA score and VAS at 6M and 1Y, respectively. JOA score and aROM in IR is inferior in DM+ group than DM- group.
Discussion: Our study showed inferior clinical outcomes of silent manipulation for frozen shoulders with DM compared with shoulders without DM. Because shoulders with DM after SM remained limit of aROM in IR, we should give careful information to patients with DM before SM was performed by us.

G1-O-06 Effectiveness of manipulation under ultrasound-guided brachial plexus block in patients with frozen shoulder: comparison between non-diabetic and diabetic patients
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Purpose: To examine the effectiveness of manipulation under ultrasound-guided brachial plexus block in patients with recalcitrant idiopathic frozen shoulder and diabetic secondary frozen shoulder.
Methods: Forty-two idiopathic frozen shoulders and 10 diabetic frozen shoulders with failed conservative treatment for at least 3 months were included in this study. The manipulation was performed under ultrasound-guided brachial plexus block and VAS, ROM, and Constant scores were measured during the initial visit and the last follow-up examination. The non-recovered rate of ROM was examined compared with the unaffected contralateral shoulder, and an odds ratio and 95% CI were calculated to express the difficulty in recovering the diabetic frozen shoulder ROM.
Results: VAS, ROM towards all directions, and Constant scores were significantly improved after the manipulation in both the idiopathic frozen shoulder and diabetic frozen shoulder groups, however the diabetic group showed inferior results compared with those of the idiopathic group. The non-recovered rate of ROM was higher in the diabetic frozen shoulder group and significant differences were observed in hand behind back (odds ratio = 9.5, 95%CI = 1.8 - 51.5, p = 0.009) and external rotation at 90°/cornd. of abduction (odds ratio = 6.6, 95%CI = 1.3 - 33.2, p = 0.02). Conclusions: Manipulation was effective and shortened the duration of symptoms in both idiopathic frozen and diabetic frozen shoulder without major complications during the procedure. Diabetic frozen shoulder showed inferior clinical results and difficulty in recovery in ROM, which indicated that diabetic frozen shoulder should be discussed as a different entity.
G1-O-07  Clinical results of arthroscopic capsular release for the shoulder stiffness due to the presence or absence of diabetes mellitus.

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In general, arthroscopic capsular release for the shoulder stiffness has been widely performed. However, it is known that in diabetic cases its postoperative results are poor. We evaluated the results of arthroscopic capsular release for the shoulder stiffness due to the presence or absence of diabetes mellitus. 120 patients who underwent arthroscopic capsular release for the shoulder stiffness were studied, comprising 29 diabetes and 91 without diabetes. We compared the range of motion and JOA score at the time of pre-operative, post-operative 3 months, post-operative 6 months and last follow-up in both groups. In all items of ROM and JOA score in both group at last follow-up were statistically significantly higher than those in each preoperative score. External rotation, internal rotation, function and total points of JOA score without diabetes groups were significantly higher than those with diabetes groups at the last follow-up. However, there were no significant difference between the two groups in the other each time. In both groups, the range of motion and JOA score improved with the passage of time after surgery. Clinical results at the time of the last follow-up, without diabetes groups were significantly higher than those with diabetes groups. Diabetes groups had poor recovery of the elevation of the subsequent three months and six months later of external rotation and internal rotation compared to the without diabetes groups.

G1-O-08  Influencing factors for shoulder pain on survivors of the Great East Japan Earthquake: a cross sectional study

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Purpose: To examine the influencing factors on shoulder pain for the survivors of the earthquake.

Methods: Between November 2012 to February 2013, survivors replied to the self-report questionnaire, and 2,275 people consented to join this study.

The living status was divided into 5 categories (1. Same house as before the earthquake, 2. Temporary small house, 3. Apartment, 4. House of relatives or acquaintance, 5. New house) and economic hardship was divided into 4 categories (1. Normal, 2. A little bit hard, 3. Hard, 4. Very hard). Gender, age, body mass index, living areas, smoking and drinking habits, complications of diabetes mellitus and cerebral stroke, working status, walking time, living status, economic hardship, psychological distress, and sleep disturbance were considered as confounding factors. We used multiple logistic regression analysis to examine the association of shoulder pain with living environment, economic hardship, psychological distress, and sleep disturbance at 2 years after the earthquake.

Results: There were no significant differences between gender, age, body mass index, living areas, smoking and drinking habits, complications of cerebral stroke, working status, walking time, and psychological distress. There were significant differences in the risk of having shoulder pain in those with ‘Apartment’ (OR=1.14, 95%CI=1.03-2.26), ‘House of relatives or acquaintance’ (OR=2.98, 95%CI=1.42-6.25), economic hardship of ‘Hard’ (OR=1.71, 95%CI=1.08-2.72) and ‘very hard’ (OR=2.51, 95%CI=1.47-4.29), and sleep disturbance (OR=2.96, 95%CI=2.05-4.27).

Conclusions: Though living psychological distress has little effect, ‘Apartment house’, ‘House of relatives or acquaintance’, and economic hardship of ‘Hard’ and ‘very hard’ have strong influences on shoulder pain.

G1-O-09  Shoulder evaluation after rotator cuff repair using self-assessment scoring tool, Shoulder 36

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Aim: To evaluate the outcome of rotator cuff repair using self-assessment scoring tool.

Patients and Methods: Subjects are the patients who underwent rotator cuff repair at Iwaki Kyoritsu General Hospital from April 2011 to March 2015. Shoulder 36 Ver.I.3, which is self-assessment questionnaire, was sent by postal. 92 men and 28 women, including 3 men and 1 woman who underwent bilateral operation, were evaluated. Average age at surgery was 63±5 (55 to 82). Average score of each domain, which constitute the Shoulder 36, was calculated. Subjects were divided into three groups; incomplete tear, small/middle-sized tear, large/massive tear. Statistical analysis was performed between sex and among tear size. Nonparametric test was performed.

Results: Each domain point was as follows; pain was 3.76. Range of motion (ROM) was 3.80. Muscle strength was 3.60. General Health was 3.64. Ability of daily living (ADL) was 3.76. Ability for sports was 3.23. There was no statistical difference between men and women in all domains. There was statistical difference between small/middle-sized tear group and large/massive sized tear group in ROM and ability for sports domains. Conclusion: Subjective outcome was preferable results regardless of tear size. Tear size might influence ROM and sports ability.
G1-O-10  Treatment results of the rotator cuff tears using Shoulder 36 ver.1.3.

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(Purpose) Shoulder 36 is patient basis evaluation. The purpose of this study is treatment results of the rotator cuff tears using Shoulder 36 ver.1.3.

(Methods) One hundred and thirty-nine shoulders in 125 patients who experienced rotator cuff tears were studied. The patient of rotator cuff tear was divided into two groups of the conservative treatment (conservative group) and the surgical operation treatment (operation group). The method asked for The Japanese Orthopaedic Association Shoulder 36 V 1.3 (Shoulder 36), Japan Orthopaedic Association Score (JOA score) and The rating scale of the University of California at Los Angeles (UCLA score) at the time of the first and last medical examination. The clinical recording, Shoulder 36, JOA score and UCLA score were compared between the 2 groups.

(Results) The operation group of the range of motion of shoulder was significantly large except C7 thumb distance. Furthermore, pain of JOA score and satisfaction of UCLA score were significantly higher than the conservative group. Shoulder 36 in all domains the operation group was significantly higher than the conservative group.

(Conclusion) Treatment of rotator cuff tear, the conservative group and the operation group were considered for mark to be comparatively high at shoulder 36, and to be useful also as quality of life evaluation.
G1-T3-1  Relation between proximal humerus cortical bone thickness and osteoporosis
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The purpose of this study is to investigate relation between proximal humerus cortical bone thickness (mean combined cortical thickness; MCCT) and osteoporosis. We evaluated 94 patients (22 male, 72 female) with proximal humeral fracture. The mean age was 72.1 years old. We observed fragility fracture (proximal femoral fracture and vertebral fracture) by using CT scout view. Fragility fracture was observed 49 cases. Using a 60mm MCCT threshold value, a positive predictive value was 67.1%, a negative predictive value was 100%, and precision was 74.3%. When patients have fragility fracture, we can diagnosis osteoporosis. A 60mm MCCT threshold value is useful to rule out osteoporosis.

G1-T3-2  Mechanical evaluation of medial support screws for proximal humeral fractures
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(Aim) Since Gradner showed the importance of medial support screws for proximal humeral fracture several mechanical evaluations had done but there are still some conflicts. We analyzed the efficacy about medial support screws by using cadaver humeral head.
(Method) 6 cadavers (3 males, 2 females, mean age 81 yrs.) were analyzed. We made the proximal humeral fracture model and the right side was fixed by 6 screws without medial support screws and the left side was fixed by them with medial support screws. The mechanical strength was measured by the universal material examination machine.
(Results) Mean load (kN) were right side: 136, left side: 212. There was not significant difference between them. Mean displacement (mm) were right side: 109, left side: 18.5. There were significant difference between them.
(Conclusion) Our study showed medial support screws are effective to hold the humeral head after reduction.

G1-T3-3  Interlocking nailing with transmendullary support screw for the treatment of displaced proximal humeral fracture
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Purpose: In cases with 2-part proximal humeral fracture, distal fragment is usually displaced medially with the muscle forces. Interlocking nail is a good option for the treatment of proximal humeral fracture, but medial displacement of the fracture frequently remained after nail insertion. We have used transmendullary support screw.
(Methods) Eighteen cases with proximal humeral fractures (mean age: 742 years, 7 males and 11 females), which were treated with interlocking nail fixation with transmendullary support screw, were retrospectively evaluated. In the operation, transmendullary support screw was inserted in the lateral side of the humeral shaft through a small skin incision, and then interlocking nail was inserted for reduction and fixation of the fracture.
(Results) Medial displacement of the fracture was significantly improved from average 54.3% to 27%, and all cases united without correction at the final follow-up. Average range of shoulder elevation was 1216 degrees and average JOA score was 81.3 points.
(Conclusion) For reduction of the fracture and preservation of the correction, we used intramendullary support screw together with interlocking nailing, and our cases showed relatively good clinical results. This procedure appeared to be useful for proximal humeral fracture with complete displacement of the metaphysis.
G1-T3-4  Operative pitfall of Proximal Humerus Fracture
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During 2012-2015, we experienced 40 cases of Proximal Humerus fracture. Our primary interest is to clarify the reason why the fractures had secondary displacement. Types of fracture were A type 19cases, B type 17cases, and C type 4cases. In preoperative x-rays and CTs, 8 cases had inferomedial comminution and 14 cases had cancellous bone defect around fracture . In postoperative x-rays, 9cases had secondary varus displacement over 10 degree, and one of them came to be fixation failure. To construct a surgical stability, it is required to build 3 dimensional inferomedial support by reducing the proximal fragment extramedullary to the distal fragment with pre- and intra-operative 3 dimensional assessment. The case with large cancellous bone defect should be treated with Bone substitute.

G1-T3-5  Suture fixation versus cable cerclage of the tuberosities in shoulder hemi-arthroplasty
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[Objective] Postoperative outcomes of hemi-arthroplasty in proximal humerus fractures are unsatisfactory. We compared the postoperative clinical outcomes and radiography findings of the tuberosities suture fixation group (S group; performed before 2013) with those of the cable cerclage group (C group; performed since 2013).

[Method] Thirty-five patients were identified (35 shoulders; 27 females and 8 males) who had undergone hemi-arthroplasty with between 2007 and 2015, following four-part or three-part proximal humeral anatomic neck fractures. Patients with rotator cuff tear and nerve palsy were excluded from this study. Mean age at the time of injury was 72.9 years (49-86 years), and postoperative follow-up period was 25 months (12-60 months). The S group included 16 shoulders, whereas the C group included 19 shoulders. Objective clinical evaluation was conducted using the JOA score and Constant score. Position of union of the tuberosities was ascertained using plain radiography.

[Results] Mean postoperative JOA and Constant scores were lower in the S group (JOA: 71.4 ± 8.25; Constant: 59.6 ± 9.7) than those in the C group (JOA: 78.9 ± 4.9; Constant: 68.2 ± 10.3; p<0.01). Anatomical union of the tuberosities was observed in 10 of 16 cases (63%) in the S group and 18 of 19 cases (95%) in the C group. The fusion rate was higher in the C group (p<0.02).

[Conclusion] In hemi-arthroplasty for proximal humerus fractures, cable cerclage fastening of the tuberosities has more favorable clinical outcomes, in terms of a better union of the tuberosities, compared to suture fixation.

G1-T3-6  Short Clinical Outcomes of Reverse Shoulder Arthroplasty for the Treatment of Complex Proximal Humeral Fractures in Elderly Patients
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The surgical treatment of complex proximal humeral fractures (CPHF) remains challenging in the elderly population due to poor bone quality or dysfunction of rotator cuff. There is no consensus on what type of arthroplasty is best for the treatment of CPHF. Japanese orthopaedic association committee approved application of Reverse Shoulder Arthroplasty (RSA) for the treatment of CPHF in the elderly 2 years ago. The purpose of this study was to evaluate postoperative complication and early clinical outcomes of RAs for CPHF. Ten patients (average age, 79 years; range, 71-88 years) were included in the analysis with a mean follow-up of 16 months (12-24 months). All shoulders were approached through the deltopectoral interval. The mean operation time was 153 minutes. Mean perioperative blood loss was 433ml. The rate of allogenic transfusion was 70%. There was no dislocation, fracture and infection. One of them had a complete radial nerve palsy after the operation. At final follow-up, mean active elevation was 95 degrees (28 degrees), mean external rotation was 15 degrees (10 degrees) and mean internal rotation was L4 level. The mean Constant score was 55 points. The tuberosity healing rate was 50%. The mean American Shoulder and Elbow Surgeons total score was 64; numeric rating score for pain, 1. RSA resulted in good pain relief and functional recovery and lower complication rate.
G1-O-11  Evaluation by the classification of subscapularis tendon tears using radial-sequence MRI

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Background: Magnetic resonance imaging has been used for diagnosis of rotator cuff tear. But conventional MRI can’t describe anterosuperior portion of subscapularis tendon due to the partial volume effect. The purpose of this study is to classify subscapularis tendon tears using radial-sequence MRI and evaluate.

Methods: We retrospectively identified 140 patients who underwent arthroscopic rotator cuff tear repairs from June 2012 to April 2016, and had radial-sequence MRI preoperatively. We checked the subscapularis tendon tears on the view with coracoid process and classified 5 grades. Grade 0 is intact, grade 1 is slightly thinning of subscapularis tendon, grade 2 is considerably thinning of subscapularis tendon, grade 3 is complete tear, and grade 4 is contact of coracoid process and anterior portion of humeral head. Ladosse’s classification was used for assessment of the subscapularis tendon.

Results: Grade 0 was 29 patients, grade 1 was 60 patients, grade 2 was 25 patients, grade 3 was 14 patients, and grade 4 was 2 patients. MRI sensitivity of subscapularis tendon tear was 77.1% and specificity was 86.7%. Specificity related to Ladosse’s classification was 95.1% in type 0, 75.0% in type 1, and sensitivity was 86.7% in type 2, 85.7% in type 3 and 100% in type 4.

Conclusion: Radial-sequence MRI could describe anterosuperior portion of subscapularis tendon more clearly which was hard to evaluate till now.

G1-O-12  Evaluation of Variety and Delamination of Infraspinatus Tendon Using Radial-sequence Magnetic Resonance Imaging

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Background: Magnetic resonance imaging (MRI) is useful for evaluating the rotator cuff but sometimes anteroposterior side of infraspinatus tendon cannot be assessed. Purpose of this study is to evaluate variety of tendinous insertion and presence of delamination of anteroposterior side of infraspinatus tendon using radial-sequence MRI.

Material and methods: This study included 81 patients underwent arthroscopic rotator cuff repair. We checked the radial-sequence MRI underwent before the operations and classified the variety of tendinous insertion and presence of delamination comparing them with the arthroscopic findings.

Two Orthopaedic surgeon read the MRI. Sensitivity, specificity, and kappav value were calculated. We also check JOA scores and range of motion in external rotation after operation and compared them between with and without delamination.

Results: The sensitivity of delamination was 74% and specificity was 60%. The classifications of tendinous insertion were correlated between two surgeons and kappav value was 0.38. There were no significant differences in post operated JOA score, occurrence of retear and range of motion in external rotation between with and without delamination.

Conclusion: Radial-sequence MRI has utility in sensitivity of delamination presence but has lower reproducibility so may need proficiency. But it has correlation to evaluating insertion of infraspinatus between surgeons. There were no significant differences in post operated JOA score, occurrence of retear and range of motion in external rotation between with and without delamination.

G1-O-13  Development of three-dimensional rotator cuff tear magnetic resonance imaging system ~ preliminary report ~

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Three-dimensional magnetic resonance imaging (3D-MRI) system has already performed at cardiovascular surgery area, and it’s useful for improving the reliability of surgical planning and informed consent for patients. However, it is difficult to establish automatically 3D-MRI of rotator cuff tear because of existing similar intensity area for other tendon and muscular tissue. The purpose of this study is to construct manually 3D-MRI of rotator cuff tendon from 2D-MRI for development of automatically three-dimensional rotator cuff tear magnetic resonance imaging system. An MR scan was carried out on 9 rotator cuff tear patients before the surgery. Humerus, rotator cuff tear, and rotator cuff tendon were manually traced. 3D-MRI data was acquired using a medical image processing, analysis, and visualization (MIPAV). Rotator cuff tear shape in 3D-MRI and intraoperative finding were almost matched. In this study, rotator cuff tear shape in 3D-MRI and intraoperative finding were matched by this method. Further study and these data programming could develop three-dimensional rotator cuff tear magnetic resonance imaging system.
G1-O-14  Quantitative evaluation of muscle volume of the Supraspinatus using 3D MRI - before and after surgery -

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The purpose of this study was to measure the volume of the supraspinatus (SSP) muscle before and after surgery using three-dimensional (3D) imaging. The right shoulders of 10 patients with rotator cuff tears who underwent Arthroscopic rotator cuff repair (ARCR) in our hospital were evaluated. T2-weighted images were studied before and 2 weeks after surgery. By plotting the muscle and tendon borders, the SSP and tendon were segmented. The 3D images were reconstructed and the volumes were calculated respectively. The mean SSP volume was 34.36(±12.80) cm³ before surgery and 36.89(±11.61) cm³ after surgery, and no significant difference was noted (P=0.203). Past reports showed that occupation ratio (OR) of the SSP to the supraspinatus fossa may improve soon after surgery due to structural changes caused by the operation. There is a possibility that improvement of OR soon after surgery may not reflect a change of the muscle volume.

G1-O-15  Quantitative analysis of the rotator cuff muscles using three-dimensional magnetic resonance imaging

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Purpose: In cases with rotator cuff tear, muscle atrophy and fatty infiltration of the rotator cuff muscle are reported to be a risk factor for irreparable tear and for poor outcomes after surgical repair. We evaluated the quantity of rotator cuff muscles using three-dimensional magnetic resonance imaging.

Methods: Ten shoulders with incomplete tear, 10 shoulders with isolated supraspinatus tendon tear, and 10 shoulders with massive rotator cuff tear were included in this study. We evaluated total muscle volume and %fat of each muscle in all cases.

Results: The muscle volume of the supraspinatus was average 28.9 cm³, that of infraspinatus was 78.2 cm³, that of teres minor was 11.6 cm³, and that of subscapularis was 96.5 cm³. The muscle volume of supraspinatus and subscapularis did not change with cuff tear, but the volume of infraspinatus significantly decreased and that of teres minor significantly increased with massive rotator cuff tear. %fat of the supraspinatus muscle significantly increased with supraspinatus tear and it became worse with massive rotator cuff tear. %fat of the infraspinatus muscle significantly increased in cases with massive rotator cuff.

Conclusion: Although muscular condition predicts the prognosis of the patients, quantitative evaluation of the rotator cuff muscles is not well established. Three-dimensional magnetic resonance imaging appears to be useful to assess the rotator cuff muscles.

G1-O-16  Relationship between Fatty Infiltration of Rotator Cuff Muscles and Postoperative Outcome of Large to Massive Tear Using MRI IDEAL Technique

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Fatty infiltration of rotator cuff muscles is irreversible and poor prognostic factor of postoperative shoulder function. Recently, IDEAL technique is noted as a newly quantitative MR imaging technique that can separate fat and water differently. The purpose of this study was to evaluate preoperative fatty ratio of rotator cuff muscles using IDEAL technique and to assess the relationship of preoperative fatty ratio and postoperative clinical outcome. 30 large to massive rotator cuff tear patients who underwent arthroscopic rotator cuff repair were included in this study. The cross sectional area was defined at Y-shaped view and ROI was set up at the supraspinatus (SSP, whole area and muscle component), infraspinatus(ISP) and subscapularis (SSc) muscles by freehand. Fatty ratio of each muscle was calculated using the signal value of In Phase and Fat Phase. Relationship between fatty ratio and re-tear rate, and JOA score were evaluated. Cut-off values of re-tear group using preoperative fatty ratio of ROC curve in SSP and ISP were calculated. Re-tear rate was 40.0%, and fatty ratio of muscle component in SSP and of ISP was significantly higher in re-tear group. The cut-off value of re-tear in SSP muscle component was 41.8% and ISP was 52.5%. Furthermore, preoperative fatty ratio of ISP and JOA score was negatively correlated (r=-0.46) and JOA score tended to be significantly lower in re-tear group. Our data showed that higher preoperative fatty ratio of ISP was thought to be poor prognostic factor using IDEAL technique.
**G1-O-17** The relationship between quantitative evaluation of fatty infiltration and muscle atrophy in supraspinatus muscle using MRI-Dixon method

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**PURPOSE:** The aim of this study was to examine the relation between fatty infiltration and muscular atrophy in supraspinatus muscle using MRI-Dixon method.

**MATERIALS AND METHODS:** The subjects consisted of 130 shoulders from 126 patients. Thirty-four shoulders were classified in the intact rotator cuff group (15 males, 19 females), and 96 shoulders were classified in the rotator cuff tear group (43 males, 53 females). Fatty infiltration and muscle atrophy of supraspinatus muscle were evaluated by 30T MRI (Signa HDxt; GE healthcare). Fatty infiltration of quantified using fat fraction. Muscle atrophy was measured and evaluated according to the Zanetti classification on T2-weighted image. We examined association between fat fraction and muscle atrophy by Pearson correlation coefficient.

**RESULTS:** A negative correlation between fat fraction and muscle atrophy was found in the rotator cuff tear group significantly (r= -0.51, p<0.01), but it was not show in the intact rotator cuff group. Additionally, the negative correlation was stronger in female (r= -0.60, p<0.01) than male (r= -0.40, p<0.01).

**CONCLUSION:** We examined fatty infiltration and muscle atrophy quantitatively, and evaluated the relationship between them. A negative correlation between fat fraction and muscle atrophy was found in the rotator cuff tear group and it was stronger in female.

**G1-O-18** Characteristic appearance of dynamic contrast-enhanced MRI for symptomatic rotator cuff tear

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**Introduction** We reported angiographic appearance surrounding subacromial bursa (SAB) in dynamic contrast-enhanced magnetic resonance (MR) imaging finding for severe idiopathic frozen shoulder at freezing and frozen phase. That indicates an abnormal vascularization and shoulder pain are related. The difference of symptomatic and asymptomatic rotator cuff tear (RCT) is apparent, in particular painfulness. In this study, we formed a hypothesis that an abnormal vascularization will be observed in symptomatic RCT.

**Materials and methods** The subjects were 35 shoulders (average ages: 68.4 years; 24 men and 11 women) with symptomatic RCT. There were 1 partial, 9 small, 7 middle, 9 large, 9 massive RCT. Angiographic appearance surrounding SAB were evaluated by dynamic contra-enhanced MR imaging in each RCT.

**Result** Angiographic appearance surrounding SAB were found 29 shoulders (83%) in dynamic contra-enhanced MR imaging. There were 1 partial (100%), 7 small (100%), 7 middle (100%), 9 large (100%), 5 massive (50%). And partial, small, middle and large RCT group were enhanced 24 shoulders (92%), massive group 5 shoulders (50%). All cuff tear arthropathy (CTA) shoulders were not enhanced.

**Conclusion** No study have been reported using 3D-dynamic contra-enhanced MR imaging for symptomatic RCT. Not greater than large RCT group were found angiographic appearance surrounding SAB.

**G1-O-19** MR imaging evaluation of suprascapular nerve entrapment caused by a paralabral cyst of the shoulder

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Paralabral cysts of the shoulder are an infrequent finding on MRI. They may result in compression of the supraspinal nerve at the spinoglenoid notch. Other described features include weakness with external rotation and posterior shoulder tenderness. The aim of this study was to assess the significance of muscle edema in the diagnosis of supraspinal nerve entrapment. A retrospective study of 16 patients with supraspinal nerve entrapment was performed. All patients underwent electromyographic studies and 1-5T MR imaging. The diagnosis of muscle edema was reached when muscles presented a high signal on T2-weighted fast spin-echo fat-suppressed images. The maximal cyst cross section according to the muscle edema site were 249mm² for infraspinatus, 316mm² for infraspinatus and supraspinatus, 145mm² for no edema. Muscle edema a typical finding on MR images in acute neuromuscular disorders. Muscle edema seems to be a more sensitive sign when compared with EMG results.
G1-O-20 **Quantified Mechanical Properties of the Deltoid Muscle Using the Shear Wave Elastography: Potential Implications for Reverse Shoulder Arthroplasty**

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The deltoid muscle plays a critical role in the biomechanics of shoulders undergoing reverse shoulder arthroplasty (RSA). However, both pre- and postoperative assessment of the deltoid muscle quality still remains challenging. The purposes of this study were to establish a novel methodology of shear wave elastography (SWE) to quantify the mechanical properties of the deltoid muscle, and to investigate the mechanical reliability of this technique using cadaveric shoulders for the purpose of RSA. Eight fresh-frozen cadaveric shoulders were obtained. The deltoid muscles were divided into 5 segments (A1, A2, M, P1 and P2) according to the muscle fiber orientation and SWE values were measured for each segment. Intra- and inter-observer reliability was evaluated using intraclass correlation coefficient (ICC). To measure the response of muscle tension during RSA, the humeral shaft was osteotomized and subsequently elongated by an external fixator (intact to 15 mm elongation). SWE of the deltoid muscle was measured under each stretch condition. Intra- and inter-observer reliability of SWE measurements for all regions showed 0.761 - 0.963 and 0.718 - 0.947. Especially, SWE measurements for segments A2 and M presented satisfactory repeatability. Elongated deltoid muscles by the external fixator showed a progressive increase in passive stiffness for all muscular segments. Segmental measurements using SWE could be reliably and feasibly used to quantitatively assess the mechanical properties of the deltoid muscle, especially in the anterior and middle portions. This novel technique based on the anatomical features may provide helpful information of the deltoid muscle properties during treatment of RSA.

G1-O-21 **Shear Wave Velocity Measurement of Upper Trapezius Muscle by Color Doppler Shear Wave Imaging.**

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Skeletal muscle stiffness is thought to be the result of increased tissue hardness, but measurement accuracy has been dependent on operator technique. We have proposed a novel shear wave real-time imaging method (Color Doppler Shear Wave Imaging; CD SWI) for continuous shear wave which is excited from tissue surface by a mechanical vibrater. Using the method, shear wave velocity is measured for upper trapezius muscle. An adaptive shear wave velocity measurement by quality estimation of shear wave wavefront is adopted. We recruited 23 male volunteers with no history of orthopedic disease and recorded shear wave propagation speed for the shear wave frequency of 275Hz to assess the intra- and inter-observer reliability. For intra-observer reliability, one observer took two measurements separated by a time delay and the intra-class correlation coefficient (ICC) was calculated as ICC (1,1). For inter-observer reliability, ICC (2,1) was calculated from both observers’ measurements. Mean propagation speed was 375 m/s (first) and 371 m/s (second) for Observer A (ICC(1,1)=0.91 [95%CI, 0.76-0.96]) and 380 m/s for Observer B (ICC(2,1)=0.83 [95%CI, 0.56-0.94]). This result suggests our technique is satisfactory reliable and has potential for future application in various fields, such as evaluation of muscles condition or the effects of rehabilitation.

G1-O-22 **The morphological examination of cervical nerve root in rotator cuff tear, frozen shoulder, and recurrent anterior shoulder dislocation using ultrasound**

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Purpose: The purpose of this study is to examine the cross-sectional area of the C5 nerve roots in rotator cuff tear (RCT), frozen shoulder (FS), recurrent anterior shoulder dislocation (RASD), and healthy volunteers (HV) using ultrasonography.

Methods: We studied 29 patients with RCT, 15 patients with FS, and 9 patients with RASD. The average age was 64.4 years old in RCT, 52.2 years old in FS, 28.7 years old in RASD, and 47.4 years old in HV. The major and the minor axis of the C5 nerve root was measured on ultrasonography, and the cross-sectional area (mm²) was calculated. The cross-sectional area was compared between the affected side and opposite side, and between the affected side and HV.

Results: The cross-sectional area (the affected side / the opposite side) were the following: RCT; 83mm² / 80mm², FS; 89mm² / 84mm², RASD; 68mm² / 59mm², HV; 65mm². There was no significant differences in cross-sectional area of C5 root between the affected side and the opposite side in all groups. The C5 nerve roots in RCT and FS were significantly thicker than those in HV.

Conclusion: Symptomatic RCT and FS caused the bilateral C5 nerve root hypertrophy.
G1-O-23  Ultrasoundographic evaluation in thoracic outlet syndrome: A preliminary report
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[PURPOSE] Thoracic outlet syndrome (TOS) is mainly caused by compression or stretch of the neurovascular structures at the costoclavicular space that is surrounded by scalene muscles and the first rib. However, little imaging diagnosis has been established especially in neurogenic TOS. The purpose of this study was to measure the brachial plexus area by ultrasonography and to evaluate its changes in arm position.

[METHODS] Using Wright and Roos tests, the subjects were divided into two groups: symptomatic group (SG) with either positive signs and asymptomatic group (AG) without any positive signs. SG comprised of 10 cases with a mean age of 30.1 years, and AG of 5 cases with a mean age of 196 years. A probe was put on the supraclavicular fossa in sitting position. First, the brachial plexus was identified at the level of first rib. Then, the brachial plexus area was measured at the side, and with the arm 90-abducted and 90 externally rotated.

[RESULTS] The brachial plexus area was not significantly changed from at-the-side to the abducted position in both group: 97.2 mm2 to 790 mm2 in SG group (reduction rate: 81.7 %) and 135.8 mm2 to 122.5 mm2 in AG group (reduction rate: 90.0%).

[DSSCUSION] Using ultrasonography, the present study successfully evaluated the brachial plexus area at the level of first rib. Despite of the small samples enrolled, we also confirmed that the brachial plexus area becomes relatively narrow in symptomatic individuals, compared with asymptomatic individuals.

G1-O-24  The Magnetic resonance images for thoracic outlet syndrome
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Introduction: We reported about the usefulness of the maximum intensity projection (MIP) method as a non-contrast MR imaging of thoracic outlet syndrome in the last year. In this study, we evaluated the subclavian artery and vein by using MIP images, and the brachial plexus by T2WI sagittal images, and examined its usefulness.

Method: The subjects were 20 cases who took MRI due to TOS. MRI were taken in Wright test position, glenohumeral joint was abduction and external rotation 90 degrees, elbow was flexion 90 degrees. In the MIP images, we evaluated the intensity of the subclavian artery and vein, and in the T2WI sagittal images, evaluated the nervous system at the costoclavicular gap.

Results: In 10 cases, subclavian vein stenosis and defect was seen in MIP images, among them, nerve compression was seen in 2 cases in T2WI sagittal images. In 7 cases, both artery and vein stenosis was seen in MIP images and accompanied with nerve compression in 5 cases in T2WI sagittal images. There was arterial stenosis in 1 case and no stenosis in 2 cases, nerve compression was not seen.

Discussion: The nervous system exist in cranial and dorsal of the subclavian artery. When there is a narrowing of the arteries, it is suspected to have compression of nerve. In this study, in the cases which have narrowing of the subclavian artery and vein, we observed nerve compression in high frequency.

G1-O-25  The results of the air-contrast CT arthrography for the patients of the recurrent dislocation of the shoulder
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As the etiology of recurrent dislocation of shoulder, separation of the labrum (Bankart lesion), failure of the joint capsule, the bone defect is widely accepted. For the evaluation of these factors, we perform the air-contrast computed tomography arthrography (CTA) as a preoperative examination. In this study, we examined the results of the air-contrast CTA to evaluate the features of the patients of the recurrent dislocation of the shoulder. Our patient group consisted of 81 shoulder instability patients who have undergone the air-contrast CTA and shoulder surgery between 2007.1 and 2016.4. After air injecting to bilateral shoulder under fluoroscopy, CT examination was performed. All patients were evaluated the intra-articular lesions using arthroscopy at the time of surgery. In 81 patients, the detection of the Bankart lesion was easy in 62 patients, mild difficult in 12 patients, very difficult in 7 patients. In arthroscopic examination, Bankart lesions was not observed in only one patient. A lot of the lesions which could not be detected by the air-contrast CTA were Perthes lesion. Moreover, we suspected the existence of HAGL lesion and/or capsular tear in 8 patients, the lesion was detected in 5 patients actually. The bony Bankart was determined in 32 patients, but, of which 3 cases bone fragments are very small and the detection of the Bankart lesion was not easy. In such cases, the bone detectability of CT was useful.
G1-O-26 Three-dimensional quantitative analysis of humeral head and glenoid bone defects with recurrent glenohumeral instability

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Background: Bone defects of the humeral head and glenoid are known to be a risk factor for poor outcomes after reconstruction. However, bone loss has not been sufficiently evaluated, and its characteristics remain unclear.

Methods: Three-dimensional surface models of bilateral proximal humeri and glenoids were reconstructed from CT data of 63 patients with symptomatic, unilateral, recurrent glenohumeral instability. The left surface models were flipped horizontally, and intact bony areas were matched to those of the right models. The volume, length, width, and depth of identified bone defects were assessed in 3 dimensions. Correlations between values of bone defects and the number of traumatic episodes were analyzed. In addition, differences between sexes and between dislocations and subluxations were compared.

Results: The prevalence of bone defects was 100% in the humeral heads and 96.8% in the glenoids. The mean volume of humeral head bone loss was 331.5 mm³, compared to 384.2 mm³ in the glenoid. The number of traumatic episodes was not correlated with humeral head bone defects, but it was moderately correlated with glenoid bone defects. Patients with recurrent dislocations had significantly deeper Hill-Sachs lesions than cases with recurrent subluxations.

Conclusion: Glenoid bone defects are supposed to enlarge with traumatic events. On the other hand, Hill-Sachs lesions might mainly be generated with the initial trauma. In cases with deep Hill-Sachs lesions, the shoulders may be less likely to reduce themselves, and they become symptomatic even with a small number of traumatic episodes.

G1-O-27 Reliability of the amount of the glenoid bony defect in patients with anterior shoulder instability

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Several measurement techniques have been reported to quantify the amount of the glenoid bony defect in patients with anterior shoulder instability. Among them, the method to use an inscribed circle and the one to use the contralateral glenoid as a control are most commonly used. However, no studies have been reported to clarify which technique is more reliable. The purpose of this study was to determine which of these methods is more reliable. CT data from 30 patients with unilateral anterior shoulder instability were used. Three investigators measured glenoid bone defect using two techniques: measure the distance from the anterior glenoid edge to an inscribed circle fitted to the posterior glenoid rim (ICp) and measure the ratio of transverse diameter of the involved glenoid to that of the contralateral side (ICr). Intra- and inter-observer reliability were measured using intraclass correlation coefficient. Intra-observer reliability showed 0.461 for ICp and 0.868 for ICr. Inter-observer reliability showed 0.560 for ICp and 0.786 for ICr. This study demonstrated that the method to measure the glenoid width of bilateral shoulders was more reliable than the inscribed circle method.

G1-O-28 Acromiohumeral interval: A comparative study of differences between the type of rotator cuff tears using tomosynthesis

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[Purpose] The superior migration of the humeral head is often recognized on X-rays in the supine position in patients with massive rotator cuff tear. But there were no reports assessed the relationship between type of rotator cuff tears and the superior migration of the humeral head. We reported we may evaluate acromiohumeral interval (AHI) more properly by tomosynthesis than X-rays. The purpose of this study was to evaluate the AHI by the type of rotator cuff tears using a tomosynthesis.

[Methods] We studied 56 shoulders in patients of rotator cuff tears. There were 29 men and 27 women, their mean age was 68 years old. We evaluated the AHI in the standing and supine position by the type of rotator cuff tears (SSP tear only; SSP group, SSP+ISP tears;ISP group, SSP+SSC tears;SSC group, SSP+ISP+SSC partial tears;Mp group, SSP+ISP+SSC complete tears;Mc group) using a tomosynthesis.

[Result] The mean AHI was 8.3mm in the standing and 8.1mm in the supine in SSP group, 6.9mm and 6.5mm in ISP group, 8.1mm and 7.7mm in SSC group, 6.6mm and 6.6mm in Mp group, and 6.5mm and 4.6mm in Mc group. There was the difference of AHI in Mc group between standing and supine position significantly. Further, the AHI of Mc group was smaller than other groups significantly.

[Discussion] Narrow AHI in the supine position suggested to have a complete tear in subscapularis.
G1-O-29  Evaluations of the muscle strength and the cross sectional area in rotator cuff tears

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Purpose: To evaluate muscle strength and cross sectional area (CSA) in rotator cuff tears

Patients and Methods: Forty-eight patients (38 males and 10 females) that underwent open repair between May, 2013 and April, 2016 were used. The mean age was 62 years old and the average symptom duration was 56 months. 90 degrees flexion strength and external/internal rotation (ER/IR) strength in adduction were measured by handheld dynameter. The CSA of Supraspinatus (SSP), Infraspinatus (ISP) and Subscapularis (SSC) were obtained using TI-weighted oblique sagital MRI images. We used the ratio of flexion, ER/IR strength to body weight (relative muscle strength).

Similarly, we used the ratio of CSA of SSP, ISP and SSC to CSA of the glenoid of scapular (relative CSA). Patients were divided into groups with isolated SSP tear (Group A), those with SSP, ISP (and TM) tear (Group B) and those with SSP, SSC (and ISP) tear (Group C).

Results: Relative flexion strength (N/kg) was Group A: 0.66, B: 0.58 and C: 0.61. ER strength was A: 0.82, B: 0.94 and C: 1.28. There was no significant difference among groups. Relative CSA of SSP was A: 54.9, B: 45.7 and C: 52.2. CSA of ISP was A: 81.3, B: 68.9 and C: 71.7. CSA of SSC was A: 161.1, B: 203.0 and C: 106.2. Relative CSA of SSC significantly smaller in group C than in other groups.

Conclusions: Muscle strength showed no significant differences among 3 groups.

G1-O-30  Clinical Outcome After Arthroscopic Single Bundle Reconstruction for Acute Acromioclavicular Joint Separations

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[Purpose] The purpose of this study was to investigate the clinical outcomes after arthroscopic single bundle reconstruction in patients with acute acromioclavicular joint separation.

[Methods] From January 2014 to September 2015, 19 patients were involved with minimum 1 year follow up. 16 males and 3 females were included with an average age of 38.2 years old. Preoperative X-ray showed Rockwood type III in 11 patients and type IV in 8 patients. Arthroscopic surgery were performed using ZipTightTM in 14 patients and Dog Bone Button 5 patients. Average period between injury and surgery was 17.9 days. The mean follow up period was 14.3 months. Clinical outcomes were evaluated using JOA score, JSS-ACJ score and postoperative X-ray findings.

[Results] The mean postop JOA score was 95.6 and JSS-ACJ score was 93.4. Although only one patient with type III demonstrated reduction loss. However, all patients with type V demonstrated reduction loss postoperatively. No correlation was observed in other factors.

[Conclusions] Arthroscopic single bundle reconstruction for acute acromioclavicular joint separations demonstrated acceptable outcomes in terms of shoulder function. However, structural outcome was not feasible specially in patients with type V.

G1-O-31  Clinical Results of Arthroscopic assisted Reconstruction for Acromio-clavicular joint Dislocation

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Background: We have been performing arthroscopically assisted coracoclavicular ligament reconstruction using Arthrex Dog Bone Button and suture tape for acute Rockwood type 3-5 dislocation of the acromioclavicular joint (ACJ) since 2013. The purpose of this study was to evaluate clinical outcome of this procedure.

Methods: 19 patients underwent the index surgery and 16 patients who were followed for more than 6 months after surgery were investigated in this study. The average age of surgery was 38.6 (19-59) years old and the mean follow up period was 17.2 (6-28) months. Clinical outcomes were using Japanese Orthopaedic Association score (JOA score) and the Japan Shoulder Society score for acromioclavicular dislocation score (JSS-ACJ score) and postoperative X-rays for investigating ACJ alignment at the final follow-up period.

Results: The mean JOA score was 96.7 (89-100) and JSS-ACJ score was 93.9 (79-100). Postoperative subluxation of the ACJ was observed in 4 patients. Conclusion: Arthroscopic ACJ reconstruction was less invasive method for soft tissue and demonstrated acceptable outcomes in terms of shoulder function and X-ray findings.
G1-O-32  Long term clinical and radiographic outcomes of coracoclavicular ligament reconstruction using synthetic ligament for acute acromioclavicular joint dislocation

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Purpose: This study aimed to evaluate the long-term clinical and radiographic outcomes of CC ligament reconstruction, and to identify risk factors for an unfavorable outcome.

Methods: We reviewed 20 cases in 19 patients treated with single-bundle reconstruction, and two cases of double-bundle reconstruction (21 males and one female with a mean age of 32.7 years) after a mean follow-up period of 150.3 months. We measured CC vertical distance (CCD) on the anteroposterior view, and compared the length of the affected side with the unaffected side (CCD ratio). We divided the single-bundle cases into either Group 1 (CCD ratio of 25% or less) or Group 2 (CCD ratio greater than 25%). We radiographically investigated the clavicle tunnel anteroposterior (CTAP) angle, clavicle tunnel ratio, and acromial tunnel orientation based on the entry and exit points at the base of the coracoid.

Results: There were 17 cases (85%) in Group 1 and three cases (15%) in Group 2. Group 1 had a significantly higher mean Constant score (98.2) compared with Group 2 (80.7, p = 0.04). Of the three radiographic parameters, only CTAP angles were significantly different between the two groups.

Conclusions: CC ligament reconstruction of acute AC joint separation resulted in successful long-term clinical and radiographic outcomes. It is important to lower the CTAP angle and ensure proper anatomical placement of the clavicle and acromial tunnel at the time of surgery.

G1-O-33  Arthroscopic procedures of anatomical reconstruction of coracoclavicular ligaments for acromioclavicular joint dislocations - Comparison to modified Cadet procedure -

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Background: The surgical treatment for acromioclavicular joint separations is recommended for type 5 according to Rockwood’s classification. We had performed modified Cadet procedure on the patients with this trauma from 1995 to 2008. On considering the disadvantages of this procedure, we have performed anatomical reconstruction of coracoclavicular ligaments under arthroscopic procedure from 2008 to present.

Materials and Methods: There were 22 patients, and their mean age at the time of surgery was 39.7 years old. The mean follow-up period was 3 year and 2 months. The palmaris longus tendon was excised from ipsilateral side as the substitute ligament for conoid ligament. Also, the artificial ligament was used for reconstructing trapenoid ligament. Both ligaments were reconstructed arthroscopically. As the comparison group, we performed modified Cadetan procedure on 68 patients, and their mean ages at the time of surgery was 35.2 years old.

Results: On radiographic evaluation, 4 patients remained subluxed and 2 patients had dislocation of the acromioclavicular joint, but the other 16 patients remained the reduced position of the joint at final follow up. Also, the occurrence of osteoarthritic (OA) changes in acromioclavicular joint was one patient (4.5%). On the other hand, in modified Cadetan procedure, subluxation occurred in 18 patients and re-dislocation in none. However, the OA changes were 9 patients (13.2%).

Conclusion: Although it requires excision of the ipsilateral palmaris longus for graft, we believe that anatomic restoration of both coracoclavicular ligaments could best restore the function of the acromioclavicular joint.

G1-O-34  Arthroscopically assisted anatomic CC ligament reconstruction for acute AC dislocation using three cortical fixation buttons

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Introduction: The purpose of this study was to introduce an arthroscopically assisted coracoclavicular(CC) ligament reconstruction technique using 3 cortical fixation buttons and to evaluate clinical and radiologic outcomes in patients with acute acromioclavicular(AC) dislocation after reconstruction.

Methods: Twenty-two patients with acute AC dislocation was treated by arthroscopically assisted CC ligament reconstruction using 3 cortical fixation buttons construct. A 4-mm drill hole was made from the predetermined medial clavicular tunnel to the central portion of the base of coracoid process, and the lateral clavicular hole was then created with a 2.4-mm drill bit on the middle between lateral edge of clavicle and medial clavicular hole. Using 2-strand suture tape passing through cortical fixation buttons with one coracoid hole and two clavicular holes, and then the AC joint was manually reduced. Clinical outcomes were evaluated using ASES and Constant score and radiological assessment was done by measurement of CC distance on plain radiographs.

Results: The CC distance was significantly reduced by 8.6 ± 1.5mm (range, 6.0 to 12.1 mm) after operation (p < 0.001). At final follow-up, the CC distance was maintained in 21 patients (95%) compared with immediate postoperative radiographs. The average ASES and Constant score was 95.4 ± 3.1 (range, 87 to 100) and 95.5 ± 3.6 (range, 85 to 100) respectively at final follow-up.

Discussion: Arthroscopically assisted CC ligament reconstruction using 3 cortical fixation buttons for management of acute AC dislocation could be considered as a treatment option for restoring secure stability to the AC joint.
G1-O-35  Our minimum invasive surgery for acromio-clavicular dislocation- What should be repaired
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Our concepts of the surgery for the acromio-clavicular (AC) dislocation is repair of delto-trapezius aponeurosis by open technique, the transcutaneous screw fixation by Bosworth technique and CA ligament transposition with arthroscopic assistance. There were 32 cases in this surgery. 65% of patients were excellent results. In 13 cases, we added arthroscopic examination at the removal of screw. The transposed CA-ligament was recognized in 7 patients. Arthroscopic technique was useful for the shoulder contracture after surgery.

G1-O-36  Clinical Results after Modified Phemister Procedure using Suture Anchor for Acute Acromioclavicular Joint Dislocation
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[Purpose] We evaluated to surgical outcome after modified Phemister procedure using suture anchor and endobuttons for acute AC joint dislocation treatment.

[Material and Methods] Thirty-five patients (33 men and 2 women) with acute AC dislocation were treated modified Phemister procedure using suture anchor and endobuttons technique. The mean follow-up period was 143 months (range, 12-30 months), and the mean patients age was 42.3 years (range, 18-65 years). A 5.0-mm metal suture anchor with extra-strong suture was inserted into the coracoids process. The dislocated AC joint was restored to the original position by fixation using a 2.0-mm wire Kirschner wire temporary. The sutures of anchor were tied on the clavicle bone using endobuttons. Clinical evaluation included postoperative Japanese Orthopedic Association (JOA) score and Constant score at final follow-up. X-rays were used to evaluate the recurrence rate of AC dislocation (the difference in the vertical coracoclavicular distance between two shoulders was over 15%) and number of osteoarthritis of AC joint, ossification of the coracoclavicular ligament at the final follow up.

[Result] There were 3 patients (8.5%) recurrence of AC dislocation postoperatively. There were 5 cases (14.3%) in osteoarthritis of AC joint, and 3 cases (8.5%) in ossification of the coracoclavicular ligament at the final follow up. The average JOA and Constant score was 92.7 and 91.1 points postoperatively.

[Conclusion] We obtained satisfactory outcomes after modified Phemister procedure using suture anchor for acute acromioclavicular joint dislocation. This method of operation has good clinical and functional results.

G1-O-37  Status of reduction and enlargement of bone tunnels after arthroscopic coracoclavicular ligament reconstruction in shoulders with acute acromioclavicular joint dislocation
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Purpose: The purpose of this study was to assess the status of reduction and enlargement of bone tunnels after arthroscopic coracoclavicular ligament reconstruction using Dog Bone Button.

Method: Six shoulders were included into this study. The status of reduction was evaluated by X-rays using the following criteria: excellent, no subluxation; good, subluxation with less than 25% of the coracoclavicular distance (CCD); fair, subluxation with less than 50% of the CCD. The area of the bone tunnels was measured by CT. Then, the enlargement ratio in 5 months for that in 4 weeks after surgery was examined. Furthermore, the relationships between the enlargement ratio and JSS-AC score, ROM and status of reduction were analyzed.

Results: Four shoulders demonstrated excellent reduction and 2 shoulders were estimated as good at 4 weeks after surgery, whereas 2 shoulders demonstrated excellent reduction, 2 shoulders were estimated as good, and 2 as fair at 5 months after surgery. Enlargement of bone tunnels were confirmed in all shoulders, and the enlargement ratio was 154.8% at the bottom of the clavicle and 38.7% at the upper end of the coracoid process. The correlation coefficient for the relations between the enlargement ratio of the clavicle and ROM was 0.77, indicating that strong correlations existed.

Conclusion: Reduction loss was observed in 2 shoulders, and bone tunnel enlargement was observed in all shoulders at 5 months after the surgery. ROM was shown to be the significant factors for the enlargement ratio of the clavicle in this study.
G1-O-38  Arthroscopic Coracoclavicular Fixation Technique Using a Suture Knot: Biomechanical Analysis and Clinical Results
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Introduction: Many surgical techniques have been described for treatment of acute and high grade acromioclavicular dislocation. But there is no gold standard surgical method that truly restores normal acromioclavicular joint kinematics. The purpose of our study was to confirm the overall biomechanical safety and to evaluate early clinical outcome and radiologic results with new surgical technique using a suture knot in the patients with acute and high grade acromioclavicular dislocation.

Methods: In biomechanical set up, cyclic loading test and load displacement curve test were done to confirm the elongation of strands and ultimate tensile strength. Clinically, we checked coracoclavicular interval on radiograph and Constant-Murley functional scores at 12months after surgery.

Results: Biomechanically, the mean elongation of stands during 1000cycles was 0.32 ± 0.21mm in cyclic loading test and the mean ultimate tensile strength was 982.8 ± 67.29N in load displacement curve test. In clinical set up, Constant_Murley scores were 93.8 ± 27 points on the injured side versus 94.1 ± 24 points on the uninjured side. On radiographs, 8 patients showed displacement of less than 2mm and one patient had an increase in coracoclavicular distance more than 4mm and 1 patient had an increase in coracoclavicular distance between 2 and 4 mm.

Discussion: Our new surgical technique using a suture knot showed good results both biomechanically and clinically. Although there are some limitations of this procedure, with reasonable advantages of multiple small sized tunnels, our new surgical technique become a good option for treatment of acute and high grade acromioclavicular dislocation.

G1-O-39  Chronic acromioclavicular dislocation leads to internal impingement
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Introduction: The chronic high grade acromioclavicular joint dislocation must lead to internal impingement according to theoretical background. But there are no proven studies providing insight into the pathologic course of rotator cuff and labrum after loss of acromioclavicular joint integrity. The purpose of our study is to develop the patient-specific glenohumeral movement based on spatial change in scapular positions and to evaluate 3D morphological changes in rotator cuff and labrum according to this movement in patient with chronic acromioclavicular dislocation.

Methods: Using a 3D models of 15 patients with chronic acromioclavicular dislocation, glenohumeral and scapulothoracic motions were simulated. We evaluated the changes in spatial scapular position while glenohumeral abduction by measuring the degree of scapular upward rotation and posterior tilt. The contact stresses of labrum and rotator cuff were also assessed.

Results: The mean scapular upward rotation / posterior tilt angle with respect to the rib cage was 32.3 ± 6.5° / 7.4 ± 8.5° on the injured side versus 44.5 ± 7.8° / 9.7 ± 5.6° on the uninjured side(p<0.05). The measured peak contact stress values were 7.7 ± 6.5 MPa and 293 ± 122 MPa for the posterosuperior labrum and the upper rotator cuff compared the value on uninjured side measured by 2.8 ± 1.5 MPa and 81 ± 7.5 MPa, respectively(p<0.05).

Discussion: Our study successfully reflected biomechanical insight into an alteration of scapula-humeral motion that may influence a rotator cuff and labral damages in chronic acromioclavicular dislocation. The finding suggested that activity requiring extreme scapular upward rotation and posterior tilt might cause rotator cuff and labral damage in biomechanical perspective.
G1-ST-01  A case with fungal infection of shoulder becoming obvious after arthroscopic rotator cuff repair

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Fungal infection of the shoulder joint is occurred to other than compromised-host. The purpose of this presentation is to review treatment strategies for rotator cuff tear with fungal infection of the shoulder. Patient is 70 year-old-man, and introduced for ACRN. However, Candida metapsilosis was detected from culture of the affected shoulder joint fluid. We determined secondary ACRN after arthroscopic debridement of the shoulder. After debridement, antifungal medications were performed for 6 months postoperatively, and secondary ACRN was done. Then, the microscopic examination of the joint fluid was negative. Fungal infection became clear after ACRN, so first, arthroscopic debridement was undergone without removal of implants. However, infection was not suppressed, and open debridement and removal of implants were performed and operative wound was closed with skin flap. Although it has taken about 12 months since his last operation, he can elevate his shoulder up to 150 degree anteriorly with rotator cuff tear and fungal infection has been suppressed.

G1-ST-02  Severe pyogenic arthritis of sternoclavicular joint due to delayed diagnosis and treatment; two case reports

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Purpose: We experienced two cases of severe pyogenic sternoclavicular arthritis due to delayed diagnosis and treatment.

case1: 66 years old male. He had untreated type2 diabetes mellitus. He complained chest pain as first symptom, and 1 month later diagnosed as pyogenic sternoclavicular arthritis and abscess of neck and mediastinum. We performed surgical treatment with otological and thoracic surgeons, and then infection didn’t have a recurrence.

case2: 53 years old male. He had untreated type2 diabetes mellitus. He complained left chest and shoulder pain as first symptom, and 2 months later diagnosed as pyogenic sternoclavicular arthritis and abscess of neck. We performed surgical treatment with otological surgeon, and then infection didn’t have a recurrence.

Discussion: Pyogenic sternoclavicular arthritis is a rare infection. The first treatment is an administration of antibiotics, and in case of resistance surgical treatment is required. Early diagnosis and treatment make good prognosis. But in these two cases, infection became severe due to delayed diagnosis and treatment. Neither case 1 nor case 2 had a recurrence, but they had invasive surgical procedure. In daily medical practice we should see about pyogenic sternoclavicular arthritis when examination of chest pain or sternoclavicular pain, especially immuno compromised patients patient such as diabetes mellitus.

G1-ST-03  Pyogenic lesion of both shoulder girdle and lumbosacral par.: 3 cases report.

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Introduction: Septic arthritis of acromioclavicular and sternoclavicular joint is rare. We report 3 cases of pyogenic lesion of both shoulder girdle and lumbosacral part of patient who has no past history.

Case1: 57 years old female. She complained about left buttock and right shoulder pain, gait disturbance. MSSA was detected in blood culture. MRI and bone scintigraphy revealed septic arthritis of left iliiosacral and sternoclavicular joint. Antibiotics was effective.

Case2: 70 years old female. She complained about pain and difficulty of elevation of right shoulder. Two days later, she concurred low back pain. MSSA was detected in acromioclavicular joint. MRI revealed septic arthritis of right acromioclavicular joint and epidural abscess of lumbar. Clavectomy of distal end and antibiotics was effective.

Case3: 70 years old male. He complained about pain and difficulty of elevation of left shoulder. Two days later, he concurred low back pain. MRSA was detected in blood culture. MRI revealed septic arthritis of left sternoclavicular joint and epidural abscess of lumbar. Antibiotics was effective.

Discussion: Those three patients, in common, had no disease like immune disorder, antecedent infection, and past history of palmoplantar pustulosis. It is very rare that healthy people acquire multiple septic arthritis. The pathophysiology of this infection is similar to that of palmoplantar pustulosis, association of lymphatic system is indicated about etiology of this infection, because of a concentration of lymphatic in both shoulder girdle and lumbosacral part. We should take note of complication of infection of lumbosacral part in treatment of septic arthritis of acromioclavicular and sternoclavicular joint.
G1-ST-04 Treatment for septic arthritis of the shoulder

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Antibacterial medicine and surgery are important to treatment of a septic arthritis of the shoulder. We treated three patients with septic arthritis of shoulder who underwent arthroscopic debridement. Case 1 was 73-year-old man who had a history of a liver transplantation and had been haemodialysis patient. Cultured organisms were Escherichia coli. Case 2 was 73-year-old man who had been a diabetic mellitus. Cultured organisms were Escherichia coli. Case 3 was 83-year-old man who doesn't have the medical history. Cultured organisms were MRSA. They were treated by arthroscopic debridement and intravenous administration of the antibiotics. Case 2 had failed initial surgery and required revision surgery by arthroscopic debridement. Laboratory signs of infection improved postoperatively. Arthroscopic debridement is less invasive and more effective treatment for the septic arthritis of the shoulder even in immunocompromised patient.

G1-ST-05 Treatment of septic arthritis of the shoulder with arthroscopic debridement

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Septic arthritis of the shoulder is thought to be difficult to treat. The aim of this study was to evaluate postoperative clinical results of the arthroscopic debridement for septic arthritis of the shoulder. We treated 8 patients 9 shoulders (3 males and 5 female) with septic arthritis of the shoulder with arthroscopic debridement. The mean interval between onset and surgical treatment was 9.0 days. The mean follow-up period was 5 months (3-12 months). Basic disease were 4 cases of diabetes, 2 cases of liver dysfunction, 2 cases of skin disease. The causes of infection were from different organisms in 4 cases, intra-articular injection in 1 case, posttrauma in 1 case, and unknown in 3 cases. Cultured organisms were MSSA in 4 cases, S. pyogenes in 2 cases, MRSA in 1 case and unknown in 2 cases. Synovial proliferation was shown at the glenohumeral joint in 8 shoulders and at the subacromial bursa in 5 shoulders. We used drain postoperatively in only 3 cases. All cases did not need revision surgery. The mean duration of antibiotic treatment after surgery was 10.2 weeks. Mean flexion at final examinations was 108.0 degrees. In radiographic finding, 1 case revealed joint destruction change.

G1-ST-06 A report of two cases : shoulder arthrodesis for paralysis shoulder

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Introduction: There are some methods of reconstruction for paralysis shoulder, shoulder arthrodesis, nerve transfer, free muscle transfer and etc. This time we experienced 2 cases of shoulder arthrodesis by plate and screws.

Case1: 42 years old man, farmer, dominant hand. His diagnosis was brachial plexus injury in a motorcycle accident. 2.5 years passed at the first medical examination under the influence of cerebral contusion. He was operated on shoulder arthrodesis on 20cm incision from spine of scapula to humerus, used the plate and screws. They had abduction brace for 6 weeks under after surgery. After 1.5 years, he had no pain. His active range of motion (flexion / abduction / external rotation) was 100/85/25 degrees. He have a high satisfaction level.

Case2: 76 years old man, farmer, Non-dominant hand. His diagnosis was Keegan type myelopathy. After 1.5 years, he was reconstruction flexion of the elbow (Steindler method). After 2.5 years, he was operated on shoulder arthrodesis. After 3 years, his active range of motion (flexion / abduction / external rotation) was 40/30/40 degrees. His range of motion do not improve, but he have a high satisfaction level because of stability of his shoulder.

Conclusion: Aim of shoulder arthrodesis is gain of range of motion and stability. There is a gap between case 1 and case 2 on range of motion. But the stability of the shoulder was gained and JOA and DASH score improve with two case. shoulder arthrodesis is an effective operation method.
G1-ST-07  Ultrasonographic evaluation of radial nerve palsy associated with humeral shaft fracture: A case report

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We presented a case evaluated by ultrasonography for a radial nerve palsy associated with humeral shaft fracture. A thirty eight years-old male patient who fell from the horizontal bar by accident presented a right middle third of humeral shaft fracture. Weakness of the wrist dorsal extension and the sensory deficit in the distribution of the radial nerve area were shown, which was diagnosed radial nerve palsy associated with the humeral shaft fracture. Ultrasonographic examination demonstrated the continuity of the radial nerve without being entrapped by the fracture and the compression by hematoma. Then, we planned the nerve decompression by removal of the hematoma with the intramedullary nailing procedure. Favorable radial recovery was obtained with bone healing at five months postoperatively. We conclude ultrasonographic evaluation helps a decision-making of neurolysis concurrently with osteosynthesis for the radial nerve palsy associated with humeral shaft fracture.

G1-ST-08  Acromio-clavicular joint dislocation occurred in coraco-clavicular joint: a case report.

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(Introduction) The acromio-clavicular joint is a true synovial joint that become painful in some patients after trauma. We present a rare case of a acromio-clavicular joint dislocation occurred in coracoclavicular joint.

(Case) A 62-year-old man had left shoulder pain after falling down during driving his bike. X-ray demonstrated an acromio-clavicular joint dislocation with small bony fragment of the end of clavicular and a dislocation of coraco-clavicular joint. Due to concern about instability of the acromio-clavicular joint, we decided to perform surgical treatment. The capsule of coraco-clavicular joint was torn and the articular surface of the dislocated joint were degenerated. Weaver procedure and the fixation of coraco-clavicular joint with suture anchors were performed. With consideration for initial fixation strength, LCP clavicle hook plate was used for three months. Seven months after the operation, he had pain-free without redislocation of his acromioclavicular joint.

(Discussion) The acromio-clavicular joint is not defined ossification of the coraco-clavicular ligaments but is diagnosed based on the presence of well-defined articular facet. In our case, it was impossible to repair the normal coraco-clavicular ligament. Use of suture anchors and Weaver procedure made the reconstruction of the stability between coracoid process and clavicular.

G1-ST-09  Anatomic coracoclavicular ligament reconstruction with palmaris longus and suspensory fixation device for chronic acromioclavicular joint dislocation: a case report

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We performed anatomic coracoidclavicular (CC) ligament reconstruction with palmaris longus and zip tight system for chronic acromioclavicular (AC) joint dislocation.

(Case) A 33-year-old man. He hit the left shoulder in traffic accident and visited a hospital, radiographs showed AC joint dislocation (Rockwood type III). Because of his lack of response to conservative treatment, he visited our hospital after 6 months. His shoulder active range of motion was 110 forward flexion, 30 external rotation and L5 level internal rotation. JOA score was 27 points. We performed anatomic CC ligament reconstruction. After the AC joint was reduced, AC joint was fixed by Kirschner wire. Then, the coracoid process and the clavicle was fixed with zip tight system under arthroscopic assistance. Finally, CC ligament was reconstructed with palmaris longus grafted from his left arm. Six months after surgery, he had improvement in preoperative symptoms such as pain and limited range of motion. However radiographs showed tunnel widening and osteolysis around fixation button.

[Conclusion] In the CC ligament reconstruction using autologous tendon, tunnel widening has been reported as a complication. It is also pointed out that the AC ligament also plays an important role in preventing superior displacement. The AC ligament should also be reconstructed with the tendon graft in chronic AC joint dislocation.
G1-ST-10 Double-bundle reconstruction of coracoclavicular ligament for acromioclavicular joint separation

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Acromioclavicular joint separation is a common injury of the shoulder, however, the gold standard therapeutic option is still not established. To gain the better functional recovery, we performed the anatomical reconstruction of both the conoid and the trapezoid ligament for the patients with the acromioclavicular joint separation. Patients are a 24-year-old male with an acute acromioclavicular joint separation of the left shoulder and a 62-year-old male with the subacute acromioclavicular joint separation of the left shoulder. We conducted the operation for these patients with anatomical double-bundle reconstruction of the coracoclavicular ligament using the non-absorbable suture and the end-buttons. A single bone tunnel was created to the coracoid process and the end-button was placed underneath the coracoid process. Small bone tunnels were created to the clavicle to re-create the conoid and the trapezoid ligament. The bone tunnel of the conoid ligament equivalent was created in antero-posterior direction to place the footprint of the conoid ligament on the posterior edge of the clavicle. The trapezoid ligament equivalent was passed in craniocaudal direction at the distal clavicle. Short-term clinical result was good in these two patients, however, the loss of reduction was observed on the plain X-ray. To prevent the fracture, the smaller bone tunnel is needed in both the clavicle and the coracoid process. Especially, the antero-posterior tunnel for the conoid ligament should be small because the distal clavicle is flat and thin. Further improvements of the surgical method are needed to prevent the loss of reduction.

G1-ST-11 Ultrasound guided removal of calcific deposits in calcific tendinitis of subscapularis: A case report

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Background: Calcific tendinitis is a common disease of the shoulder which usually responds to conservative treatment. In cases unresponsive to conservative management, surgical treatment is sometimes required. While there are several reports on arthroscopic excision of calcific deposits in cases of calcific tendinitis of the subscapularis tendon, documented cases of ultrasound guided resection of calcium deposits are rare.

Case: We present a case of a 59 year old lady with severe anterior shoulder pain. A CT revealed calcium deposits in subscapularis tendon. Pain was refractory to multiple injections of corticosteroid and physical therapy for 3 months. Ultrasound-guided excision was performed on beech chair position. Calcific deposits were visualized and a 18 gauge needle was inserted for localization of calcification. Holding the needle by an assistant, 20mm incision was created in line with the needle. After the dissection of the subcutaneous tissues calcific deposits were successfully removed. Diagnostic arthroscopy was performed to examine the articular sided calcific deposits in the subscapularis tendon but neither calcium nor iatrogenic tear in tendon that needs surgical repair was not detected. Also coracoplasty was not performed due to the absence of stenosis in subcoracoid space in preoperative evaluation. The patient followed a conservative postop rehabilitation protocol and ultimately regained full range of motion and was pain free at the latest follow-up.

Conclusion: This report describes the clinical and technical details of ultrasound-guided removal of bursal sided calcific deposits of the subscapularis tendon.

G1-ST-12 Ultrasound therapy for calcific tendinitis of the shoulder: report of two cases

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Introduction: Various treatments have been reported for calcific tendinitis of the shoulder. Ultrasound therapy is one option. Previously, few reports described ultrasound therapy for calcific tendinitis of the shoulder. This presentation reports two patients whose calcification disappeared and the symptoms resolved completely with ultrasound treatment.

Case 1: A 53 year-old female of the right shoulder pain lasting for ten months was consulted. X-ray demonstrated calcification (lateral length: 27mm, height:17mm, A-P length: 18mm) above the humeral head. We treated with twenty-two times ultrasound therapy during eight weeks simultaneously with oral prednisolone and famotidine. The calcification disappeared and pain was relieved completely.

Case 2: A 60 year-old female of the right shoulder pain lasting for 18 months was consulted. X-ray demonstrated calcification (lateral length: 30mm, height: 5mm, A-P length: 12mm) above the humeral head. We treated with thirty-one times ultrasound therapy during three months simultaneously with oral famotidine. The calcification disappeared and pain was relieved completely.

Discussion: Our report showed significant effect of ultrasound therapy in two patients of calcific tendinitis of the shoulder. Patients could have ultrasound treatment in an outpatient clinic with physical therapy and avoid surgery. Extracorporeal shock wave therapy is also used as a similar therapeutic method. An Ultrasound therapy machine is much more inexpensive and much smaller than a machine for extracorporeal shock wave therapy, therefore is more easily accessible. Ultrasound therapy could be an excellent therapeutic option for calcific tendinitis of the shoulder.
G1-ST-13 A case of antegrade humeral intramedullary nailing required rotator cuff repair

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Background: Antegrade intramedullary nail is widely used for proximal humeral fractures because of its minimally invasive procedure. Some complications, such as nonunion, collapse of humeral head, subacromial impingement, nerve injury have been reported. But rotator cuff tear after antegrade intramedullary nail procedure is rare. We report a case of rotator cuff tear after antegrade intramedullary nail procedure.

Case: A 22-year-old male who underwent antegrade intramedullary nail procedure in different hospital. 1 year after operation, he had shoulder pain and limitation of range of motion. So we performed operation to remove antegrade intramedullary nail. Arthroscopic findings revealed remarkable inflammation of rotator interval and rotator cuff tear, so we performed rotator cuff repair.

Discussion: In our case, persistent impingement induced by exert intramedullary nail. Therefore appropriate insertion is important in antegrade intramedullary nail procedure for proximal humeral fractures.

G1-ST-14 A case report of a frozen shoulder with contracture of deltoid muscle

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50 years male had already had a limitation of ROM in right shoulder due to contracture of deltoid muscle since 6 years old. He could work as a fisher even though his shoulder limitation. But he had a more serious limitation and pain. Flexion was 80 degree and internal rotation -30 degree superficially. Limitation of Abduction was 30 degree. But accurate limitation was more serious due to his winging scapula. His X-ray, CT and MRI showed significant posterior rotational shifts of scapula and cuffs. These shifts were produced by long affected contracture of deltoid muscle. There was no cuff tear. We diagnosed frozen shoulder with contracture of deltoid muscle. There were different findings and treatments between common frozen shoulder and his frozen shoulder in clinical findings. Points of muscle tenderness were shifted along bone shift. It was very hard to confirm of approach point of injection because of shift of tendons. So we used echo and X ray for injection. Fortunately injection was effective and his symptoms were getting better. It was approximately ten years duration on the time of onset of the deltoid contracture in Japan. Their ages are almost 50's years old, so they often get to affect frozen shoulder. We need knowledge about history and pathogenesis of contracture of deltoid muscle and the most careful explanations because their causes of contracture of deltoid muscle were iatrogenic injection and we may use injection to their affected muscle.

G1-ST-15 A case of pigmented villonodular synovitis in shoulder joint treated by arthroscopic surgery

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Introduction: We report a case of pigmented villonodular synovitis in shoulder joint treated by arthroscopic surgery.

Case report: A 61-year-old man presented with pain and difficulty of elevation in right shoulder. Physical examination showed limitation of range of motion and muscle weakness in right shoulder was observed, and bloody fluid was observed by right by puncture. MRI showed the mass and rotator cuff tear. The mass was low intensity on T1-weighted images and mixed by low and high intensity on T2-weighted images. Rheumatic disease was negative by laboratory data. Therefore, we suspected pigmented villonodular synovitis and performed arthroscopic resection. In intraparative findings, synovial hyperplasia and rotator cuff tear was observed. Histopathology revealed synovial hyperplasia with infiltration of multnucleate cell, and deposit of hemosiderin, so diagnosis of pigmented villonodular synovitis was made. After operation, the right shoulder pain disappeared rapidly, and recurrence of the tumor has not been observed at 3 months post operation.
G1-ST-16 A rotator cuff tear with a lipoma in the spinoglenoid notch: A case report

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[Introduction] The most common tumor in the spinoglenoid notch is a ganglion cyst. But a lipoma in the spinoglenoid notch is rare. We report a rare case of a rotator cuff tear with a lipoma in the spinoglenoid notch.

[Case] A 68-year-old woman complained of a right shoulder pain from the end of 2011. She had a conservative treatment, but her symptom didn’t improve. So she was referred to our department in April 2012. MRI showed a moderate tear of supraspinatus, and a 5 cm mass with as isometric signal intensity on T1 and T2 sequence as a subcutaneous fat tissue. The mass signal was depressed on fat suppression mode. The mass expanded to the deep part of the supraspinatus and infraspinatus through the spinoglenoid notch. Electromyography didn’t detect suprascapular nerve palsy. JOA score was 74 points. We performed an arthroscopic rotator cuff repair and an open excision of the tumor in July 2012. We released the deltoid muscle from the scapular spine, and excised the tumor. Pathological diagnosis was lipoma. No recurrence has been observed in 3 years after surgery.

[Discussion] The lipoma is an usual benign soft tissue tumor, but it is extremely rare that occurs in the spinoglenoid notch. To our knowledge, there is no report in Japan and two case reports in foreign countries. If the tumor grows, she might cause suprascapular nerve palsy. Treatment of the rotator cuff tear and excision of the lipoma led to resolution of her symptom.

G1-ST-17 Four cases of synovial proliferation on shoulder magnetic resonance imaging.

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We report four cases of synovial proliferation on shoulder magnetic resonance imaging (MRI). Cases 1 and 2: A 72-year-old woman visited our department with a 3-month history of right shoulder pain. MRI showed synovial proliferation. Conservative treatment was ineffective. Subsequently, arthroscopic synovectomy was performed. Pathological diagnosis indicated amyloid arthropathy. After 5 months, she experienced left shoulder pain and underwent the same surgery. Pathological diagnosis was similar to that at the right shoulder. Postoperatively, she had less pain in both shoulders. Case 3: A 67-year-old man visited our department with left shoulder pain. MRI showed a rotator cuff tear and proliferation of the synovium in the subacromial bursa. Arthroscopic synovectomy and rotator cuff repair were performed. The pathological diagnosis was lipoma arborescens. Postoperatively, shoulder pain reduced, and there was no recurrence. Case 4: A 63-year-old man visited our department because of right shoulder pain and frozen shoulder. Radiography showed multiple calcified nodules. T2-weighted MRI indicated synovial proliferation and low-intensity multiple loose bodies. Arthroscopic synovectomy was performed to extract all visualized loose bodies. The pathological diagnosis was synovial osteochondromatosis. Postoperatively, he had less pain and no disease progression. Discussion: Synovial proliferation on shoulder MRI is observed in diseases, including rheumatoid arthritis, infectious arthritis, pigmented villonodular synovitis, synovial osteochondromatosis, lipoma arborescens, and amyloid arthropathy. These cases indicate that appropriate examinations should be chosen based on the differential diagnosis. In these cases, arthroscopic synovectomy was useful to treat for synovial proliferation on the shoulder.

G1-ST-18 Arthroscopic treatment for synovial chondromatosis of the subscapular bursa: a case report

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We report a rare case of synovial chondromatosis of the subscapular bursa treated by arthroscopic surgery. A 13-year-old boy presented with pain during basketball activity and recurrent bursitis in his right shoulder. Physical examination of the right shoulder showed full range of motion with slight effusion. Plain radiographs showed no abnormal finding, but computed tomography and magnetic resonance imaging (MRI) showed multiple calcified mass lesions in the glenohumeral joint and the subscapular bursa. Arthroscopic examination revealed multiple free fragments in the glenohumeral joint and the subscapular bursa. Multiple intrasynovial chondroid nodules were seen in the subscapular bursa. Sublabral foramen was found at anterosuperior portion of the glenoid and communicated with the subscapular bursa. Arthroscopic removal of loose bodies and synovectomy of the subscapular bursa were performed. The histological examination confirmed the findings of synovial chondromatosis. Three weeks after the operation, he was symptom-free with full range of motion and was able to return to sports. At follow-up after 3 years months, MRI showed no evidence of recurrence. Arthroscopic removal of loose bodies and synovectomy, which provides good visualization and early functional recovery is useful treatment option for the synovial chondromatosis of the subscapular bursa.
G1-ST-19  Arthroscopic decompression with ultrasound-guided injection of indigo carmine for paralabral cysts in the shoulder
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The purpose of this study was to investigate the results of arthroscopic decompression with ultrasonography-guided injection of indigo carmine in 5 patients with paralabral cysts in the shoulder. Three cases were male, and two cases were female, and their mean age was 41 years old. Indigo carmine was injected into the cyst under ultrasonography guidance just before the operation. The leakage point of indigo carmine was detected using arthroscopy. Arthroscopic decompression was performed until indigo carmine was completely discharged. Shoulder pain, limited range of motion, and muscle weakness on abduction and external rotation improved after surgery in all cases. Magnetic resonance imaging or ultrasonography confirmed the disappearance of the cyst in all cases. Arthroscopic decompression using ultrasonography-guided injection of indigo carmine is a useful treatment for a paralabral cyst in the shoulder.

G1-ST-20  Comparison of the Effect of Analgesics in Arthroscopic Transosseous Suture Repair of the Rotator Cuff -Second Report-
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Recently several reports of which the effect of TRAMCET, which are Combination Tablets (Tramadol hydrochloride/ Acetaminophen (AAP), TRAM) after surgery were seen. Last year, we reported the no difference among the effects of three different analgesics (TRAM, AAP, and NSAI Ds). This time we compared the effect of three analgesics for patients who complained severe pain. From 2014 May to 2015 Feb, 96 patients underwent ATOS. 18 patients who discharged early, and 40 patients who didn’t complain severe pain (VAS was less than 7) were exclusive. 38 patients were involved. The mean age at the operation was 66.4, 21 males and 17 females were examined. 12 patients took TRAM (Group T), 16 patients took NSAI Ds (Group N), and 10 patients took AAP (Group A). VAS between 1POD and 2POD in Group T and Group N improved significantly, but that of Group A didn’t improved apparently. Among three groups in 2POD, VAS of Group T was improved better than the other groups significantly. About the side effect, constipation was seen in three patients in Group T and four patients in Group A. Nausea was not observed in all groups. TRAM was considered to be effective for the patients who complained severe pain after ATOS compared with NSAI Ds and AAP.

G1-ST-21  Hemiplegia In Unaffected Side After Arthroscopic Rotator Cuff Repair : A Case Report
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We report a case of the hemiplegia in unaffected side after arthroscopic rotator cuff repair. The case was of a 68 years old male farm manager. He had a history of hypertension though abnormal findings were not observed in preoperative ultrasonic cardiography. He complained 2 months of right shoulder pain. Assessing supraspinatus tendon rupture, we operated arthroscopic rotator cuff repair with beach chair position under general anesthesia. We found the hemiplegia in unaffected side after the emergence from anesthesia. Though suspected cerebrovascular accident, brain CT findings were within normal limits. He was sent to the university hospital for 5 minute investigations. Hypoxic encephalopathy in the region of right middle and anterior cerebral arteries was found through brain M RI, and then hypoplasia of bilateral posterior communicating arteries in the circle of Willis was found in the cerebral angiography. This is a quite rare case as the frequency of cerebrovascular accident occurrence in shoulder surgery with beach chair position was reported as 0.003%. We considered its critical causes and preventions with some literature review.
B1-O-01  The proprioception of the shoulder joint for the patients with traumatic shoulder instability

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Background: The proprioception of the shoulder joint is usually damaged in the patients with traumatic shoulder instability. Surgical reconstruction of anterior-inferior glenohumeral ligament (AIGHL) is considered to restore the proprioception of the shoulder, but the details are not known well. In this study, we evaluate postoperative changes of proprioception for the patients with traumatic shoulder instability after arthroscopic Bankart repair.

Subjects and methods: We examined 120 patients with traumatic shoulder instability who were underwent arthroscopic Bankart repair. They were 117 men and 3 women with a mean age of 26.3 years (range, 18 to 48). Proprioception was assessed by subjective angle inaccuracy (RAI) measured by using Bioex System2TM (BIODEX, New York) at the target angles of 75-degree external rotation with 90-degree abduction of scapular plane. Each RAI was measured three times at the pre-, 6, 12 months and final follow-up (mean 31.6 months) after the surgery.

Results: The mean RAI was 6.3 preoperatively, and significantly decreased to 5.2 at 6 months after the surgery (p=0.012). The values kept on the same level between 6 months and the final follow-up after the surgery.

Discussions and Conclusions: This study indicates that the reconstruction of AIGHL complex can improve the proprioception of the shoulder joint at least 6 months after the surgery.

B1-O-02  Correlations of coracohumeral ligament and range of motion restriction in patient with recurrent anterior glenohumeral instability by magnetic resonance arthrography

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Purpose: To investigate correlations of thickness of the coracohumeral ligament (CHL) and ROM restriction in patient with recurrent anterior glenohumeral instability.

Methods: Between January 2005 and March 2015, 181 shoulders (137 males and 44 females) had their Bankart lesions evaluated by preoperative magnetic resonance imaging (MRI) arthrography and treated with an arthroscopic Bankart repair. The mean age was 29.3 years (range 13 to 48) and divided into four age groups (10, 20, 30, and 40s). Patients were evaluated by preoperative ROM, thickness of the coracohumeral ligament (CHL) and obliteration of subcoracoid fat triangle in the MR arthrography. ROM measurements, including forward flexion (FF), external rotation with the arm at the side (ER), and hand behind the back (HBB) were measured in a standing position.

Results: There were significant difference in FF, and HBB among the age groups (p = 0.001), and no significant difference in ER (p = 0.159). The thickness of the CHL and the presence of obliteration of the subcoracoid fat triangle were significantly increased with age (p = 0.001, p = 0.004). The presence of obliteration was significantly higher in patients with ROM restrictions (p = 0.001). FF, ER, and HBB were significantly restricted in patients with obliteration compared with those without obliterations (p = 0.001, p = 0.004, p = 0.001, respectively).

Conclusions: Obliteration of the subcoracoid fat triangle and the thickness of the CHL correlated with ROM restrictions, and these changes were greater with age in patients with recurrent anterior glenohumeral instability.

B1-O-03  Computed Tomography Evaluation of Osteophytes in Shoulders with Traumatic Anterior Instability

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Purpose: Computed tomography (CT) is a valuable imaging modality for the evaluation at the time of treatment for traumatic anterior shoulder instability. We sometimes detect osteophytes in unstable shoulder on CT. The purpose of this study is to evaluate osteophytes using CT images and clarify the factors influencing the formation of osteophytes.

Method: Total 239 shoulders with traumatic anterior instability were investigated regarding osteophytes formation on glenoid or humeral head using multi-planar reconstruction (MPR) CT. Those who experienced surgical treatment were excluded. The size or positions of osteophytes on glenoid and the presence of osteophytes on humeral head were evaluated using coronal, axial and oblique sagittal views. In addition, we assessed several factors influencing the formation of the osteophytes using multiple regression analysis.

Result: Among 239 shoulders, osteophytes were detected in 89 shoulders (37.2%) on glenoid or humeral head. In patients with unilateral instability, as 74 of 183 unstable shoulders (40.4%) have osteophytes, their prevalence of osteophytes was significantly higher than in contralateral shoulders (17.6%). Among 91 patients with unilateral instability underwent bilateral CT evaluation, while osteophytes were detected in 31 shoulders on unstable shoulders, they were detected in 11 shoulders on healthy side too. Age at primary injury, time since primary injury, numbers of dislocation and subluxation and glenoid defect size were significant risk factors for the formation of osteophytes.

Conclusion: CT evaluation could reveal the high incidence of osteophyte formation in shoulders with traumatic anterior shoulder instability.
B1-O-04  Prediction of the glenoid track using the shoulder range of motion

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Introduction: The purpose of this study was to determine the relationship between the glenoid track width and the shoulder range of motion in healthy volunteers.

Methods: MRI images of 8 shoulders of 4 healthy volunteers (mean age: 40 years old) were assessed. Three-dimensional (3D) scans were obtained using an open MRI system. The subjects laid supine. The MRI scans were taken with shoulder joint in maximum horizontal extension, keeping the arm in 90°°±2°, of abduction and 90°°±2° of external rotation. 3D models of the scapula and humerus were created from the MRI data using image analyzing software (Amira). The distance from the anterior rim of the glenoid to the medial margin of the footprint of the rotator cuff tendon was measured, and defined as the glenoid track width. Active and passive ranges of shoulder motion were measured in both supine and sitting position. Measured motions were: horizontal flexion, horizontal extension in arm neutral rotation and 90°°±2° of external rotation, abduction, flexion, extension, internal and external rotation with the arm at side and 90°°±2° of abduction. The correlations between the glenoid width and shoulder motions were investigated by Pearson’s correlation coefficient test.

Results: Statistically significant strong correlations were observed between the glenoid track width and the following shoulder motions: active and passive flexion (r = 0.78, 0.72) and active and passive extension (r = 0.90, 0.84).

Conclusion: The greater the range of flexion or the smaller the range of extension, the smaller the glenoid track width.

B1-O-05  The glenoid track width reduces with an increase of horizontal extension in live shoulders

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Introduction: We reported that the glenoid track width in cadaveric shoulders was affected by the horizontal extension. The greater the angle of the horizontal extension, the smaller the width of the glenoid track. The purpose of this study was to determine the relationship between the glenoid track width and the horizontal extension in live shoulders.

Methods: MRI images of 8 shoulders of 4 healthy volunteers (mean age: 40 years old) were assessed. Three-dimensional (3D) scans were obtained using an open MRI system (Siemens, Signa Profile HD) with a wide gantry. The subjects laid supine. The MRI scans were taken in 3 static shoulder positions at -40°°±2°, 0°°±2°, and maximum horizontal extension, keeping 90°°±2° of abduction and 90°°±2° of external rotation. 3D models of the scapula and humerus were created from the MRI data using image analyzing software (Amira). The distance from the anterior rim of the glenoid to the medial margin of the footprint of the rotator cuff tendon was measured, which was the width of the glenoid track.

Results: The mean width of the glenoid track with the arm at -40°°±2°, 0°°±2°, and maximum horizontal extension were 31.9 ± 6.2 mm, 29.5 ± 6.4 mm, 24.4 ± 4.2 mm, 22.2 ± 5.4 mm (114%, 105%, 87%, and 79% of the glenoid width), respectively.

Conclusion: The greater the horizontal extension, the smaller the glenoid track width.

B1-O-06  Does "subcritical bone loss" really exist?

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Introduction: It has been demonstrated biomechanically that 25% is a critical size defect of the glenoid. Recently, Shaha et al (JSM 2015) reported that bone loss above 13.5% led to impairment of QOL even in patients who did not sustain a recurrence of their instability ("subcritical bone loss"). The purpose of this study was to clarify the existence of a "subcritical bone loss" using a disease-specific quality-of-life questionnaire.

Methods: Twenty-four patients (mean age: 28 years) with less than 25% glenoid defect who had arthroscopic Bankart repair were assessed at a mean follow-up of 23 months. WOSI score and Rowe score were used for the evaluation. The mean defect size of the glenoid was 6.6% (0.4%-19.5%).

Results: The recurrence rate was 4% (1/24 shoulders) and both WOSI and Rowe scores were significantly improved postoperatively. There was no significant correlation between the defect size and WOSI score. No significant difference of WOSI score between greater than 13.5% and less than 13.5% defects was found.

Conclusion: "Subcritical bone loss" proposed by Shaha et al was not seen in our study. This may be because the number of the subjects is small in this study and all their subjects were military men who needed a high level of mandatory activity.
The critical bone loss of the glenoid that leads to recurrent glenohumeral instability after stabilization surgery

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Introduction: The purpose of this study was to analyze the critical value of anterior glenoid bone loss that led to failure of Bankart repair.

Methods: A total of 169 patients with erosion of the anterior glenoid rim underwent arthroscopic Bankart repair. The amount of anterior glenoid erosion was calculated as the ratio of the glenoid defect width and the longest anteroposterior glenoid width to the diameter of the outer fitting circle based on the inferior portion of the glenoid contour on 3D-CT. The critical value of glenoid bone loss was analyzed through the receiver operating characteristic (ROC) curve analysis. Patients were divided into two groups based on the glenoid erosion rates: group A (less than the critical value) and group B (greater than the critical value). Clinical outcomes were evaluated using the ASES, Rowe score. Surgical failure was defined as patients who had revision surgery or subjective symptoms of instability.

Results: The optimal critical value of glenoid erosion rates was 17.3% (area under the curve (AUC) = 0.82, 95% confidence interval: 0.73-0.91, p<0.001). There were 134 patients in group A and 35 patients in group B. Both ASES and Rowe scores were significantly lower in group B compared to group A (p<0.001). Failure was significantly fewer in group A (5 patients, 3.7%) than group B (15 patients, 42.9%) (p<0.001).

Discussion: Greater than 17.3% rates should be considered as the amount that is likely to lead to recurrent instability postoperatively.
B1-T2-1  
**Analysis of failure cases after Arthroscopic Bankart Repair for Recurrent Anterior Glenohumeral Instability**

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**[Purpose]** The purpose of this study was to retrospectively analyze the characteristics of the failed cases after arthroscopic Bankart repair.

**[Methods]** Subjects consisted of consecutive 41 patients who underwent arthroscopic revision stabilization for the failed arthroscopic Bankart repair between 2012 and 2015. Among them, 13 cases received initial surgery in our institute (group F), and 28 in other hospitals (group O). We analyzed the age at the initial surgery, period from initial surgery to recurrence, possible cause of recurrence, bone morphology at the initial surgery (group F), and the number and placement of suture anchors (group O).

**[Result]** The mean age at the initial surgery was 20.6 years old. Five out of 13 cases in the group F and 19 out of 28 cases were recurrent less than one year after initial surgery. Regarding bone morphology at initial surgery in group F, the mean glenoid bone loss was 11.5% with attritional type predominated and all cases had evident Hill-Sachs lesion. Thirteen out of 28 cases in the group O demonstrated that the lowest anchor position was higher than the 4-o’clock (right shoulder). Twelve out of these 13 shoulders experienced recurrence within one year after the initial surgery.

**[Conclusions]** The characteristics of the failed cases after arthroscopic Bankart repair were younger age at the time of initial surgery, attritional type of moderate glenoid bone loss with large Hill-Sachs lesion in the group F, and inadequate capsular tensioning in the group O.

B1-T2-2  
**Clinical outcome of the surgical treatment based on the glenoid track concept for patients with recurrent shoulder dislocation**

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The purpose of this study was to determine the efficacy of treatment selection based on the glenoid track concept. Seventy-nine patients with an on-track lesion and a glenoid defect under 25% underwent arthroscopic Bankart repair. Among 9 patients with an off-track lesion, 2 underwent arthroscopic Bankart repair with remplissage and 7 underwent Latarjet procedure. With a minimum of 2-year follow-up, 4 patients treated with arthroscopic Bankart repair had recurrence (9%). No recurrences were observed in off-track cases treated with Latarjet. This study indicates the application of the glenoid track concept in preoperative assessment is useful in determining the optimal surgical option.

B1-T2-3  
**Clinical outcomes of open inferior capsular shift method with iliac bone graft for anterior shoulder instability with glenoid defect**

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**Purpose:** A glenoid bone defect larger than 25% of the glenoid fossa transverse diameter is regarded as a risk factor for redislocation. We performed the open inferior capsular shift method with iliac bone graft (ICS-IBG) in patients with anterior shoulder instability with a glenoid defect larger than 25% of the glenoid fossa, and report good clinical outcomes.

**Methods:** This study comprised 10 patients treated with ICS-IBG (male: 8, female: 2, average age: 25.7). Of these, four had had redislocation after endoscopic Bankart repair. All patients were assessed for their redislocation rate, external rotation after the operation and their scores in the JOA and Rowe scales preoperatively and at 12 months postsurgery. In addition, the glenoid bone defect preoperatively and at 12 months was evaluated using 3-D CT. Data were statistically analyzed using the Mann-Whitney U test.

**Results:** Redislocation did not occur after surgery but the procedure resulted in restricted external rotation. Patients had significantly improved JOA and Rowe scores, and the glenoid bone defect rate was improved from 29.8% to 10.8%.

**Discussion:** The transfer of the coracoid with attached conjointed tendon is currently recommended for treatment of a glenoid bone defect, but this method changes the anatomical positioning. We consider that the ICS-IBG method is effective for the treatment of glenoid bone defects larger than 25% of glenoid fossa transverse diameter and does not change the anatomical position.
B1-T2-4  Clinical Results of Arthroscopic Bankart Repair: Effectiveness of Artificial Bone Grafting for Glenoid Defect

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The bony loss of glenoid and/or humerus remains as a problem to be solved for the treatment of traumatic shoulder instability. Since 2012 we have arthroscopically performed the artificial bone grafting for glenoid bone defect. The purpose of this study was to examine the clinical results of arthroscopic stbalization using double anchor footprint fixation technique. 403 patients were included in this study who were followed up for at least one year. 266 patients treated until 2011 enrolled in group A. 137 patients after 2012, who included 40 patients with an augmentation of arthroscopic artificial bone grafting, were in group B. Recurrence rate was 11.7 percentage in group A and 5.1 percentage in group B. Recurrence rate was significantly lower in group B. Artificial bone grafting for glenoid bone loss was effective.

B1-T2-5  Complications of Arthroscopic Bankart-Bristow procedure

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The purpose of this study was to evaluate the complications of arthroscopic Bankart-Bristow procedure, in traumatic anterior shoulder instability. We retrospectively studied 103 patients (97 males and 6 females) ranging from 15 to 25 years of age (average, 19.1 years old). The mean follow-up was at 18.7 months (range 12-32 months) after surgery. Medical records and video were reviewed to identify complications in the studied patients. We evaluated the kind and rate of complications in arthroscopic surgery and after surgery. There was no troubles of surgical equipment, DVT and complex regional pain syndrome (CRPS). We had a hematoma, a mild infection and three cases of musculocutaneous nerve palsy after surgery. Three patients of musculocutaneous nerve palsy recovered from 3 to 5 months. Two of five cases with coracoid bone block nonunion were reoperated because of pain and resubluxation. Complications associated with arthroscopic Bankart-Bristow procedure are relatively rare. The main complications were concerned with the coracoid bone block healing and musculocutaneous nerve palsy. The two cases of screw back-out were 100kg over weight, it was necessary to reconsider about the screw length and the position of PM portal it concerned with direction of screw.
**B1-O-08 Osteogenesis and osteolysis of the grafted coracoid process after modified Bankart & Bristow procedure**

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**Purpose:** The purpose of this study was to evaluate size change of the coracoid graft after modified Bankart and Bristow procedure (BB). Method: Seventeen shoulders in 15 patients who underwent BB more than 10 months ago were evaluated. Computed tomography images were obtained just after surgery and at last examination. Bone union and area of coracoid graft were evaluated in 3 mm superior and 3 mm inferior slices to the center hole of cannulated screw. JSS-SIS was evaluated at the last examination.

**Results:** Bone union was confirmed in the superior slice in 7 shoulders (group S) and in the inferior slice in 6 shoulders (group I), and fibrous union was observed in 4 shoulders (group F). The mean area value was increased by 536 % in group S, 0.7% in group I and decreased by 176 % in group F, which was significantly different (ANOVA). The mean JSS-SISs were 94.8 points in group S, 935 points in group I and 835 points in group F, which was not significantly different.

**Discussion:** Since more osteogenesis was observed in group S and osteolysis could be observed in group I, our findings suggest that bone union in BB preferentially occurs at the superior area, although no significant difference in clinical results were observed in this study. A long-term follow-up study is needed for further evaluation.

**B1-O-09 Investigation of effect for muscle strength after Arthroscopic Bankart-Bristow procedure**

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**Introduction:** We select Arthroscopic Bankart-Bristow (ASBB) procedure for the collision athletes with higher risk of re-dislocation. We have reported good outcomes after ASBB. However, recovery of muscle strength is also needed to the early return to sports.

**Purpose:** The purposes of this study were to measure the muscle strength after the ASBB, to compare the improvement in muscle strength between Arthroscopic Bankart (ASB) procedure group and ASBB group, and to investigate whether the additional Bristow procedure worsens or improves in muscle strength compared with Bankart procedure alone. We finally investigated about the validity of early return to sports after ASBB.

**Method:** We investigated 11 shoulders after ASBB procedure. We measured the peak torques using MT-100w (Sakai) at 3, 4, 5 and 6 months post operatively and calculate ratios against unaffected side. Comparisons between ASB group (9 shoulders) and ASBB group were investigated in terms of muscle strength at 3, 4, 5 and 6 months postoperatively.

**Results:** The muscle strength was improved to more than 90% of unaffected side after 5 months postoperatively. No significant muscle strength improvement was seen in any investigated item in ASB group.

**Conclusion:** The validity of the return to sports at 4 months postoperatively after ASBB procedure was proven in terms of recovering the muscle strength. Adding Bristow procedure did not become a factor of the post-operative muscle weakness. ASBB procedure is thought to be a useful procedure for the athletes who hope for the early return to preoperative sports activity.

**B1-O-10 Evaluation of the coracoid graft state and the complication for the modified arthroscopic Bankart & Bristow procedure.**

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The purpose of this study was to evaluate for the coracoid graft (CG) location and the complication for the modified arthroscopic Bankart & Bristow procedure (ASBB) through the pectoralis major portal. The state of the CG is very important. We retrospectively reviewed 10 shoulders in 10 subjects who were treated by the ASBB. The state of coracoid grafts were evaluated by the CT scan after surgery. And we also investigate regarding complication during surgery. The size of GC were length (16mm), width (14mm) and thickness (11mm). The angle between the long axis of the CG and the screw was 11 degrees. The position of the CG on the glenoid using sagital views was 4 o'clock. The angle between the CG and long axis of glenoid was 82 degrees. The gap of the between CG and glenoid articular surface was 1.5mm. The angle of the long axis of the CG and the glenoid articular surface was 20 degrees. Intraoperative complications due to cut-out of the Screw, the dislocation of the CG was one and the deflection fixed of the CG was one. In this study, we have demonstrated that small deviations of the CG long axis and the screw angle cause the trouble in fixing the CG. It is important to make a drill hole coincides with the center and a long axis of the CG.
B1-O-11  Our result of the Latarjet procedure

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[Introduction] We have performed the Latarjet procedure for the glenohumeral instability.

[Materials and methods] Between 2010 and 2015, 50 cases were managed operatively in our center. Average ages were 36.7 years old. If we classified according to a disorder, there were 42 recurrent dislocations, 3 glenoid fractures, and 5 locked dislocations.

[Results] Almost cases recovered the instability of the shoulder, decreased a pain, and improved ROM of the shoulder. But 3 cases developed glenoid fracture during the coracoid osteotomy, 2 cases developed dislocation of the grafted coracoid postoperatively, and 4 cases suffered the fracture of the grafted coracoid.

[Discussion] Compared with the Bristow procedure, the Latarjet procedure can reconstruct the large glenoid defect, and a firm primary fixation of the grafted bone using two screws. But it is more difficult and complicated to transfer the larger coracoid process in the deep shoulder joint. Especially, the conjoined tendon may hide the position of the grafted bone in the obesity patients and muscular patients. The grafted bone must be positioned along a glenoid edge correctly, for avoiding the late degenerated change and the nonunion of the grafted bone.

[Conclusion] We will get a better result if we can understand the complications of this procedure.

B1-O-12  The comparison of the size of the coracoid process between preoperative estimation and postoperative actual measurement for Latarjet procedure

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The purpose of this study is to compare the size of the coracoid process (CP) between preoperative estimation and postoperative actual measurement after Latarjet procedure and to define the appropriate anatomical landmark of pre-operative planning. 34 shoulders in 32 patients (all males, the average age; 18.5 (15-38) y.o) were included in this study. CT examination was performed preoperatively and at 1 day after surgery and the length, height and width of CP were measured preoperatively and postoperatively using 3-dimensional image analyzing software, VINCENT. The length of CP was defined as the distance from the tip to elbow. The height and width were measured at the proximal part of CP and at the distal part of CP, considering 2 screws insertion. Preoperative estimations of the length, proximal height, distal height, proximal width and distal width were 22.5mm (19.7-27.1), 10.5mm, 9.0mm, 13.6mm and 13.0mm. Postoperative measurements were 21.7mm (18.0-25.7), 7.8mm, 7.0mm, 13.6mm and 12.9mm, respectively. Only height was significantly decreased. Preoperative estimation of CP length should be measured from the tip to elbow of CP. The height was decreased because the cortical bone of caudal site of CP were removed to promote bone union.

B1-O-13  Arthroscopic findings of the anterior shoulder instability relation with glenoid morphology

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Purpose: Arthroscopic findings of anterior labrum lesion of anterior shoulder instability have several variation. The purpose of this study is to research difference of medical condition by each type of labrum lesion and relation with glenoid morphology.

Material and Methods: From January 2009 to December 2015, 226 cases. Average age was 23.9 years old, 182 males and 44 females. We classified labrum lesions into 4 types. Detached type, type I, medial shifted type, type II, medial shifted with detached portion: mixture type, type III. Gender, age of first dislocation, numbers of dislocation, disease duration, rate of self reposition, presence of trauma at first episode, and glenoid morphology were investigated.

Results: Type I was 118 cases, type II was 62 cases, type III was 22 cases, and type IV was 19 cases. Type I had most high ratio of man (87%). The first dislocation age of type I was youngest (16.7). Type II had most large Total dislocation numbers of times (m:13.4, mx:6). Type II had most high ratio of selfrepposition (70%), and type II had most low ratio (4%). Most of first episodes of type III were low energy injury (62%). Most of type IV had bony Bankart lesion (48%), most of type II had erosion of glenoid, type I and type II had almost normal shape glenoid (mx:70%, l:58%).

Discussion: The labrum form of the anterior glenohumeral instability was affected by age at the time of the first dislocation and traumatic degree, and the possibility that it changed with glenoid morphology as a disease period became longer was suggested.
**B1-O-14 Postoperative recurrence after arthroscopic Bankart repair due to a new fracture of anterior glenoid rim**

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Purpose: The purpose of this study was to investigate the occurrence of a new fracture of anterior glenoid rim in shoulders with postoperative recurrence after arthroscopic Bankart repair.

Methods: The subjects were divided into 2 groups according to the type of suture anchors; 154 shoulders in group F using Fastak®; and 208 shoulders in group J using JuggerKnot®. Group J was further divided into 2 groups according to the interval since operation: 114 shoulders in group J-1 (more than 2 years) and 94 shoulders in group J-2. Postoperative recurrence, a new glenoid rim fracture, and their relationship with the number of anchors were investigated.

Results: Recurrence was recognized in 19 shoulders among group F, 19 among group J-1 and 3 among group J-2. Among 38 shoulders evaluated by CT scan at recurrence, a new glenoid rim fracture was recognized in 14 (36.8%). Among them a fracture along with the insertion site of anchors was recognized in 4, 5 and 2 shoulders, respectively. While the mean number of anchors was 4.3, 5.6 and 6.6 in each group, the ratio of a glenoid rim fracture at insertion site to all recurrences in each number of anchors was as follows: 4 anchors: 4/12, 5 anchors: 0/4, 6 anchors: 0/2 in group F; 3 anchors: 0/1, 5 anchors: 3/5, 6 anchors: 1/8, 7 anchors: 1/3 in group J-1, and 7 anchors: 2/3 in group J-2.

Conclusions: Recurrence due to a new glenoid rim fracture along with insertion site of anchors was frequently recognized.

**B1-O-15 Effective glenoid width and height after anterior glenoid correction with bankart repair for the traumatic anterior glenohumeral instability**

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In case of no bony bankart lesion or bony bankart lesion less than 10% bony loss, we have performed the glenoid correction using small chisel. In this study, we evaluated the effective glenoid width and height after glenoid correction with bankart repair for the traumatic anterior glenohumeral instability. MRI axial views of 7 patients were evaluated the effective glenoid width and height after surgery. The effective glenoid width was increased from 28.95 mm before surgery, to 35.34 mm after surgery. The effective glenoid height was increased from 204 mm before surgery, to 821 mm after surgery. In both measurements, significant difference was found. All patient was recorded no dislocation and revision surgery until final follow up. In future study, we would like to measure the effective glenoid width and height of unaffected side and normal group. Then, we will evaluate how is different from that of affected side.

**B1-O-16 Glenoid Osteotomy for patients with atraumatic shoulder instability**

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Purpose: Treatment for shoulder with atraumatic instability is considered to be challenging. The objective of this study was to show clinical results after glenoid osteotomy in patients with atraumatic multidirectional instability. Methods: Osteotomy was performed at the neck of the scapula and posteriorinferior glenoid surface was elevated interposing an iliac bone graft as a chock. The study involved 251 shoulders with atraumatic multidirectional instability which were treated with this procedure. There were 73 men and 178 women with 20 years old on average. Clinical results were evaluated through JOA scores and patients' satisfaction. Bone union, osteoarthrosis, and articular congruity were examined in their plain x-rays. Results: JOA scores improved by 34 points on average and 91 % of the patients were satisfied with their results. Twenty-one patients complained of anterior pain and apprehension and 12 patients were treated with additional operation using the N-H method for anterior instability. All cases confirmed graft union without progress of osteoarthritis. All cases got better joint congruency except three cases which showed residual slipping of the head in elevated position.Conclusions: Glenoid osteotomy was a useful procedure for maintaining the head centered. Good results and patients' satisfaction could be expected with this procedure.
B1-O-17  Evaluation of the cases of posttraumatic posterior instability of the shoulder

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The purpose of this study was to evaluate the cases of posttraumatic posterior instability of the shoulder. 23 shoulders of 22 patients who underwent arthroscopic stabilization for posttraumatic posterior instability of the shoulder were involved. Mean age was 201 (15-43) years old and follow-up period was 17.4 (12-36) months. Posteroinferior capsulolabral reconstruction was carried out in 20 shoulders and capsular plication was done in 3 shoulders. Preoperative symptoms, physical examinations, arthroscopic findings, and JSS shoulder instability score (JSS-SIS) were investigated. Recurrent posterior instability was observed in 6 shoulders. The chief complaint was posterior deep shoulder pain in 17 shoulders. A sharp pain was observed in 18 shoulders due to the posterior load and shift test. By arthroscopy, detachment of the posteroinferior labrum was found in 17 shoulders, 2 cases had a crack of the posteroinferior labrum, and one had posteroinferior glenoid rim bony lesion. 3 cases had no capsulolabral lesion. Preoperative JSS-SIS was significantly increased from 62.9 to 90.3 points postoperatively. The recurrence was occurred in 2 of 3 cases with capsular plication within 12 months after an operation. The main complaint in the patients of posttraumatic shoulder instability was deep shoulder pain. It is indicated that the posteroinferior capsulolabral reconstruction is more available than capsular plication only.

B1-O-18  Arthroscopic Bankart repair for recurrent shoulder dislocation of middle-age athletes

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We investigated the outcome of the recovery procedure of the arthroscopic Bankart repair for recurrent shoulder dislocation of middle-age (over 40 years) athletes. The target was 27 shoulders (22 male, 5 female, surgery age at 40 to 56 years old). Sports types were Collision 6 shoulders, contact 6 shoulders, overhead 9 shoulders, other six shoulders.
10 shoulders were competitive level, 17 shoulders were lifelong sport level.
21 shoulders were first dislocated in less than 40 years old, 6 shoulders in more than 40-year-old.
We added the plication of the rotator cuff sparse part in 8 shoulders. Remplissage in 2 shoulders.
The JSS-SIS score improved from 41.3 points to 92.3 points. Row score improved from 29.3 points to 91.3 points.
16 shoulders (60%) were returned at the same competition level as before injury. 9 shoulders (33%) were returned lower competition level than before injury.
The shoulders of women, first dislocation were less than 40 years old, overhead sports were less complete reversion rate. We concluded that the outcome of arthroscopic Bankart repair is generally good, but there are differences by sports types, gender, the age of first dislocation.

B1-O-19  The postoperative bone absorption of anterior glenoid rim (BAGR) and the enlargement of anchor holes after arthroscopic Bankart repair.

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[Purpose] To evaluate clinical results of ASBR retrospectively and to perform statistical examination to evaluate the correlation between the bone absorption of anterior glenoid rim (BAGR) and the enlargement of anchor holes.
[Methods] We retrospectively investigated 100 shoulders in 99 patients with a minimum of one-year follow-up after ASBR. The recurrence rate is 60% (6/100). Among those patients, the 30 patients (22 shoulders in 22 males and 8 shoulders in 8 females) who were performed CT scans postoperatively (at within 1 month, 6 months, 1 year and 2 years) were available for evaluation for this study. The mean age of the patients at the time of surgery was 29.1 years (range, 14-52 years). A postoperative change of BAGR area and the size of anchor holes were estimated and evaluated statistically. The SPSS software system (SPSS Inc., Chicago, IL) was used to analyze the data using ANOVA and the multiple linear regression analysis. The level of significance was set at P value less than 0.05.
[Results] An average rate of incidence of BAGR (more than 5% of area) was 57.5%. A postoperative BAGR occurred more likely in the cases without bony Bankart lesion. There were no significant correlation between the postoperative change of BAGR area and the size of anchor holes.
[Conclusions] This study suggested that there were no significant correlation between the postoperative change of BAGR area and the size of anchor holes. However, when it goes with the enlargement of anchor holes, it might become a risk factor.
B1-O-20  Analysis of the Change of the Drill Holes of Bioabsorbable and Non-bioabsorbable Anchors after Arthroscopic Bankart Repair Surgeries
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Objective: We previously reported that the rate of enlargement of the drill holes of bioabsorbable anchors were significantly higher than that of non-bioabsorbable anchors. But because analyzed anchors had different designs, the relationship between materials and the change of anchor holes was unclear. To investigate the postoperative change of the diameters of drill holes of bioabsorbable and non-bioabsorbable anchors with similar designs after Arthroscopic Bankart Repair (ABSR) surgeries.

Methods: Materials were the case who were performed ASBR surgeries using Bioraport (BR: Non-bioabsorbable) or Osteoraport (OR: Bioabsorbable) anchors at our hospitals. Patients who got follow-up CT scan at within a month postoperatively and at 6 months or 1 year postoperatively, were included. We measured each hole’s diameter of 3D-CT scans of each time point, and classified it as reduction, no change, mild-enlargement, enlargement compared with the diameter of early postoperative period.

Results: At 6 months postoperatively, diameter change of both groups were not significantly changed. At 1 year postoperatively, the rate of enlargement and mild-enlargement of drill holes of OR group were significantly higher than that of BR group.

Conclusion: It is reported to take more than 10 months that biodegradative process of PLLA which was made OR anchors from occurs. This might be one of the causes of OR group’s tendency to enlarge its drill holes. In conclusion, the rate of enlargement of anchor holes of OR group was significantly higher than that of BR group, and the biodegradation process of PLLA might be a possible cause.

B1-O-21  The outcome of remiission as reinforcement in arthroscopic Bankart repair
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Background: The remission had been performed as a reinforcement of arthroscopic Bankart repair from 2009 instead of rotator interval closure in our institute regardless of Hill-Sachs (H-S) engagement. The purpose of this study was to assess the outcome of arthroscopic Bankart repair with remission as reinforcement.

Methods: Objects were consisted of 35 shoulders (male 33, female 2) mean age 24.3 years, mean follow-up period 32.7 months. We evaluated the clinical outcome by JSS-SIS, UCLA score, range of motion (ROM), return to sports, state of remission site using MRI and also investigated recurrence by telephone interview at this survey.

Results: JSS-SIS, UCLA score significantly improved after surgery. Limitation of ROM was slight. 91.4% (32) had returned to their sports completely. Incomplete return was observed in 1, recurrence in 1 and 1 quit his sport by another social reason in spite of good function and stability. The union state between tendon and H-S at remission site was good.

Conclusion: There was no significant limitation of ROM lead to functional problem. But the reason of incomplete return case was pain at throwing handball and recurrence case was football player with poor configuration of it’s glenoid and both cases were revision.

B1-O-22  Clinical outcome of arthroscopic Remissagement procedure for recurrent anterior shoulder instability
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Arthroscopic remissagement method is one of the augmentation of arthroscopic Bankart repair(ABR) for recurrent anterior shoulder instability, but there is little report with the postoperative results. The purpose of this study is to compare post-operative results of arthroscopic remissagement in addition to ABR with isolated ABR. This study consists of 18 remissagement group and 20 Bankart group from April of 2011 to March of 2014 in our hospital. Case was what was possible to follow-up for more than one year. Our criteria of Remissagement are cases that have engaged Hill-Sachs lesion and be determined to have high risk of post-operative re-dislocation such as collision/contact athletes. We evaluated the range of motion (flexion, abduction, internal rotation, external rotation), power (abduction, external rotation), VAS of pain, JSS-SIS, Rowe and UCLA score before and after surgery. At final follow-up, both groups had no re-dislocation and re-instability. In comparison to Bankart group, remissagement group had significantly inferior in all directions range of motion, JSS-SIS, Rowe and UCLA score. In comparison to pre- and post-operative in remissagement group, external rotation was restriction, but other subjects showed an improvement, so it can be expected further improvement in the future. Remissagement method is one of the effective augmentation, adaptation since there is a possibility that the cause of the limited range of motion should be considered carefully.
B1-O-23  Comparison of shoulder ROM between boys and girls in juvenile baseball players  
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Purpose: Girls baseball players are increasing in number, but there were no reports describing the differences of physical characteristics between juvenile boy and girl players. We assessed the whole players attending juvenile baseball player medical check, and evaluated the differences of ROM of upper extremity between boy and girl.

Materials and Methods: The Materials were juvenile baseball players attending the baseball medical check in 2015, and the girls and boys from 8 to 11 years old were evaluated. Results: The results showed that the number of the girls were 86 players, 4.8% of total players (1960). The height, weight, and the experience were not significantly different between boys and girls. The joint motion of shoulder and elbow were not also significantly different between boys and girls. The shoulder ROM (2nd ER, 2nd IR, 3rd IR) were significantly different between throwing side and non-throwing side in 8, 9, 10 and 11 years old boys, whereas those of girls were not significantly different until 11 years old. Discussion: This study revealed that there were no significant differences between boys and girls about the ROM of shoulder and elbow joints. But the shoulder posterior tightness represented by the restriction of 2nd and 3rd IR was absent in young girl players compared to boy players. There might be a different patho-mechanism between boys and girls in juvenile baseball players.

B1-O-24  Relationship between Humeral Torsion and Career of Pitcher in Elementary and Junior-high Schools  
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Objective: The objective of this study was to assess the effect of baseball position in youth and adolescent athletes on humeral torsion.

Materials and Methods: We studied 153 high school baseball players who began to play baseball in elementary school at the age of 8.1 ± 1.6 years old. We divided them into four groups according to their baseball positions in elementary and junior-high schools. 35 players were pitchers in both elementary and junior-high school (group 1), 32 players were pitchers in elementary school but fielders in junior-high school (group 2), 17 players were fielders in elementary school but pitchers in junior-high school (group 3), and 69 players were fielders in both elementary and junior-high school (group 4). Humeral torsion was assessed bilaterally by using ultrasonad.

Results: Humeral torsion was significantly greater (p<0.001) on the dominant shoulder than on the non-dominant shoulder in all groups. Humeral torsion on the dominant shoulder was significantly greater (p=0.05) in group 1 than in group 4 (mean difference, 7.1°/deg).

Conclusions: In high school baseball players, humeral torsion was greater on the dominant shoulder than on the non-dominant shoulder. Players who played baseball as pitchers during both elementary and junior-high school had greater humeral torsion on the dominant side than did players who were fielders during both periods. Given that pitchers throws more frequently than do fielders, this study suggests that increased time pitching in youth and adolescent athletes increases the humeral torsion on the dominant shoulder.

B1-O-25  Influences of humeral retroversion on glenohumeral internal rotation deficits in juvenile baseball players  
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The aim of this study is to evaluate relationships between glenohumeral internal deficits (GIRD) and humeral retroversion in juvenile baseball players. We retrospectively assessed 67 players (mean age of 11.3 years old) who took medical check at off-season. Range of motions (ROM) of internal rotation at 90 degree abduction and 90 degree forward flexion were investigated, and the bilateral differences were calculated as 2nd GIRD and 3rd GIRD. Humeral retroversion angle (HRA) was calculated due to bilateral differences of angles between vertical line and longitudinal axis of forearm, keeping intertubercular groove in a horizontal position using ultrasonography. The mean HRA was 9.1 degree (4.2 degree at 10 yo group, 7.2 degree at 11 yo group, 120 degree at 12 yo group). The mean 2nd GIRD was 11.7 degree and the mean 3rd GIRD was 11.2 degree. HRA at group checked for the second consecutive year increased by 4.2 degree in one year, and it showed correlation with one year change of 2nd GIRD. Degree of posterior soft tissue tightness adjusted due to HRA at injured group showed significantly high than healthy groups.
B1-O-26  Lateral scapular slide test in young baseball players
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Purpose: Lateral scapular slide test (LSSST) has been reported as a quantitative means for the assessment of scapular dysfunction, and this was measured as the distance between the inferior point on the scapula and the center on the thoracic spine. The aim of this study was to investigate relationships between LSSST and shoulder and elbow pain or throwing performance in elementary, junior high, and high school baseball players.
Method: 382 young baseball players who underwent shoulder and elbow examinations participated in this study (elementary school: 185, junior high school: 133, high school: 64).
Results: In the order of elementary, junior high, and high school baseball players, the results was following shoulder pain (26, 29, 44%), elbow pain (32, 41, 39%), difficulty in pitching (0: no difficulty, 100: worst) (9, 25 points), and baseball throwing performances score (BTP score) (6: worst, 100: best) (60, 79, 70), respectively. In the same order, the mean LSSST was 78.4, 85.0, 95.0 mm on the throwing side; 78.1, 84.4, 93.5 mm on the non-throwing side; and 0.3, 0.6, 1.5 mm on the difference between the throwing and non-throwing sides, respectively.
Discussion: In elementary school baseball players, LSSST was significantly correlated with presence of the shoulder pain and lower BTP score (p value within 0.05, respectively). In both junior high school and high school baseball players, there was no relationships between LSSST and shoulder and elbow pain or throwing performance.

B1-O-27  Comparison of glenohumeral rotation range of motion between right and left handed throwers
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The purpose of this study was to assess the glenohumeral rotation range of motion in collegiate and semi-professional baseball players. A total of 88 baseball players (57 right handed throwers and 31 left handed throwers) who participated in medical check-ups from 2013 to 2016 were evaluated. Right handed throwers were defined as group R and left handed throwers were defined as group L. Combined-abduction test and horizontal-flexion test were performed and passive glenohumeral range of motion including internal and external rotation at 90 degree abduction and bicipital-forearm angle was measured. Positive rate of horizontal-flexion test in group R was significantly higher than those in group L. Group R had significantly greater external glenohumeral rotation of throwing side, internal glenohumeral rotation and total rotational arc of non-throwing side than group L. Internal glenohumeral rotation of throwing side was smaller than those of non-throwing side in group R. Total rotational arc of non-throwing side was greater than those of throwing side in both group. These results indicate posterior shoulder tissues of right handed throwers tend to become tighter than those of left handed throwers.

B1-O-28  Partial-thickness rotator cuff tears does not always cause shoulder pain in university baseball players
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Objective: The objective of this study was to assess the rates and characteristics of symptomatic and asymptomatic partial thickness rotator cuff tears in baseball players.
Methods: We studied 57 university baseball players (age: 19.7 ± 0.8 years; baseball career: 11.5 ± 1.7 years; position: 25 pitchers and 32 position players). All subjects completed questionnaires about current and past shoulder pain; their rotator cuff tendons were then ultrasonographically examined.
Results: Twenty-two (39%) players were diagnosed with rotator cuff tears using ultrasonography. All tears were articular sided and of partial thickness. Eleven tears were in the supraspinatus, 5 in the infraspinatus, and 6 in both the supraspinatus and the infraspinatus. Tear depth was 3.6 ± 1.5 mm in the supraspinatus and 2.8 ± 1.4 mm in the infraspinatus. There was no significant difference in rate of shoulder pain between rotator cuff tear and intact rotator cuff. Five of the 25 pitchers (17%) and 17 of the 32 position players (53%) had rotator cuff tears.
Conclusions: Ultrasonographic examination showed that 30% of these university baseball players had asymptomatic articular-sided partial-thickness rotator cuff tears. The tear extended for less than 50% of the medial-to-lateral dimension of the rotator cuff’s footprint on the greater tuberosity; this suggests that most of these were tears of the superior capsule but not the rotator cuff tendons, because the superior capsule is attached in the articular half of the greater tuberosity. Therefore, most so-called articular-sided partial-thickness rotator cuff tears may not be pathological tendon tear but instead adaptive changes in response to acquired laxity without any symptom.
**B1-O-29**  Pathophysiology of thoracic outlet syndrome in high school baseball players  
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[Purpose] Thoracic outlet syndrome (TOS) is one of the common disorders of the upper extremity. We often encounter symptomatic baseball players of TOS, but the underlying pathophysiology is not well known. The purpose of this study was to investigate the pathophysiology of TOS in high school baseball players.  

[Materials and Methods] Players in annual medical check in Kyoto Prefecture during the off-season were enrolled. The players who felt numbness or radiating pain in their upper extremities and whose Wright test were positive, were diagnosed as TOS. We investigated in detail the players who visited the hospital.  

[Results] Players diagnosed with TOS were 13 out of 365 (3.5%). 5 of them visited the hospital. On their physical examination, hypokinesis of scapula (3 cases), thoracic malalignment (3 cases) and posterior shoulder tightness (1 case) were found. For all of them, rehabilitation such as a stretching of the levator scapulae muscle and a mobilization of the scapula was performed. As a result, they came to be able to throw without symptoms in two months.  

[Discussion] It can be speculated that TOS of baseball players is caused by muscle hypertonia or traction force upon throwing. The cause of symptoms of the 5 players in this study seemed to be muscle hypertonia or the lower shift of the scapula. Rehabilitation could improve these factors and their symptoms disappeared.

**B1-O-30**  The radiographic findings of posterior aspect of glenoid hypoplasia using modified Bernageau method in 71 baseball players  
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Background: The shearing and compression force to the posterior glenoid fossa have been thought to be the cause of osteochondritis dissecans of throwing shoulder. The purpose of the present study was to assess the posterior glenoid dysplasia in adolescent baseball players using modified Bernageau method for evaluating anterior glenohumeral instability.  

Material and methods: 142 shoulders of 71 adolescent baseball players (69 males, 2 females, mean age, 14.7 years old, range 8 to 20 years) suffering from throwing disorders were evaluated. Proximal humeral epiphysiolysis was 19 shoulders and painful baseball shoulder were 52 shoulders. We measured the antero-posterior width of glenoid fossa and presence of posterior glenoid dysplasia using modified Bernageau method on X-ray in both shoulders. Statistical analysis: Paired t-tests were used to compare the values of the affected shoulders and unaffected shoulders. P value was less than 0.05 considered significant.  

Results: The anteroposterior distance of glenoid fossa of affected baseball shoulder had a significant shorter mean width than non-affected shoulder (mean 25.66mm and 28.76mm, respectively) by paired t test (P <0.01). The ratio of hypoplastic glenoid of painful affected shoulder in adolescent was 85.7% (60 shoulders).  

Conclusion: The adolescent baseball players are associated with a much higher incidence of the hypoplastic glenoid. The hypoplastic glenoid in adolescent baseball players might be triggered by the repetitive shear and compressive forces for glenoid.

**B1-O-31**  The location of the Bennett lesions could characterized throwing shoulders  
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(Purpose) To characterize throwing shoulders by the location of the Bennett lesions  

(Materials and Methods) There were 28 male patients, diagnosed as throwing shoulders with Bennett lesion, who underwent surgeries. The average age was 35.7(19-57) years old. Bennett lesions was evaluated by 3D-CT. Arthroscopic observation and clinical results also investigated retrospectively.  

(Results) The 28 shoulders was classified into two groups. Superior ridge of the Bennett lesion was above 9 o'clock in 10 shoulders (A group) or on 9 o'clock or below in 18 shoulders (B group). Seven of 16 shoulders needed anterior SLAP repair in the B group but none needed in the A group (p<0.05). There were 5 shoulders with articular side partial rotator cuff tear in the A group, 12 with it in the B group. All 10 patients reported posterior shoulder pain in the A group and 10 of 18 patients in the B group (p<0.05).  

(Discussion) Bennett lesions in the postero-inferior quadrant of the glenoid tend to make the humeral head shift antero-superiorly. As a result, anterior SLAP lesions might be worsen and needed repair. Conclusion) Anterior SLAP lesions had occurred and needed to repair significantly in the throwing shoulders with the Bennett lesions limited in the postero-inferior quadrant of the glenoid.
B1-O-32  Intraoperative findings and postoperative results of pitching shoulder injury accompanied by impingement as a result of pulley lesions

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[Introduction] This paper reports an examination of the pathology and postoperative results in cases of disabled throwing shoulder due to pulley lesion.

[Material and Methods] Study subjects consisted of 10 cases that allowed for a year or more of follow-up observations after surgery. The average age at the time of surgery was 21.8, while the follow-up period was 193 months. Both intraoperative findings and post-operative clinical results as the Japan Shoulder Society sports (Sports score) score and the American Shoulder and Elbow Surgeons (ASES) score were examined.

[Results] In arthroscopic findings, relaxation of the superior glenohumeral ligament (SGHL) was observed. Displacement of the long head of biceps (LHB) and collision phenomena between the LHB base and glenoid labrum with the torn portion of the SSP tendon were confirmed in forward flexion and internal rotation of the shoulders. Surgery entailed debridement of the injured portion of the SSP tendon, with suture anchoring performed to repair the SGHL. Sports score was improved to an average of 72.6 points, and ASES score to an average of 87.9 after surgery.

[Discussion] In throwing disorders, it appears that the occurrence of pulley lesions facilitates the occurrence of LHB instability and the anterior displacement of the humeral head, which in turn leads to the occurrence of collision phenomena between the SSP and LHB base.

B1-O-33  The relationship between tightness of the hip joint and Shoulder or Elbow pain in High school baseball players

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PURPOSE: The purpose of this study was to analyze the relationship between the Shoulder or Elbow pain of High school baseball players and the function of Hip joint.

METHOD: A total of 123 high school students with a mean age of 16.5 +/- 0.5 years participated in this study. Shoulder or Elbow pain, hip flexion angle and internal/external rotation angles of the hip at 0 degree (IR0, ER0) and 90 degree (IR90, ER90) of flexion are assessed. Students were divided into pain group and a normal group based on the pain assessment, and each hip angle was compared between groups using non-paired t-test. P values smaller than 0.05 were considered statistically significant.

RESULTS: 19 of the 123 students have shoulder or elbow pain. The IR90 of the throwing side was 25.8 degree for the pain group and 31.5 degree for the normal group (P=0.040). In the pain group, IR90 was significantly lower than the IR0 on throwing side. There was no significant difference between IR0 and IR90 in the normal group.

CONCLUSION: Limitations to hip internal rotation at 90 degree of hip flexion was risk factor for shoulder/elbow injury. Differences in internal rotation angles between 0 degree and 90 degree of hip flexion may be important criteria for identifying high school baseball players at risk of shoulder/elbow pain.
B1-T5-1  Head, upper trunk, and lower trunk axial rotation angles in young baseball players with a history of throwing-related pain

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Purpose: This study aimed to examine the head, upper trunk, and lower trunk axial rotation angles in young baseball players with and without a history of throwing-related pain.

Methods: Sixty-one young baseball players aged 9-12 years participated. They were divided into two groups: 18 men with >1-week history of persistent pain in the shoulder or elbow (injury group) and 43 healthy men (control group). The head, upper trunk, and lower trunk axial rotation angles were measured during those active motions of the dominant (D) and non-dominant (ND) upper limbs directions in a fixed stationary position.

Results: The axial rotation angles of the head and upper trunk in D and ND directions were significantly lower in the injury group than in the control group, and those in the lower trunk were not significantly greater in either direction in the injury group than in the control group. Regarding rotational directions, the angles of the upper trunk were greater in the ND direction than in the D direction in the control group, whereas those in the lower trunk were greater in the D direction than in the ND direction in both groups.

Discussion: These findings suggested that the axial rotational function decreased in the head and upper trunk in the injury group. Thus, the superiority of the rotational direction and angle in the head and trunk suggests that evaluating them is crucial. However, further examination of the causal relationships is needed.

B1-T5-2  Relationships between limbs reach tests and range of motion in young baseball players with a history of throwing-related pain

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[PURPOSE] We investigated relationships between limbs reach tests and range of motion in young baseball players with a history of throwing-related pain.

[METHODS] Sixty-one baseball players aged 9-12 years were divided into two groups: 18 men with >1-week history of persistent pain in the shoulder or elbow (injury group) and 43 healthy men (control group). They performed arm reach test to measure the maximum distance between the dominant middle finger and the non-dominant second toe in a position similar to the follow-through phase. In a position similar to the early cocking phase, they performed leg reach test to measure the maximum distance between the non-dominant toe and dominant medial heel. These reach tests were normalized by the length of their arm and leg, respectively. We measured the range of motion (maximum extension and rotation of the trunk, shoulder, and hip) and used multiple regression analysis to determine the effect of these factors on the limbs reach tests.

[RESULT] The distances of arm reach test but not leg reach test were significantly lower in the injury group than in the control group (p < 0.05). Arm reach test was significantly affected by the axial rotation angles of the head and upper trunk in the dominant direction (R = 0.27, p < 0.01).

[DISCUSSION] These findings suggested that arm reach test was related to throwing-related pain, and the axial rotation angles of trunk influenced this test. Such evaluations are crucial in young baseball players.

B1-T5-3  Effects of the trunk alignment at the wind-up phase given to pitching motion

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The purpose of this study was that the trunk alignments of the wind-up phase in the pitching motion to consider the effects on the next phase. The subjects were forty high school baseball players. The pitching motion captured by a digital video camera, and evaluated the trunk alignment of the wind-up phase. We evaluated the trunk alignment from the front and the side. Then it was classified into the backward-inclined group and the straight group. We were analyzed for the time required to foot plant and relationship of trunk alignment and step direction. The time required to foot plant of the backward-inclined group was the shorter than the straight group. The backward-inclined group was large numbers in step or out step. In this study was suggested that the backward-inclined alignments at wind-up phase effects motion speed and step direction.
B1-T5-4  Scapulothoracic function in youth baseball players with Little League Shoulder.

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Youth baseball players with little league shoulder (LLS) often show different pain timing when throwing. We investigated the relationship between the timing of pain and scapulothoracic function.

We asked players when they felt pain while throwing, and categorized four different phases: the stride (S) phase, arm-cocking (AC) phase, acceleration (Acc) phase, and follow-through (FT) phase. We also evaluated scapular muscle strength (shoulder external/internal rotation, scapular adduction/abduction), and the presence of scapular winging in the push-up plus test.

The distribution of pain was 42% in the Acc phase, 28% in the AC phase, and 18% in the FT phase. There were no significant differences between phases and scapular muscle strength. However, scapular winging appeared more frequently in those with pain in the FT phase (68%). LLS patients with pain on follow-through have dysfunction of the serratus anterior muscle, with a risk of disruption of smooth scapular abduction at the scapulothoracic joint during throwing.

B1-T5-5  Clinical results of Little Leaguer’s shoulder

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Throwing sports like baseball are very popular with the younger generation in Japan. As a result, numerous patients suffer from Little Leaguer’s shoulder. Here we show the clinical results of 52 cases (age range, 8-15 years) with Little Leaguer’s shoulder who consulted our clinic in 2015. These patients were examined using X-ray, ultrasonography (US) and the resistance test of the humerus. Little Leaguer’s shoulder was diagnosed according to these criteria: 1) widening of the epiphysis on X-ray; 2) an area of low echogenicity around the epiphysis; and 3) posterolateral pain in the humerus during the resistance test. We classified US images into 3 groups: type 1, area of low echogenicity in the epiphysis; type 2, area of low echogenicity in and around the epiphysis; or type 3, area of low echogenicity and effusion exists around the epiphysis. We investigated the duration until healing and the correlation between healing duration, age and US type. The healing duration was 5-6 months for 8- to 10-year-old patients, 4 months for 11-year-olds, and 3 months for 12- to 15-year-olds. Patients who showed type 1 US images were on average older. Cases of recurrence showed larger areas of low echogenicity at that time. Providing objective advice on the throwing level that should be used by individuals suffering Little Leaguer’s shoulder is difficult, because the healing process varies widely between individuals. US images may provide some useful information in this regard.
**B1-ST-01** A case of shoulder instability due to suprascapular nerve entrapment with paralabral cyst

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We report a case of shoulder instability due to suprascapular nerve entrapment with paralabral cyst. The case was a 19 years old female who was a badminton player. She complained pain and instability of right shoulder. Physical examination showed pain in maximum external rotation, positive posterior instability and anterior apprehension. Muscle weakness also presented in external rotation. MRI revealed a paralabral cyst at under supraspinatus muscle. EMG revealed denervation of infraspinatus muscle. After arthroscopic excision of paralabral cyst and decompression of suprascapular nerve, muscle strength was recovered immediately. Pain and instability disappeared and returned sports in 2 months. Infraspinatus disfunction with suprascapular nerve entrapment causes loss of dynamic stability. Shoulder instability in overhead sports athlete can be occurred by paralabral cyst.

**B1-ST-02** A rare case report, isolated rupture of the subscapularis tendon because of the sports injury.

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Especially in young patients, isolated rupture of the subscapularis tendon (SSC rupture) is very rare injury, and only few cases have been reported. We report a case of this injury due to sports activity. 13 years old, baseball boy, he was injured at loggerheads with other players by a sliding. The clear bone fracture did not accept by XP. We accepted the SSC rupture and the dislocation of the long head of biceps (LHB) tendon by the MRI. In the surgery, we performed repair of the SSC rupture with the Bridging Suture methods and LHB tenodesis under arthroscopy. As for the postoperative progress, it was good and returned to baseball in four months. JOS and JSS shoulder Sports Score were 100 points after surgery in six months. The SSC rupture in young cases is very rare, but is more likely to leave serious functional disorder when appropriate treatment is not provided. At first it is necessary to recognize the injury, and the arthroscopic surgery thinks most effective then.

**B1-ST-03** Rotator cuff tear in young overhead sports athletes

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Background Rotator cuff tears in young overhead sports athletes are rare. The purpose of this study was to investigate patient characteristics, rotator cuff tear characteristics, and clinical outcomes after rotator cuff repair in overhead sports athletes.

Material and Method Twenty-five patients, with a mean age of 22.8 years were available for follow-up at a mean of 14.4 months. Patient characteristics were evaluated: sports history. Rotator cuff tear characteristics also evaluated in intraoperative findings: rotator cuff tear shape and injured rotator cuff tendon. Clinical outcome measures were applied before surgery and at the final follow-up: UCLA score and JOA score.

Results For rotator cuff tear characteristics, most common tear shape was posterior tear, and most common injured cuff was infraspinatus tendon. At the last follow-up, the UCLA score improved from the preoperative mean of 20.4 points to 30.6 points and the JOA score improved from the preoperative mean of 76.4 points to 90.2 points. Almost patients reported minimal to no shoulder pain and recovered sports without significant complaints.

Discussion and Conclusion In this study, posterior tear was occurred in young overhead sports athletes. Most common injured cuff was infraspinatus tendon. The cause of rotator cuff injuries in the overhead athlete might be not only external or internal impingement but also pulling the infraspinatus tendon for throwing athletes. In clinical, rotator cuff tears in young overhead athletes respond well to open rotator cuff repair, as shown by good patient outcomes.
**B1-ST-04** A Case Report of Triceps muscle Injury which Occurred Subsequent to Latissimus Dorsi Muscle Injury in Elite Baseball Pitcher

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A 31 years old elite baseball pitcher who threw left sidearm got injured his left Latissimus dorsi muscle during pitching motion. The diagnosis was made by physical examinations and MR images. He was treated conservatively and started throwing at 4 weeks after injury. But he got reinjury at 5 weeks after initial injury, so we needed more 6 months to recover. When he came up to same level as before injury, he felt pain in his shoulder again during the game. We diagnosed it as Triceps muscle injury. Eventually he needed one more month to get full recovery. During sidearm throwing motion, especially in the late cocking phase and the follow through phase, Latissimus dorsi muscle and Triceps muscle are running parallel plane near the shoulder joint. Some mismatches of these muscle power balances might cause this Triceps muscle injury.

**B1-ST-05** The effectiveness of SGHL re-tensioning in the throwing injury of the shoulder

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Purpose: We think that one pathological factor of the throwing injury of the shoulder has malfunction of SGHL. The aim of this study was evaluate the effectiveness of re-tensioning SGHL for anterior shoulder instability in throwing injury of the shoulder.

Materials and Methods: There were 10 cases consisting of subjects who diagnosed with throwing injury of the shoulder accompanied by SGHL malfunction which was doubted by MR Arthrography. They had anterior instability with Load and Shift test, and felt pain just after ball release and follow throw. We investigate arthroscopic diagnosis of throwing disorders, and also clinical result of arthroscopic antero-superior labrum excision (SGHL re-tensioning) which was able to follow over 1 year. All shoulders performed arthroscopy on beach chair position under general anesthesia. 2 cases had pulley lesion. Others had SGHL weakness. We evaluated JOA score and JSS-SSS score.

Results: The average of JOA score was 86.7 prior to surgery and became 98.3 following surgery. While the average JSS-SSS was 50.0 prior to surgery and became 97.2 following surgery. They returned original sports except an example which was injured SGHL on the side of humeral head and sutured SGHL on the same side with descent external rotation. 9 cases was re-tensioning SGHL at 90 degree of abduction and 90 degree of external rotation of the shoulder.

Discussion: The SGHL damage was suggested as one factor of the throwing injury of the shoulder. In addition, I should sutured in throw limb position in the case of re-tensioning SGHL.

**B1-ST-06** Arthroscopic excision of Bennett lesion for throwing disorder

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Throwing disorders are depended on various factors. Bennett lesion is the structural change of posterior glenoid between throwing players but this is not only the cause of pain. We treated this disorder by arthroscopic excision of the lesion with posterior capsulotomy. We report the result of the surgical techniques. Subjects and Methods: Twenty-two cases from 2010 to 2015 of 22 baseball players, who have some symptoms until throwing. They did not show any improvement by conservative treatment and relief the pain by 1% lidocaine injection for Bennett lesion. All of the patients underwent arthroscopic osteotomy for Bennett lesion, with additional treatment of posterior capsulotomy. Result: Many of the cases relief posterior pain between throwing. The index of internal rotation significantly rose from 33.3 points to 44.5. CT image showed the dissipation of exostosis. Discussion: Bennett lesion was thought to be a reactive change of throwing shoulder and development of this lesion was still unclear. Some report said that excision of spur is not necessary, but we think that treat this lesion can relief posterior glenohumeral joint pain in the group which had painful Bennett lesion.
B1-ST-07  Hara-test is useful to diagnose throwing shoulder injuries
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Objective: The objective of this study was to assess the relationship between Hara-test and throwing shoulder injury.
Materials and Methods: We studied 25 baseball players who can not throw due to severe shoulder pain (Average age: 19.4 years, 6 professional, 8 university, 9 high school, 2 junior high school) and 44 asymptomatic baseball players (Average age: 18.8 years, 4 professional, 26 university, 14 high school). In the symptomatic group, there were 11 SLAP lesions, 3 SLAP lesions and PASTA lesion, and 11 shoulder arthritis. The results of Hara-test were compared between baseball players with and without shoulder pain.
Results: Average scores of Hara-test in the baseball players with severe shoulder pain was only 48 points (1 to 7 points), while asymptomatic baseball players had 9.5 points of Hara-test (5-11 points). Positive rate of scapula-spine distance, elbow extension test, elbow push test, combined abduction test, horizontal flexion test, muscle strength of abduction, external rotation, internal rotation, subacromial impingement, and hyper-external rotation test were significantly higher in symptomatic baseball players.
Conclusions: Hara-test is useful to diagnose throwing shoulder injuries. Critical score of Hara-test is less than 7 points.

B1-ST-08  A case of osteochondritis dissecans of the humeral head
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Osteochondritis dissecans of the humeral head is rare. We treated a patient who had osteochondritis dissecans of the humeral head. Case: A 32-year old woman had the discomfort of the right shoulder since a junior high student. There was a soft tennis career at time of the junior high student. Two months prior to her initial visit to us, she fell down on a road, and a right pain shoulder pain turned worse. So she visited us. There was sharp pain in flexion and abduction movement. Active flexion was 90 degrees and abduction was 90 degrees. The x-ray and CT showed a posterosial lytic defect in the osteochondral surface of the humeral head. We performed arthroscopic examination. The cartilage of the lesion was almost isolated from the humeral head. So we resected a bone cartilage fragment and were drilling the bone exposed part. There was not clear osteonecrosis in the pathologic findings of a bone cartilage fragment. Postoperative three years six months, her symptom was improved and the x-ray showed a good repair of the humeral head.

B1-ST-09  Arthroscopic-assisted core decompression for osteonecrosis of the humeral head
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Objective: Atraumatic osteonecrosis of the humeral head is a relatively rare disease. Positive results of core decompression for early stage of necrosis were previously reported. We report cases of osteonecrosis treated by arthroscopic-assisted core decompression.
Methods: Four shoulders in 3 patients (all females) who underwent arthroscopic assisted core decompression for atraumatic osteonecrosis of humeral head were reviewed. Average age at operation was 32 years old (30-35 years old). Three shoulders in 2 cases were steroid-induced and 1 shoulder was alcohol-induced osteonecrosis. Pre-operative imaging analysis revealed 2 Stage I, 1 Stage II and 1 Stage III changes of osteonecrosis. Arthroscopic assisted core decompression was performed. Drilling toward cartilage softening area of the humeral head from distal of the greater tubercle was performed using ACL drill guide. To avoid rupture of the humeral head, drilling was performed under fluorescent guidance. The average duration of follow-up was 28 months (6-39 months). Clinical outcomes were evaluated with imaging analysis and JOA score.
Results: Shoulder pain was improved in all cases, but stage of necrosis progressed in 3 shoulders postoperatively. The average JOA score was improved from 70.4 points (63-78 points) to 845 points (80-87 points).
Discussion: Sure drilling to the necrotic area of the humeral head was achieved by arthroscopic-assisted procedure. However, core decompression might have only limited effects in osteonecrosis of the humeral head, because it could not prevent osteonecrosis progression.
Conclusion: We reported osteonecrosis of humeral head treated with core decompression.
B1-ST-10  Case report; Osteochondral transfer for osteonecrosis of humeral head

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We report the treatment of necrosis of the humeral head in an 37-year-old patient who had history of proximal humeral fracture two years ago. On physical examination, the patient demonstrated right shoulder pain and his range of motion was limited because of pain. Plain radiographs and computed tomography showed a radiolucent bony defect in the postero-superior aspect of the humeral head. Laboratory investigations were normal. The osteochondral lesion was normal visually. But, chondral surface was so soft. Removing soft chondral lesion, subchondral bone was filled with granulation tissues. Surgical treatment included removal of granulation tissue, resurfacing of the defect with an osteochondral autograft. At a follow-up of 12 months, her range of motion was not fully recovered but the pain had decreased. X-ray showed resolution of the defect of the humeral head. Treatment options include rest, drilling, osteochondral autograft transfer. We selected osteochondral autograft transfer for restoration of the articular humeral surface. At follow-up, the clinical result was fair.

B1-ST-11  Shoulder impingement by osteonecrosis of the humeral head in a young patient

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Introduction: Osteonecrosis of the humeral head (ONHH) is a disease which humeral head collapses. We report a case of ONHH treated by arthroscopy.

Case: The case is a 24-year-old woman treated for idiopathic thrombocytopenic purpura by corticosteroid. She complained shoulder pain. The range of motion (ROM) was 90 degrees of flexion, 90 degrees of abstraction, 70 degrees of external rotation, and internal rotation to L1. Plain radiograph and CT scan showed collapse of humeral head. MRI delineated a low signal area in the humeral head. Impingement of a bony edge of the humeral head collapse on the glenoid was observed under fluoroscopic control when flexing and abducting the shoulder. In arthroscopy, the bony edge impinged on the posterior part of the glenoid during the shoulder flexion and abstraction, which limited ROM. Resecting the bony edge resolved the impingement, which improved ROM. Three months after the surgery, the pain was reduced, and ROM was increased to 160 degrees of flexion, 170 degrees of abstraction, 70 degrees of external rotation, and internal rotation to Th8.

Discussion: Prosthetic arthroplasty has been performed for humeral head deformity of many patients with ONHH. On the other hand, bone preservative procedure should be indicated for young patients. It was difficult to perform osteochondral autograft transplantation for preserving humeral head because the lesion was large in this case. Resection of the bony edge achieved pain relief and improvement of ROM. Arthroscopic resection of the bony edge is one of the effective treatments for ONHH.

B1-ST-12  A case of impression fracture of the humeral head by electrical injury

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[C]Case[Male, 45-years old][Chief complaint]Right shoulder pain
[Past medical history]Type I diabetes, asthma, right shoulder periartthritis
[Current medical history]In November, 2013, the patient was immediately taken in the ambulance after electric shock by the machine with 200 volts.
[Finding at the initial visit]Heat burn was found from both hands to forearm. Because of a strong left shoulder pain, it was difficult to do shoulder joint autonomous movement.
[Imaging finding]Humeral head had depressed fracture as approximately 6mm in round shape.
[Surgical finding]While executing fenestration for lateral epicondyle of humerus and observing intra-articular condition with arthroscope, we conducted a plate fixation by filling granular artificial bones with a combination use of X-ray fluoroscopy and reduced the fracture by lifting up a depressed portion from the surgical window.
[Course of the symptom]Range-of-motion exercise was started one week after the surgery. 100 degrees for shoulder joint flexion and 95 degrees for evasion at the time of the final observation two years after the surgery.
[Discussion]Depressed fracture of humerus often would take place with shoulder joint dislocation, but it was not shoulder joint dislocation to cause the fracture in our case. It was considered that humeral head was pushed into glenoid cavity by a strong muscle contraction at the time of electric shock and eventually caused Depressed fracture of humeral head. Shoulder arthroscopy was useful for reduction of fracture.
B1-ST-13  Acute massive rotator cuff tear in young patient with electrical burn injury
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Introduction: 42 years-old male patient who had electric burn on his right shoulder 3 weeks ago was admitted to the hospital. He said that he heard an explosive "bang!" sound in his shoulder at that time and became to be unable to elevate his arm with severe pain and 2nd degree burn wounds on his shoulder.

Methods: On the physical examination, Neer (+++), Hawkins (+). Empty can sign(+++), GT tenderness(+) were shown, but horn-blower sign was negative. MRI indicated acute rotator cuff tear including supraspinatus as well as infraspinatus tendon. ULCRA score was 2 preoperatively. The surgery (Arthroscopic suture bridge repair) was done. Torn rotator cuff tendon end showed degenerative change with blunt shape and ivory colored margin and supraspinatus and infraspinatus muscle was separated and torn longitudinally and several bleeding points were seen in the torn muscular substance. All operative procedures were recorded with HD quality video device.

Results: Passive ROM exercise with physical therapy was started at POD 6 week. At POD 2 month, UCLA score was 18. And at POD 4 month, UCLA score was 35 and Ultrasoundography showed intact integrity of repaired site.

Discussion: This case is very rare and never have reported in Korea, and indicate that not only direct injury or dislocation but also electric shock can make rotator cuff tear. I considered that electric shock induce over-contraction of the rotator cuff muscle and so make the tendons torn. And clinical results and healing integrity of rotator cuff were very good at POD 4 month.

B1-ST-14 LHB tenodesis for pulley lesion caused trauma in 7 cases
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Pulley system failure (pulley lesion) caused by trauma and degeneration, is account for instability of LHB and present with the symptom of pain. However that method of diagnosis and treatment hasn’t been established. We experienced pulley lesion caused by trauma, that diagnose from physical findings and image findings, and then treated arthroscopic rotator cuff tenodesis:Performed surgery at the pulley lesion caused by sports injury and trauma is 7 (4 male, 3 female) cases, perioperative age is 24-52 (average 35.2) years old. All cases had movement pin around the LHB (anterior shoulder pain), and had positive views at Speed’s test, and intraarticular block test using local anesthetic was affective. Joint contrasting MRI was performed, T2 emphasized image recognized expansion of the pulley and high signal image of SSC adhesion department. In both cases operation carried out after an observation period of 3-12 (average 6.7) months. The operation was performed arthroscopic surgery in all cases. LHB is isolation at proximal intertubercular groove, after having confirmed that there was not tension, fixed at direct top of the pectoralis major fascia using interference screw. Then repaired at SSC it as needed. After surgery, JOA score is 95-100 (average 98.5), and a pain is left in 2 cases.

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Sternoclavicular joint dislocations account for 5 % of all dislocations of the shoulder girdle. Whereas most cases of anterior dislocation do not experience symptoms, some patients with anterior instability remain symptomatic and require reconstructive surgery to stabilize the sternoclavicular joint. We present the case of a 58-year-old female diagnosed with right sternoclavicular joint anterior dislocation and unusual swallowing difficulty while 90 degree elevation, and her head shake in a left direction. Rockwood SC joint rating scale was 9 points and ASES shoulder score was 48.3. The patient was treated using a modified figure of 8 method for reconstruction of the sternoclavicular joint using the ipsilateral semitendinosus tendon. Surgical outcome was successful, based on the Rockwood SC joint rating scale and ASES shoulder score, and the patient maintained excellent stability even after 2 years. The figure-of-eight semitendinosus reconstruction is involves reconstruction of the anterior and posterior capsules with a free semitendinosus tendon graft that is passed in a figure-of-eight fashion through 4-mm-diameter drill-holes in the manubrium and clavicle. While this procedure is one of the most strong reconstruction methods, it is difficult to pass drill-holes from anterior to posterior through the manubrium for its neighbor structures. So in our procedure, drill-holes are passed from anterior to joint surface through the manubrium. This surgical technique is more convenient than the conventional one for an inexperienced surgeon.
B1-ST-16 A case of Friedrich's disease

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Avascular necrosis of the sternal end of the clavicle was first described by Friedrich in 1924, which is known as Friedrich's disease. Here, we report a case of Friedrich's disease of the clavicle. The diagnosis was made by the clinical and radiographic findings without biopsy because the condition disappeared spontaneously.

B1-ST-17 Huge acromioclavicular joint cyst with cuff tear arthropathy

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"Introduction" An acromioclavicular joint (AC joint) cyst resulting from a massive rotator cuff tear and osteoarthritis of the glenohumeral joint and AC joint is rare. "Case report" We report a case of a 70-year-old woman with a 1-year history of an enlarging painless suprashoulder mass, associated with a cuff tear arthropathy. The mass was 8X4cm in size and overlying an AC joint. The active range of motion of the shoulder joint was 100 degrees of forward elevation, 40 degrees of abduction, 80 degrees of external rotation and internal rotation to the level of T7. Plain X-ray examination showed proximal migration of the humeral head and osteoarthritis of the glenohumeral joint and AC joint. MRI evaluation confirmed a complete rotator cuff tear and a huge cyst in communication with the AC joint. Since the cyst was aspirated several times with a rapid reaccumulation of the fluid, we performed a subacromial synovectomy arthroscopically and directly excised the cyst. The distal end of the clavicle was also resected to prevent disease recurrence. At the 15-year follow-up, the patient had no recurrence of the cyst. "Discussion" A rotator cuff tear should be taken notice of in considering the operation for an AC joint cyst. If the surgeon adequately excises the cyst in combination with a rotator cuff repair or a lateral resection of the clavicle, there is a low likelihood of recurrence.

B1-ST-18 Arthroscopic procedure for the suprascapular nerve palsy due to a ganglion: a case report

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The suprascapular nerve palsy due to a ganglion is less common in the shoulder. We present a case of infraspinatus muscle paralysis due to the suprascapular nerve palsy, and explain the pathology and therapeutic result about this case. A 54-year-old right-hand dominant lady presented to our hospital with complaints of discomfort of the right shoulder. She felt a weakness of external rotation in activities of daily living without sensory disturbance. The plain radiographs demonstrated no calcium deposits or osteoarthritic changes in shoulder joint. However, MR images showed a space occupying lesion on the suprascapular notch. We diagnosed a suprascapular nerve palsy due to the space occupying lesion. We performed arthroscopic surgery on this case. We recognized SLAP lesion type 2 and a thinness of posterior-superior capsules. Then, we detached the superior labrum from 10 o'clock to one o'clock, and suctioned that lesion. After these procedure, we sutured the detached labrum on the edge of the superior glenoid using two suture anchors. Finally, the diagnosis was a ganglion on the suprascapular notch. At one year after the surgical procedure, the strength of infraspinatus was recovered and a space occupying lesion was disappeared on MR images.
B1-ST-19 Clinical outcomes of arthroscopic treatments for paralabral cysts

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Purpose: We report the postoperative outcomes of six patients with paralabral cysts who underwent arthroscopic surgery.

Methods: The subjects were six shoulders of six patients (5 males, 1 female, the mean age of 47.5 years) who were diagnosed with paralabral cysts and underwent arthroscopic surgery. One case was reoperation. Chief complaints were shoulder pain in four patients, limited range of motion in one patient, and muscle weakness and fatigue in one patient. While three patients had paralabral cysts only at MRI, the other three patients had each complicated with massive rotator cuff tear, shoulder joint contracture, or acromioclavicular osteoarthritis. In the surgery, paralabral cysts were removed by an approach through the glenohumeral joint or subacromial. For the complicated lesions, rotator cuff repair was added for the rotator cuff tear, mobilization was added for the contracture, and distal clavicle resection was added for the acromioclavicular osteoarthritis under arthroscopy. Japanese Orthopedic Association (JOA) Score and Constant Shoulder Score were evaluated before surgery and one year after surgery.

Results: In all patients except for the patient complicated with massive rotator cuff tear, the external rotational muscle strength and the infraspinatus muscle atrophy have improved. The patient with contracture has improved the range of motion. In other five patients, JOA score and Constant Shoulder Score has improved.

Conclusion: Clinical outcomes have improved in all patients including those with complications. It was considered that arthroscopic treatment is a useful surgical procedure not only for cases with paralabral cysts only but also for cases with complications.

B1-ST-20 Pain of the right shoulder and paralysis of supraspinatus/ infraspinatus that took time to diagnosis.

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The patient is 69 year-old female who has whole body pain and admitted to our hospital. We diagnosed her to sepsis with pyelonephritis and rhabdomyolysis, and treated with antimicrobial agent. After the treatment, right shoulder pain and restriction of ROM were reminded. Obvious bone wound nor cervical spondylitis/ other shoulder disorder were not found in the X-ray images. The pain was improved in the natural course, but supraspinatus/ infraspinatus paralysis was developed. In the chest CT, 2 cm diameter size tumor was presented on the right clavicle rear, sternocleidomastoid clavicle branch. The tumor was a high intensity on MRI T2-weighted imaging. Tumorectomy was performed since we suspected the tumor may involved in neurological disorders, but there were no findings of vascular invasion nor nerve compression macroscopically. The tumor was diagnosed as ganglion cyst in the pathological examination. After surgery, right shoulder pain was disappeared, and restriction of ROM and paralysis were improved. We diagnosed her to neuralgic amyotrophy from the clinical course. Since the ganglion cyst from the sternoclavicular joint had been co-exist with nerve paralysis, it was difficult to diagnosis.

B1-ST-21 The musculocutaneous neuropathy after the long head of the biceps tendon: a case report

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Rupture of the long head of the biceps tendon (LHBT) is relatively common, whereas neuropathies of the lateral antebrachial cutaneous nerve (LACN) are rare. Compression of the LACN at the bicipital aponeurosis is considered to cause LACN neuropathies. We report a rare case of LACN entrapment after LHBT rupture. Only five published reports describe an association between LHBT rupture and tenosynovitis. Case: A right-handed 40-year-old man presented with left shoulder pain three months before feeling a painful ‘pop’ at the left anterior shoulder when lifting a heavy load. The radial aspect of the left forearm became hypotendinous and tingling one week after the injury. We suspected that the LHBT rupture had created a mass effect that stretched the LACN. Thus, we treated the injury by tenosynovitis. The patient had no numbness in the left arm and total range of motion in the left shoulder at three months after the procedure and was asymptomatic at three and a half years thereafter. Entrapment of the LACN after LHBT rupture is rare, although LHBT tenosynovitis is a routine type of shoulder surgery. Neurolysis and/or LHBT tenosynovitis are the strategies previously selected to treat LACN neuropathy related to LHBT disorders. We selected LHBT tenosynovitis for our patient with the intent to decrease the mass effect of the biceps muscle belly. The surgical outcome was good. These findings suggest that LACN entrapment should be considered as a complication of LHBT rupture and tenosynovitis.
P1-001  Is the learning curve different by two operators of arthroscopic rotator cuff repair?

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[Purpose] The purpose of this study was to evaluate about the learning curve of arthroscopic rotator cuff repair (ACCR). [Methods] The study made comparison between operator S started from 2006 and operator Y started from 2013. About patient's age, sex, operation time, JOA score (3 months after ACCR). [Results] In early 30 operations, the mean age at the time of surgery were each 64 years (operator S) and 64.5 years (operator Y). The both operators underwent for 20 right shoulders, 10 left shoulders. Twenty one male (operator S) and twenty male (operator Y) were involved. About the required period of proved the early 30 operations, operator S needed 35 months, Y needed 27 months. The Y's operation time under three hours was confirmed since 20 operations. The S's operation time under two hours was confirmed since 50 operations, and two operators had the learning curve clearly. Mean JOA score (3 months after ACCR) about Y's patients was 76.5. [Conclusions] Irrespective of the operator and experience, the mean of age, sex, affected side were mostly same. The both operators improved the operation time underwent ACCR once a month. The both JOA score (3 months after ACCR) were stable from an earlier time. About a hundred operation can give us stable technique.

P1-002  Atrophy of deltoid muscle after arthroscopic rotator cuff repair

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[Introduction] Arthroscopic rotator cuff repair (ACCR) is less invasive to the tissue around the shoulder joint. Anyone had never reported the atrophy of deltoid muscle after ACCR. The purpose of this study is to examine the impact of the procedure of ACCR on the deltoid muscle. [Methods] Between January 2014 and October 2015, the subject consisted of 38 shoulders in 38 patients with ACCR in our hospital. 63.8 years of age, 14 males, 24 females. We performed suture bridge method in all cases. Using MRI images of preoperative and postoperative 6-month, we measure the thickness of the deltoid muscle in the coronal T2-weighted image (acromial anterior angle level). As a control group, we investigated the patients of rotator cuff tear with open surgery in acromion osteotomy approach. 4 shoulders in 4 patients. [Result] In ACCR group, the thickness of the deltoid muscle after surgery was thinner than before surgery (6.68 mm vs. 6.94 mm). In control group, there was no significant difference (5.99 mm vs. 5.48 mm). [Discussion] The sites of the thickness measured this time is near anterolateral portal. Since the portal is often larger than the other portals, we may damage the deltoid muscle in the operation during surgery. We must pay attention so as not to damage the deltoid muscle, during synovectomy and cannula insertion.

P1-003  Symptomatic knot impingement after arthroscopic rotator cuff repair: which knot is critical?

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Purpose: We investigated knot placement on the rotator cuff tendon and the affected site on the acromion during symptomatic knot impingement after arthroscopic rotator cuff repair. [Methods] The study population comprised 632 shoulders that underwent arthroscopic rotator cuff repair (single-row, double-row, compression double-row, and knotless suture bridge) with acromioplasty from 2007 through 2014. In all patients, physical examination included measurement of shoulder range-of-motion and muscle strength, and subacromial impingement tests (Neer and Hawkins tests) were performed during the follow-up period. When shoulder pain with a positive subacromial impingement test did not disappear by 6 months after surgery, MRI and 3DCT were used to diagnose knot impingement. [Results] Two of the 632 patients (0.3%) had symptomatic knot impingement. Both patients had undergone single-row repair (one anchor and two knots) during a first surgery for a small bursal-side partial-thickness tear. Both had bone erosion at the anterolateral corner of the acromial undersurface according to 3DCT and subacromial effusion as revealed by MRI. Arthroscopic removal of the knots relieved shoulder pain in both patients. In both patients, all knots had been placed at the muscle tendon junction of the supraspinatus tendon and had caused the defect on the undersurface of the acromion. [Conclusions] Knots tied at the muscle tendon junction of the supraspinatus tendon caused symptomatic subacromial impingement after arthroscopic repair of partial-thickness rotator cuff tears. The knots on the supraspinatus tendon impinged on the anterolateral corner of the acromion, leading to bone erosion.
P1-004 Evaluation of the imaging and clinical outcome of arthroscopic rotator cuff repair using bioabsorbable full thread anchors

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Purpose: We attempted to determine the bone resorption results and clinical outcomes of arthroscopic rotator cuff repairs using a bioabsorbable fully threaded suture anchor made of poly-L-lactide-co-glycolide and &beta;-tricalcium phosphate.

Patients & Methods: From October 2013 to January 2015, 15 patients (mean age 69.5 yrs) with 15 shoulders (8 medium tear, 7 large tear) were treated. All 15 rotator cuffs were repaired with a single or double row technique. The anchor used in each case was the HEALIX ADVANCE® (Depuy Synthes Mitek). We evaluated the pre- and postoperative JOA score and Shoulder 36. The re-tear rate was determined by MRI performed 6 months postoperatively. Type IV and V classifications were defined as re-tearing. We investigated bone resorption by X-ray imaging at 1 year postoperatively, and the postoperative outcome was evaluated based on the presence or absence of bone resorption.

Results: The postoperative JOA scores and all sections of the Shoulder 36 were significantly improved compared to the preoperative values. Two shoulders had a re-tear, and these cases were both large tears preoperatively. Four shoulders had mild bone resorption. However, overall the patient’s scores was significantly improved based on their pre- versus postoperative values. There was no significant difference in postoperative results based on the presence or absence of bone resorption.

Conclusions: These results are for a small number of patients examined over a relatively short period of time, but they showed that the use of this anchor resulted in little bone resorption, and the clinical outcomes were good.

P1-005 Frequency of effusion around suture anchors after rotator cuff repair - Comparison of PEEK and Biocomposite Biodegradable anchor-

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Background: The purpose of this study is to compare the frequency of effusion around anchors after rotator cuff repair with Suture-bridge technique between PEEK and Biocomposite biodegradable anchors.

Methods: Arthroscopically operated 108 shoulders with PEEK anchor and 200 shoulders with biodegradable anchor were included in this study. The mean age of both groups were 63.0ys and 63.1ys respectively. The effusion around anchors were examined on the MRI images at 1 year after operation. The occurrence of effusion were summed up retrospectively. The effusion were classified into 4 grades (Grade 0-3) according to its severity. Correlation of effusions with re-tear of rotator cuff repair and influencing factor on effusion were investigated.

Results: Effusion around anchors significantly decreased with biodegradable anchors in 24.4% of 464 anchors compared with PEEK anchors in 56.0% of the 293 anchors. Re-tear rate tended to decrease in Biocomposite Biodegradable anchors but not significantly different between two anchors. Age, sex, anchor insertion region and effusion grade did not influence to re-tear of rotator cuff repair significantly.

Conclusion: Biocomposite biodegradable anchors seem to decrease postoperative effusions around anchors compared with PEEK anchors nevertheless no significant difference in re-tear rates.

P1-006 Formation of a huge bone cyst around polyetheretherketone anchors after arthroscopic rotator cuff repair: a case report

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[Introduction] We report our experience with a huge bone cyst that formed more than a year after arthroscopic rotator cuff repair (ARCR) using polyetheretherketone (PEEK) anchors.

[Case report] A 61-year-old woman complained of pain in her right shoulder. Magnetic resonance imaging (MRI) revealed a small tear in the supraspinatus tendon. A right rotator cuff tear was diagnosed and ARCR was performed. The suture bridge method was used, with 1 PEEK anchor on the medial side and 2 PEEK anchors on the lateral side. At follow-up 1 year postoperatively, the MRI showed no signs of retearing. Slight cyst-like changes were observed around the medial anchor, but no functional problems were observed, so this was not considered problematic. At the 2-year follow-up, the cyst-like changes seen on MRI a year earlier had progressed into a huge, continuous, multinocular cyst-like lesion that extended to the humeral shaft. Results of blood tests to exclude infection, tumor, and allergies were all negative. A biopsy was performed for definitive diagnosis. Pathologic examination showed multiple foam cells but no eosinophils or malignant cells. At the 3-year follow-up, MRI showed the lesion had got smaller.

[Discussion] While there have been a few reports of cyst formation with bioabsorbable anchors, in the present case the cyst formed around bioinert anchors, and developed more than a year postoperatively. Cyst formation can reduce anchor stability. Even after anchors attach to the rotator cuff, care is warranted because fluid and other factors can aid cyst formation around the medial anchors.
P1-007  Relationship between subscapularis tendon tear and preoperative 3D-CT findings
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Purpose: The purpose of this study was to investigate the relationship between the existence of the subscapularis tendon (SSc) tear and preoperative 3D-CT findings such as morphology of the bicipital groove (BG) and bone cyst formation in the lesser tuberosity.

Materials and Methods: We studied 124 shoulders of 120 patients who underwent arthroscopic rotator cuff surgery (repair or debridement). The patients were 86 males and 38 females, and the mean age was 61.9 years old. With preoperative 3D-CT, morphologies of the BG according to Nonaka’s classification (2012) and bone cyst formation in the lesser tuberosity (Niikado, 2013) were evaluated. Arthroscopic evaluations for the SSc tears were performed with Nagasawa’s and Ide’s classifications. 3D-CT findings and SSc tear classification results were compared with each other.

Results: In 124 shoulders, morphology of the BG was classified into 5 types. Type1: 35 shoulders, Type2: 22 shoulders, Type3: 12 shoulders, Type4: 41 shoulders, Type5: 14 shoulders. Bone cyst formation in the lesser tuberosity was detected in 29 shoulders. With progress of the type of the BG morphology, the SSc tears became more severe, and the lesser tuberosity bone cyst was frequently detected in the SSc tear cases.

Conclusion: Preoperative 3D-CT evaluations of the BG morphology and lesser tuberosity bone cyst are useful to predict severity of the SSc tear.

P1-008  Mid-Term Outcome of Pectoralis Major Transfer for the Treatment of Irreparable Subscapularis Tears
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Purpose: The purpose of this study was to evaluate the mid-term outcome of pectoralis major transfer for the irreparable subscapularis tears.

Patients and Methods: Ten patients that underwent pectoralis major transfer between January, 2008 and January, 2015 were used. There were 10 males. The mean age was 62 years old and the average follow-up period was 50 months. The mean active flexion was 133 degrees; preoperatively, ER 57 degrees, IR L5/S and the average JOA score was 64.7 points. The mean acromion head interval (AHI) was 10.7 mm preoperatively. Seven patients had a massive tear of subscapularis, supraspinatus and infraspinatus tendons and three patients had a large tear of subscapularis and supraspinatus. Preoperative magnetic resonance imaging revealed retraction of the subscapularis musculotendinous unit to the Glenn and fatty infiltration of the subscapularis muscle of grade III in three patients and grade IV in seven patients. The proximal half tendon of pectoralis major muscle was released from its insertion and fixed to the distal aspect of the greater tuberosity using transosseous suture technique. The tendons of supraspinatus and infraspinatus were repaired to the greater tuberosity with suture anchors.

Results: The mean active flexion was 160 degrees postoperatively, ER 61 degrees, IR L3 and the average JOA score was 91.4 points. The average AHI was 8.4 mm postoperatively.

Conclusions: Pectoralis major transfer results in improvement for patients with an irreparable subscapularis tear.

P1-009  Re-arthroscopic surgery for LHB tendinitis after arthroscopic rotator cuff repair -A report of four cases-
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[Purpose] To report a series of four cases which underwent biceps tenotomy due to arthroscopic rotator cuff repair due to prolonged anterior shoulder pain.

[Subjects and Methods] Subject consisted of 4 cases who underwent ARCR between 2010 and 2015. All four females with an average age of 65 years old at the index surgery were included. Pre and postop physical findings, MRI images and operative findings were retrospectively investigated.

[Results] After ARCR, all 4 patients had severe postoperative pain which needed the steroid injection in glenohumeral joint. Although the postoperative integrity was Sugaya type 1 or 2, all patients complained the anterior shoulder pain which accompanied with point tenderness of the bicipital groove or positive speed test. Second arthroscopic surgery revealed the biceps hypertrophy and inflammatory findings around biceps tendon which were not present at the index surgery. After the re-arthroscopic surgery, shoulder pain was disappeared and JOA score was improved from 79.8 to 92.8.

[Conclusion] We reported 4 cases of postop shoulder pain due to the biceps problem. The symptoms in all patients were improved after biceps tenotomy. Careful evaluation and decision making of the biceps treatment would be necessary at the rotator cuff repair.
P1-010  Relationship between subscapularis tendon tears and long head of the biceps tendon position on preoperative magnetic resonance imaging

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Purpose: The purpose of this study was to investigate the relationship between long head of the biceps tendon (LHB) position and subscapularis tendon (SSC) tears.

Materials and Methods: LHB conditions were evaluated using T2 weighted (T2W) axial magnetic resonance imaging (MRI) in 56 consecutive shoulders (average age of 64.4) undergoing arthroscopic rotator cuff repair surgery from January 2015 to April 2016. The SSC tendon tears were classified according to Nagasawa classification. We classified LHB location in the bicipital groove as center, medial, and absence. The distance between the bone surface below the bicipital groove and undersurface of the LHB (LHB shift) was also measured.

Results: The numbers of shoulders classified as Type 0, 1, 2, 3, and 4 by using the Nagasawa classification were 20, 11, 8, 8, and 9 respectively. The numbers of shoulders with LHB location classified as center, medial, and absence with type 0 and type 1 were 21, 10, and 0 respectively, and those with type 2-4 were 8, 7, and 10 respectively. Based on the receiver operating characteristic (ROC) curve, a diagnostic cut-off value of the LHB shift at 2.65 mm was defined in order to over the type 2 (sensitivity 79.2%, specificity 87.1%, likelihood ratio 6.1), a diagnostic cut-off value of the LHB shift at 3.10 mm was defined in order to over the type 3 (sensitivity 87.5%, specificity 97.4%, likelihood ratio 34.1).

Conclusion: The LHB shift below the bicipital groove is quantifiable and may be a indicative of an associated SSC tendon tear.

P1-011  Clinical characteristics and surgical results of isolated subscapularis tendon tear

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Purpose: The purpose of this study is to investigate clinical characteristics and surgical results of isolated subscapularis tendon tear.

Subjects and Methods: Four subjects who received rotator cuff repair for isolated subscapularis (SSC) tendon tear were investigated in this study. The etiology of injury, specific symptom, concomitant injuries were investigated, and results of surgical treatment was also evaluated.

Results: The etiology of injury was direct contusion of SSC tendon in two subjects, passive stretch of SSC tendon in excessive shoulder abduction with external rotation position in one subject, and eccentric contraction of SSC in one subject. Shoulder pain with limitation of active elevation was observed in all subjects, and two subjects complained pain and feeling of weakness when they lift up the heavy load. Three of them had complete tear of SSC tendon and the other had partial tear. All subjects had subluxation of biceps long head, and tenodesis were performed along with SSC tendon repair. Good clinical result with full functional recovery was achieved in all subjects after surgery.

Conclusion: Since the isolated SSC tear is rare condition, it might be important to assess the specific etiology and symptoms as with the detailed radiographic examination to prevent underestimate the SSC tendon tear.

P1-012  Concomitant coracoplasty during arthroscopic subscapularis repair: is it imperative for better clinical outcomes and structural integrity?

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Introduction: Few studies have examined whether concomitant coracoplasty improves clinical and radiological outcomes after arthroscopic subscapularis repair. The purpose of this study was to compare clinical outcomes and structural integrity after arthroscopic repair of isolated subscapularis full-thickness tears, either with or without concomitant coracoplasty.

Methods: This study included 62 patients who underwent arthroscopic subscapularis repair either with coracoplasty (Group A) or without coracoplasty (Group B). Preoperative and postoperative VAS pain scores, subjective shoulder values(SSV), UCLA shoulder scores, ASES scores, subscapularis strength using the modified belly-press test, and shoulder active ROM were assessed. Postoperative MRA or CTA was performed 6 months postoperatively for structural integrity assessment.

Results: At 2-year follow-up, VAS pain scores, SSVs, ASES scores, UCLA shoulder scores, subscapularis strength, and ROM improved significantly in both groups compared with preoperative values (p < 0.001). However, none of these values differed significantly between groups. Preoperative coracohumeral distance (CHD) was similar for both groups: 65 mm in Group A and 67 mm in Group B. On follow-up MRA/CTA, the CHD in Group A increased significantly to 8.4 mm (p < 0.001), this was significantly greater than the follow-up CHD in Group B (7.0 mm) (p = 0.018). The re-tear rates were not significantly different between groups.

Discussion: For isolated subscapularis full-thickness tears, concomitant coracoplasty during arthroscopic repair did not produce better clinical outcomes or structural integrity than repair without coracoplasty. This suggests that concomitant coracoplasty may not be imperative during arthroscopic repair of isolated subscapularis full-thickness tears.
P1-033  Short Term Result of Reverse Total Shoulder Arthroplasty
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BACKGROUND: Reverse shoulder arthroplasties (RSA) are increasingly used for treatment of glenohumeral arthropathy with rotator cuff deficient in recent years, and better results have been reported than the results of anatomic shoulder arthroplasties.

METHODS: This study includes nine patients (4 men, 5 women) undergoing RSA with TM Reverse Shoulder (ZIMMERBIOMET) between May 2014 and March 2016, the clinical and radiologic outcomes are evaluated. Mean age was 78 years (range, 71-85 years). Mean follow-up duration was 9 months (range, 2-17 months). Indications were cuff tear arthropathy in 4 patients, massive rotator cuff tear in 3 and failed rotator cuff repair in 2.

RESULTS: Range of motion improved from 64 degree to 28 degree in anterior elevation, 59 to 112 in lateral elevation, 32 to 36 in external rotation, however, worsened from L2 to L5 in internal rotation. The Japanese Orthopaedic Association score improved from 86.6 points to 85.6 points. Six of nine patients were able to make 90-degree anterior elevation in three weeks after RSA. Radiographic analysis showed no lucencies, subsidence, or stress shielding around the humeral or glenoid components. Glenoid notching was not found.

CONCLUSION: RSA in patients older than 70 years shows encouraging short-term results with excellent pain relief and restoration of good active elevation. RSA for cuff tear arthropathy or massive rotator cuff tear in old patients result in functional improvement. However, longer-term study should be required to determine whether RSA is reliable or not like total hip arthroplasty and total knee arthroplasty.

P1-034  Clinical outcome of reverse shoulder arthroplasty for massive rotator cuff tear and cuff tear arthropathy
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PURPOSE: The purpose of this study was to evaluate clinical outcome of reverse shoulder arthroplasty (RSA) for massive rotator cuff tear (RCT) and cuff tear arthropathy (CTA).

METHODS: We retrospectively evaluated 6 shoulders (1 male, 5 female) underwent RSA with minimum 1 year follow up. We used Grammont-style RSA in all cases. Mean age at surgery was 82.5 year-old. We investigated JOA score, active ROM (flexion, external rotation, internal rotation), and postoperative complications.

RESULTS: JOA score was improved from 47.2 points to 88.2 points postoperatively. Active ROM in flexion/external rotation was improved from 442/117 degrees to 143/167 degrees. Postoperative internal rotation was limited at L5 and buttock level in all cases. Major complications (infection, instability, nerve palsy, and fracture) were not observed. Bony spur formation caused by inferior scapular notching was showed in only one case.

CONCLUSION: RSA for massive RCT and CTA results in functional improvement.

P1-035  Reverse shoulder arthroplasty for the rheumatoid arthritis with the severe bone loss of the glenoid: A case report
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Surgical treatment of destructive arthropathy with severe bone loss of the glenoid is extremely challenging. We underwent a method of single-stage reverse total shoulder prosthesis using a tricortical iliac crest bone graft (TICBG). The patient was a 67-year-old woman. She had continued right shoulder pain at 10 months after 2 time arthroscopic debridement. The most suspicious diagnosis was rheumatoid arthritis. Preoperative range of motions (ROM) were followed: forward flexion 60 degrees, external rotation 15 degrees and internal rotation T12 level. 3D-CT showed type A2 glenoid pattern according to Walsh’s classification. The most unique aspect of this operation was the method used to harvest the iliac bone. To achieve immediate, solid fixation of the TICBG to the long post baseplate, the baseplate was first implanted onto the crest. Finally, the TICBG and baseplate were implanted and fixed with long screws after cancellous allograft in conjunction with the baseplate. A sling was worn for 4 weeks. Active ROM exercise was allowed after 6weeks. There have been no major and minor complications during perioperative and postoperative periods. 1 year later, ROMs were followed: forward flexion 110 degrees, external rotation 30 degrees and internal rotation L4 level. The pain score (NRS) was 0 points. Though X-ray showed radiolucent area around the baseplate, clinical symptoms of the loosening have been identified. The use of a structural TICBG and long baseplate is effective for patients with larger central defects around intact surrounding wall.
P1-036  Bony increased-offset reverse shoulder arthroplasty (BIO-RSA) using a pre-operative 3D template system
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Purpose: The purpose of our study is to report a case who was underwent bony increased-offset reverse shoulder arthroplasty (BIO-RSA) using a pre-operative 3D software (BLUE PRINT) for primary OA shoulder with advanced glenoid erosion and backward subluxation of the humeral head.

Case report: We performed the BIO-RSA for a 79 years old female who had long-time shoulder pain and severe disturbance of shoulder range of motion. A severe glenoid erosion (Walsh B2) and an advanced posterior subluxation rate (86.0%) were found by the CT scan. We used 3D template software manufactured by TORNIER for preoperative planning. We harvested bone graft from humeral head using angle BIO system. And then, the bone graft was fixed between the baseplate and glenoid according to the preoperative planning.

Conclusion: The BLUE PRINT was used for preoperative planning to facilitate the accurate installation of the bone graft between glenoid and baseplate.

P1-037  The timing of Reverse shoulder arthroplasty for patient with acute axially nerve palsy - A case report-
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Case: 76 years old man. He couldn’t elevate his arm after 1st shoulder dislocation. He was referred to our hospital after 10 weeks. He had no particular history. He couldn’t move his arm any direction. He had massive rotator cuff tear. In the goutallier classification, the infraspinatus and infraspinatus were 3 or 4. We assessed him EMG at 14 weeks after dislocation. In the deltoid, Acute sign didn’t appear. Latency of affected side was a little longer than healthy side, and amplitude of affected deltoid was much smaller than normal side. Before operation, he cold flex 20 degrees, and extend 45 degrees. We used SMR (ima) Patient put on sling for 4 weeks. Passive ROM exe was started the day after operation. After 1 month, Flexion and abduction was 30 degree. External rotation was 15 degrees, and internal rotation was buttock level. Constant score was 30 points. After 3 months, Flexion and abduction was 140 degree. External rotation was 45 degrees, and internal rotation was L3 level. Constant score was 75 points. After 14 months, Flexion and abduction was 150 degree. External rotation was 45 degrees, and internal rotation was L3 level. Constant score was 86 points. We decided the operation because he could extend 45 degrees. This timing may be useful criteria for patient with deltoid palsy.

P1-043  Association of the cortical thickness of the proximal humerus and mineral bone density of the distal radius
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The aim of this study is to examine whether it is possible to evaluate osteoporosis using a cortical bone thickness of the radiographic measures of proximal humerus and BMD of the DXA measures of distal radius retrospectively 43 patients (43 women) with a median age of 75.6 years with DXA and shoulder radiographs were included in this study. Cortical bone thickness was assessed with Cortical index(CI) method and Cortical thickness(CT) method. Osteoporosis due to WHO and primary osteoporosis diagnostic criteria was 31 cases. CI measurements at the proximal humerus correlated with BMD (R=0.592, P<0.0001), correlation coefficient). Average CT measurements also correlated with BMD(R=0.599, P<0.0001). Osteoporosis group was significantly lower than the non-osteoporosis group to the CI measurements, average CT measurements for both(p=0.006, p=0.007). CI measurements and the average CT measurements were correlated with BMD.
P1-044  Effect of friction of suture anchors on the "deadman theory": A biomechanical study.
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Purpose: The purpose of this study was to conduct a pullout test using a thread-less anchor to determine the effect of anchor friction on the deadman theory.

Materials and Methods: Pullout tests were performed using universal testing machine. Synthetic cancellous bone of 0.16 g/cm³ and thread-less metal anchor was used. Synthetic bones were pre-drilled by two different sizes (2.0 and 2.5 mm) to create a pilot hole for anchor insertion. Anchors were inserted at 45, 90 or 135 degrees to the surface, then they were pulled in the direction of 135 degrees. The anchor was preloaded to 10 N and pulled at a crosshead speed of 1 mm/s. Maximum load was recorded for 6 pullout tests performed for each condition. Pullout strength between each condition was statistically analyzed.

Results: Pullout strength of anchors inserted at 45 degrees was significantly higher than those inserted at 90 or 135 degrees for both pre-drilling diameter. When the pullout strength was compared between the two hole sizes, the pullout strengths of 45-degree-anchor relative to 90-degree- and 135-degree-anchors were significantly greater with a 2.5-mm hole than 2.0-mm group (p=0.001, p=0.0001, respectively).

Discussion: All the previous biomechanical reports in the literature showed that the pullout strength data were against the deadman theory. With use of a thread-less anchor, this study for the first time demonstrated the data which perfectly matched the deadman theory. This strongly suggests that the deadman angle would depend on the friction of the suture anchors.

P1-045  Comparison of the strength of four fixation procedures for Bankart repair
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[Methods] Our technique which looped Labral tape is passed labrum and fixed by Pushlock is defined as Pushlock Loop Fixation group (PLF group). The procedure passing simple this tape is defined as Pushlock Single fixation group (PSF group). Procedures fixed using SMC knots and 3 times half pitch by Gryphon and JuggerKnot are defined as Gryphon suture group (GS group) and JuggerKnot suture group (JS group). The maximum failure load of these procedures were compared in every 10 cases. The pig skin was used as soft tissue. Sawbone was used as simulated bone which is implanted anchor. Failure load was measured by measuring instrument (AG20kND, Shimazu co)

[Result] Failure load were 108.4N in JS group, 111.4N in GS group and 117.6N in PSF group and 130.4N in PLF group. PLF group was significantly higher compared to the other groups.

[Discussion] Fixing strength of our surgical procedure was the strongest compared to the other conventional procedures in this trial. It has been shown initial fixing force of our surgical technique is strong. The materials were used simulated bone, however, there is a need to recognize the difference from in vivo.

P1-046  Experimental rotator cuff pain reduces the maximal isometric muscle strength around the shoulder by approximately 40%
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Aim: The most frequently cited symptom associated with rotator cuff tear is severe pain which possibly decrease muscle strength around the shoulder. The aim of this experimental study is to investigate characteristics of rotator cuff pain (RCP) and its potential for modulating muscle strength around the shoulder.

Methods: Fifteen healthy men were included. RCP was induced by ultrasound-guided injection of hypertonic saline (5.8%, 0.5ml) into the bursal insertion of the supraspinatus tendon. Another shoulder pain was induced by injection of hypertonic saline identically into the trapezius muscle (TP). Isotonic saline was injected contralaterally as control in each session. Pain intensity was assessed on a visual analogue scale (VAS) and subjects mapped the pain distribution. Before, during and after the injection, maximal isometric muscle strength around the shoulder and grip power were measured.

Results: RCP showed significantly higher VAS scores than TP and compared with isotonic saline. Extensive pain referral patterns were observed in RCP while TP showed localized distribution around the injection site. Maximal isometric muscle strength around the shoulder (abduction, ER, IR) and grip power decreased by approximately 40% in RCP, which was within 10% and not significant in TP and isotonic saline injections.

Conclusions: Rotator cuff is vulnerable to nociceptive input, which may easily cause central sensitization resulting in extensive pain referral and widespread reduction of the muscle strength compared with trapezius. This study demonstrates the importance of anti-nociceptive therapy for improving motor function in patients with rotator cuff tear.
P1-047  Isometric supination strength alterations after arthroscopic biceps surgery - Comparison between tenotomy and tenodesis -
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[Introduction] The long head of biceps tendon (LHBT) disorders are commonly recognized as a cause of pain. Current surgical techniques for the LHBT disorders are tenotomy or tenodesis. Although similar clinical outcomes have been reported for tenotomy or tenodesis except cosmetic problem, few studies reported on the supination strength after the surgery. The purpose of this study was to compare supination strength after tenotomy and tenodesis.

[Methods] Twenty-two shoulders divided into the 3 groups; 10 shoulders who had arthroscopic rotator cuff repair with no biceps disorders, 8 with tenotomy, and 4 with arthroscopic subgrouse tenodesis. Constant and DASH scores were used for the clinical outcomes. All participants were examined forearm supination peak torque using BIODEX machine by isometric testing pre and minimum 6 months postoperatively.

[Results] Significant improvement in each clinical score was found after the surgery in all groups. No significant difference between tenotomy and tenodesis group was obtained in each score. Only one patient in the tenotomy group had Popeye sign. No significant differences of alteration ratio (postoperative/preoperative) in supination strength in all groups were found in the current study, 1.00, 0.97, 0.98, in the control, the tenotomy, and the tenodesis group, respectively.

[Discussion] There are few studies in the literature directly comparing outcomes of biceps tenotomy and tenodesis between preoperative and postoperative. Our results indicated that the isometric supination alteration did not changed in all groups, even though LHBT was cut.

P1-048  Evaluation of the coracoid graft state for the modified arthroscopic Bankart & Bristow procedure using Coracoid Reamer
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The purpose of this study was to evaluate for the coracoid graft state for the modified arthroscopic Bankart & Bristow procedure (ASBB) using the Coracoid Reamer (CR) and Glenoid Reamer (GR). CR is a tool for cutting the base of the CG to the exact cylindrical. GR is a tool for making the hole for inserting the CG base on the front site of glenoid. The both reamer were developed by us. We have compared with the group G without the CR & GR, and the group CR with CR & GR. This study had demonstrated that the contact ratio of the CG and the glenoid is significantly increased. This result showed that the CG got the stronger fixation and the optimal conditions for a bone union. CR and GR were found to be a very useful tool for ASBB method.

P1-049  Treatment of recurrent shoulder joint dislocation in collision sports players
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Various procedures have been proposed for surgical treatment of recurrent shoulder joint dislocation in collision sports players, and the surgical outcomes have been reported in literatures. In this study, we reviewed our experiences with surgical treatment of recurrent shoulder joint dislocation in this cohort of patients. Fourteen collision athletes who underwent surgeries from August 2012 to March 2016 in our hospital were included in the study. The patients were comprised of 6 rugby, 3 American football, 1 judo, 1 boxing, 1 handball, and 1 soccer players. The average age, height, and bodyweight of the subjects were 20.4 years, 171.1 cm, and 73.7 kg respectively. The surgical procedures performed were 10 modified Bristow, 3 modified Putti-Platt, and 1 arthroscopic Bankart repair. After surgery, all patients could return to play their original sports activities at competitive level within 6 months, and no recurrent dislocation was encountered during the study period. The postoperative functional and clinical results (including UCL score) were not significantly different among the three procedures. Although our primary surgical option for collision sports athletes is the modified Bristow procedure, the modified Putti-Platt method could afford comparatively satisfactory results without limitation of external rotation in our practice.
P1-050 Outcomes of Treatment for Recurrent Dislocation of Shoulder Associated with Epileptic Seizure

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Objectives and Methods: Dislocation of shoulder caused by epileptic seizure often recurs postoperatively. Among cases of shoulder dislocation which underwent surgery and treatment at our hospital during the past 5 years, this time we discussed and then report the clinical outcomes of 5 shoulders attributed to epileptic seizure.

Results: The mean ages at first dislocation and at surgery were 21.4 and 24.0 years, respectively. Regarding operative method, arthroscopic Bankart repair was performed in 1 case, arthroscopic Bankart repair and augmentation in 1 case, and arthroscopic Bankart-Bristow-Latarjet procedure was performed in 3 cases. The improvement in JSS shoulder instability score was 23.4 points on average. Epileptic seizure was well controlled with oral medications in 2 cases and inadequately controlled with one in 2 cases. Although 3 cases had no recurrence of dislocation, the 1 inadequately-controlled case developed seizure during the postoperative course, in which a curve of screw was observed although bone union had been achieved after arthroscopic Bankart-Bristow-Latarjet procedure. Thereafter, dislocation did not recur, and there was no difficulty in daily life; however, there is a concern of recurrence of dislocation in case of seizure.

Conclusions: With respect to dislocation of shoulder caused by epileptic seizure, for cases inadequately controlled with oral medications, robust arthrodesis with the use of additional treatment such as Bankart-Bristow-Latarjet procedure is needed, and control of seizure is also essential.

P1-051 Traumatic anterior instability of the shoulder without awareness of dislocation or subluxation

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The purpose of this study was to evaluate the cases of traumatic anterior instability of the shoulder without awareness of dislocation or subluxation at injury. 14 patients (9 male and 5 female) who underwent arthroscopic Bankart repair for traumatic anterior instability of the shoulder were participated. There mean age was 166 (14-21) years old and follow-up period was 136 (12-24) months. Preoperative symptoms, physical examinations, bone morphology by using three-dimensional computed tomography (3DCT), and arthroscopic findings were investigated. All patients complained of a pain due to preoperative anterior apprehension test. However it was decreased by relocation test. A bony Bankart lesion was observed in only one case. The bony defect of the glenoid was 26% of its transverse diameter. The length between medial boarder of Hill-Sachs lesion and attachment of rotator cuff was 5.5mm, which was significantly less than in the patients with multiple events of dislocation or subluxation. The patients without awareness of dislocation or subluxation of the shoulder had small bony defect of the glenoid and small Hill-Sachs lesion. For the patient whose shoulder pain decreases due to relocation test, it is considered the presence of traumatic anterior instability and recommend to do further examination like 3DCT or magnetic resonance imaging.

P1-052 The relationship between posterior instability of the shoulder and scapula dyskinesia -usefulness of the scapula mobility jerk test-

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Purpose: The purpose of this study is to show the relationship between posterior instability of the shoulder and scapula dyskinesia with the scapula mobility jerk test (SMJT).

Methods: We evaluated 49 shoulders of the posterior instability with the jerk test positive (posterior instability group: PG), and 66 shoulders with the jerk test negative (normal group: NG) using the SMJT. The SMJT was the useful method to evaluate the scapula dyskinesia during the jerk test. At the jerk test we simply evaluated whether the scapula was abducted or not when the shoulder was adducted horizontally. When the scapula was not moved in spite of horizontal adduction of the shoulder, the SMJT was positive, while the SMJT was negative when the scapula was abducted with the shoulder adducted horizontally to prevent the shoulder posterior instability. We examined the difference of the result of the SMJT between two groups, statistically.

Results: In all shoulders in the PG, the SMJT was positive. On the other hand, in only 3 of 66 shoulders in the NG (4.5%), it was positive (p<0.05). The PG showed the scapula mobility was clearly restricted, especially during horizontal adduction of the shoulder at the jerk test.

Conclusion: The shoulder with posterior instability was very relevant to the scapula dyskinesia, because its scapula was not abducted at all in spite of horizontal adduction of the shoulder at the jerk test.
P1-053  Relationship between the insertion angle of anchors and the change of glenoid rim in Bankart repair

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We reported that the horizontal diameter of glenoid articular surface decreased after Arthroscopic Bankart repair (ABR) in 10 out of 24 cases (42%). In those cases, the bone around the anchor holes decreased at the level of glenoid articular surface (the bone loss). We investigated the relationship between the bone loss and anchor insertion angle. 88 patients with recurrent anterior shoulder instability underwent ABR in our institution. 32 patients with bony Bankart lesion and 9 patients with intraoperative anchor damage were excluded. We investigated 99 anchors on the articular surface out of 233 anchors in 47 patients. There were the bone loss in 40 anchors (Group L), no bone loss in 59 anchors (Group M). We divided 99 anchors into two groups about sports activity and anchor insertion angle (competitive athletes or not, the anchor insertion angle was less or more than 45 degrees). Statistical analysis was performed using the Chi-squared test with 0.05 level of significance. The number of competitive athletes was significantly more in Group L than that of non-competitive athletes. there was no relationship between the bone loss and the anchor insertion angle. The bone loss was often observed in young patients with sports activities.

P1-054  Comparison of postoperative anterior glenoid bone loss between arthroscopic dual- and single-suture methods

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[Purpose] Anterior glenoid bone loss after arthroscopic Bankart repair has been reported. Here, we compare postoperative glenoid bone loss after the use of the dual-suture (Group D) and single-suture (Group S) methods.

[Method and subjects] The subjects were 37 shoulders of 37 patients who underwent arthroscopic Bankart repair (excluding bony Bankart lesions). Mean age at the time of surgery was 25.8 years (14.46 years). Group D (24 shoulders) underwent repair using the dual-suture method, in which high-strength sutures were used in addition to two inferior anchors made with a Panath Loop. Group S (13 shoulders) underwent repair using the single-suture method, in which all anchors were made of Gyrphon. The area of glenoid bone loss was evaluated enface-view of 3D-CT 6 months after surgery. We measured the difference in anterior glenoid bone loss between both groups using Image J (NIH). Statistical analysis was performed using Mann-Whitney U test.

[Results] The mean rate of postoperative glenoid bone loss was 13% (7.18%) in Group D and 8% (3.13%) in Group S. Group D showed greater postoperative bone loss than Group S (p=0.002).

[Conclusion] Postoperative glenoid bone loss after arthroscopic Bankart repair was observed in both groups. Group D showed greater postoperative glenoid bone loss than Group S. Further study of the effects of different anchors and sutures is needed. Careful monitoring of changes in glenoid bone loss is needed to determine whether such changes affect clinical outcomes.

P1-055  Results of arthroscopic Bankart repair in patients with recurrent anterior dislocation of the shoulder

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Arthroscopic Bankart repair in patients with anterior instability of the shoulders is minimally invasive surgery. The purpose of this study was to evaluate a minimum of one-year clinical results and clinical features of arthroscopic Bankart repair (ABR). We retrospectively evaluated 32 shoulders (18 male and 14 female) of arthroscopically treated Bankart lesions with a minimum one-year follow-up. The mean age at the surgery was 26.3 years old. We used Jagger knot anchor for ABR. The average of using anchor was 5. We excluded recurrent anterior dislocations of the shoulders with rotator cuff tears. Clinical results were evaluated using a JSS-SIS, shoulder36, QuickDASH score and re-dislocation rate. The averaged JSS-SIS was 55.4 points preoperatively to 90.9 points postoperatively. Shoulder36 and quickDASH score both improved. Postoperative re-dislocation was 2 shoulders. Average range of motion of external rotation decreased slightly. Studies have shown the rate of re-dislocation from 2.6% to 23.8%. In our study was in line. Arthroscopic Bankart repair surgeries have shown favorable clinical outcomes at a minimum of one-year follow-up.
P1-056 Arthroscopic treatment for the Isolated Bankart lesion and combined Bankart and Type II SLAP lesions: A Comparative Study

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Introduction: We hypothesize that in patient with combined with Bankart and type II SLAP lesion could cause poor outcomes comparing patients with isolated Bankart lesion, because combined lesion needs more fixation points, this could lead to more excessive tension and more limited range of motion. Thus we compared long term clinical results of isolated Bankart repair and combined with Bankart and type II SLAP repair

Methods: Total 128 patients with isolated Bankart lesion or combined Bankart and type II SLAP lesions were enrolled. They could be followed up for minimum 60months (60-84month) from March, 2005 to march, 2010. 97 patients with isolated Bankart lesion were classified as group I, and 31 patients with combined Bankart and type II SLAP lesions were classified as group II. The therapeutic results were analysed to compare group I and II in follow up periods by using Visual Analogue Scale, range of motion, ASES shoulder score, Constant shoulder score, and Rowe score for instability.

Results: The mean of ASES score, Constant shoulder score and Rowe shoulder scores were improved from preoperative 61.5, 68.1 and 35.2 to postoperative 94.1, 97.4 and 95.2(p<0.05) in group I and were improved from preoperative 63.2, 68.5 and 36.6 to postoperative 93.8, 97.5 and 91.5(p<0.05) in group II. There were no significant differences between two groups. Meanwhile, in both groups pain relieved remarkably and no significant difference was found in terms of the range of motion measured at the last follow-up.

Discussion: With arthroscopic repair of combined Bankart and type II SLAP lesion, there were no statistically significant clinical limitations comparing with repair of isolated Bankart lesion in long term follow up.

P1-057 The long-term clinical outcomes of arthroscopic Bankart repair for rugby players

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The purpose of this study is to report the long-term clinical outcomes of arthroscopic Bankart repair with rotator interval closure in rugby players having traumatic anterior shoulder instability. We treated 26 shoulders of 25 players from 2007 to 2011. The mean age at surgery was 18 (ranged from 16 to 31) years old. Patients were permitted to return to the game in more than six months postoperatively. We researched the presence or absence of re-dislocation and patient's sports activities by having questionnaires. We got answers from 20 patients and mean follow up period was six years and nine months. Although all patients could return to rugby, 5 patients (23%) re-dislocated their shoulders. The mean period after surgery to re-dislocation was two years (ranged from 3.5 months to 4 years 8 months). The mean period which the other 15 patients played rugby was three years and seven months, and 11 patients was keep playing competitive sports (rugby: 8, American football: 1, hockey: 1). For the rugby players having shoulder instability, arthroscopic Bankart repair with rotator interval closure was not enough to get instability sufficiently to endure high energy caused in rugby especially tackling. It would be necessary to add Remplissage procedure and/or coracoid transfer to get better outcome.

P1-058 Long-term results of modified inferior capsular shift for recurrent anterior dislocation of the shoulder

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[Purpose] The purpose of this study was to investigate long-term results of modified inferior capsular shift (MICS) for recurrent anterior dislocation of the shoulder performed by the same surgeon, procedure and post-operative rehabilitation.

[Patients and Methods] The study group consisted of 17 patients (10 male, 7 female) who were followed for more than 10 years postoperatively. The follow-up ratio was 47%. The average age at surgery was 30 years old and the average follow-up period was 12.5 years. Sixteen of 17 patients participated in recreational level of sport activities. The surgery consisted of a direct Bankart repair and capsular tightening with the shoulder from 30 to 40 degrees of external rotation. Sports activities were allowed 6 months after surgery. Correlation between the recurrence and age, sport event, bone defect of the glenoid, and general joint laxity was evaluated.

[Results] Nineteen year-old judo player developed recurrent instability (recurrent ratio 5.9%). There were 5 patients each who had large bone defect of the glenoid and general joint laxity, however none of them had recurrence. There was no patient who complained of limitation of range of motion including external rotation. Fifteen patients returned to the same level of their preoperative sports activities. Osteoarthritic changes on the X-ray were not observed in 4 patients who had a radiological examination.

[Conclusion] Long-term results of MICS were satisfactory with low percentage of recurrence and less limitation of range of motion and sports activities.
P1-059  Motion Analysis Using Electromagnetic Tracking System during Arm Elevation in Young and Elderly Adults

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Introduction: Arm elevation movement in young and elderly adults were examined by three dimensional motion analysis using electromagnetic tracking system in this present study.

Methods: The subjects were eight healthy twenties (younger group) and eight healthy males aged 65 or older (older group). In the movement of upper limb flexion-elevation, the total upper limb elevation angle, the tilt-back angle to the pelvis and the posterior tilt angle, upward rotation angle, adduction angle of the scapula and the flexion angle of the glenohumeral joint were measure by three dimensional motion analysis using an electromagnetic tracking system to compare the results in young group and the elderly group.

Results: The upper limb total elevation angle was significantly lower in older group compared to the younger group. In addition, the adduction angle of the scapula and the flexion angle of the glenohumeral joint were significantly lower in older group compared to the younger group. Discussion: Compared to the young people, the adduction angle of the scapula and the flexion angle of the glenohumeral joint decreased significantly in the elderly, as a result led to a reduction of the upper limb total elevation angle.

Conclusion: In the movement of upper limb flexion-elevation, a decrease in the movement of scapula and glenohumeral joint were revealed in the older group compared to the younger group.

P1-060  Influence of muscle stiffness on scapular movement during arm elevation

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[Objective] The purpose of this study was to examine influence of the muscle stiffness on scapular movement during scapular-plane elevation in elderly female.

[Subjects and Methods] The subjects were 24 elderly female (71.7 ± 5.9 years). The muscle stiffness was measured using a NEUTONE TDM-N1DX (TRY-ALL) trapezius muscle, rhomboid minor and rhomboid major. In a sitting position, the subjects were instructed to perform scapular plane elevation to the maximal point for 3 seconds. The kinematic data were measured using a magnetic tracking device (SPACE-LIBERTY), from 30° to 120° during scapular plane elevation.

[Results] The interclass correlation coefficient in trapezius muscle, rhomboid minor and rhomboid major was 0.79, 0.87 and 0.70, respectively. Each muscle stiffness (mean ± SD) were as follows: trapezius muscle; 1.0 ± 0.2, rhomboid minor; 1.2 ± 0.2 rhomboid major; 1.5 ± 0.1. Significant negative correlation was found between muscle stiffness of rhomboid major and scapular posterior tilt of arm elevation: 90° ( r = 0.41 p<0.05) and 120° ( r = 0.43 p<0.05).

[Conclusion] Muscle stiffness of rhomboid major affects scapular posterior tilt during scapular-plane elevation.

P1-061  Influence of women's underwear on scapula kinematics

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[Background] The purpose of this study was to investigate influence of women’s underwear on scapula kinematics during arm elevation, using a 3-dimensional electromagnetic tracking device.

[Materials and methods] Eighteen healthy female (20.4 ± 0.9 years) were subjects in this study. The subjects were instructed to elevate their arm from at-the-side to the maximum level in the scapular plane for 3 seconds; this task was performed twice with the subjects worn or not. Kinematic data were collected using an electromagnetic tracking device (Polhemus 3Space Liberty) and the Motion Monitor System (Innovative Sports Training Inc.) : 1) glenohumeral elevation, 2) scapula upward rotation, 3) scapula internal rotation, and 4) scapular posterior tilt.

[Results] Significant interaction was detected between the subjects with or without underwear and among arm elevation angle in the glenohumeral elevation, scapula upward rotation and posterior tilt angle (p<0.05, respectively). The glenohumeral elevation angle was significantly greater in the subjects with underwear than in those without underwear (p<0.05). Oppositely, the scapular upward rotation and posterior tilt angle were significantly smaller (p<0.05, respectively) in the subjects with underwear. The scapular internal rotation angle was significantly smaller in the subjects with underwear than in those without underwear (p<0.05), but not with significant interaction.

[Conclusions] In women with underwear, the scapula kinematics is relatively reduced during arm elevation, compared with the glenohumeral motion.
P1-062 Influence of tear size on three dimensional scapular kinematics in patients with rotator cuff tears
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Introduction: The purpose of this study was to examine the influence of tear size on three-dimensional (3-D) scapular kinematics during arm elevation in patients with rotator cuff tears.

Methods: Twenty-five patients (28 shoulders, mean age 69.2 years) were subjects of this study. Inclusion criteria consisted of rotator cuff tears confirmed by magnetic resonance imaging in which active arm elevation more than 120 degree was shown. The tear size was assessed using T2-weighted images in coronal oblique plane; then, the subjects were divided into massive rotator cuff tear groups (>5cm, m RCTs: 17 shoulders) and small to large tear size groups (<5cm, s/l RCTs: 11 shoulders). 3-D scapular kinematics was analyzed during arm elevation in scapular plane, with electromagnetic tracking sensors (GSPAC-Liberty, Polhemus) attached to the scapular, the humerus and the thorax. Changes of the scapular kinematics (upward rotation, posterior tilt and external rotation) were calculated at 10° arm elevation with respect to the thorax, from 30° to 120°. Two-way repeated measures analysis of variance was used as statistical analysis.

Results: Scapular external rotation at 120° arm elevation was significantly smaller in the s/l RCTs group than in the m RCT group (p<0.05). For the scapular upward rotation and posterior tilt, there were no significant difference between the two groups.

Conclusion: In patients with rotator cuff tears, the tear size in coronal plane less affects 3-D scapular kinematics during arm elevation.

P1-063 Electromyographic and 3D motion analysis of the elevation with the rotator cuff tear
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[Purpose] We examined the elevation with the rotator cuff tear using electromyographic and 3D motion analysis.

[Material and Method] We examined the 3 cases (pseudo-paralysis group, PP) (average 72 years old) had shown pseudo-paralysis and the other 3 cases (nompseudo-paralysis group, NP) (71 years old) had not shown. In 3D motion analysis using VICON MX (VICON motion system), we measured the angle of humerus and scapula. Also we measured the reaction times and the peak times until maximum power of deltoid (DeL), DelM, Trapezoid (TraU, TraM, TraL) and serratus ant (SA) in electromyogram using MQ16 (Kisseicomtec).

[Result] The scapulohumeral rhythm (SHR) (PP/NP) were 3.2/5.9 in the elevation of 0-30 degrees, 3.4/3.6 in 30-60, 3.5/3.5 in 60-90, 3.4 (NP) in over 90 degrees. At the starts of the elevation the scapula had been anterior tilt and inferior rotation in NP. The reaction times of DelM and SA had been earlier in NP, of TraM, and TraL had been later. The peak times of DelM and SA had been later in NP, of TraM, and TraL had been earlier.

[Discussion] In 30 degrees or less SHR of NP was greater than of PP. At the initial elevation the early contraction of DeM and the anterior tilt and inferior rotation of scapula had shown in NP. It was considered to concern with the stability of the glenohumeral joint. It was thought that DelM and SA had activated until the terminal elevation because the peak time of DelM and SA was delayed.

P1-065 The Relevance between Rest, Motion, and Night Pain by Rotator Cuff Tears
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[Introduction] Some patients with rotator cuff tears (RCTs) have various shoulder pains. The purpose of this study was to evaluate the relevance between rest, motion, and night pain by RCTs.

[Subject and method] Fifty-five patients with RCTs were included. The mean age for the patients were 64.1 years and there were 27 males and 28 females. The patients were divided into two groups according to RCT sizes. Thirty patients had small or medium RCTs (group SM) and 25 patients had large and massive RCTs (group LM). Visual Analogue Scales about rest, motion, and night pain were measured. Unpaired t-test was used for comparison of each shoulder pain between group SM and group LM as statistical analysis. Pearson's correlation coefficient analysis was used to assess the relations among shoulder pains.

[Results] All shoulder pains did not differ significantly between group SM and group LM. Motion pain was positively and weakly correlated with rest pain (r = 0.31) and night pain (r = 0.22). A correlation was observed between rest pain and night pain (r = 0.62).

[Discussion] This study showed that the degree of shoulder pain was not affected by RCT size. Rest pain was correlated with night pain. These pains for RCTs could be caused in a similar mechanism.
P1-066  The association between rotator cuff dysfunction and night pain
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Purpose: Night pain is a particularly vexing symptom in patients with shoulder disorder. We hypothesized that rotator cuff function related with this symptom. The purpose of this study was to assess the association between rotator cuff function and night pain.
Methods: Ninety-four shoulders of eighty-eight patients with shoulder impingement syndrome (average age: 52.4 years old) were evaluated. Imaging was performed with a Signe 1.5-tesla MRI device. MRI of rotator cuff motion was performed using TrueFISP. During imaging, subjects rotated their hand from maximum pronation to maximum supination in the first 10 seconds and back in the subsequent 10 seconds. We assessed rotation angle and patients’ UCLA score. We divided patients into two groups: night pain or not, and compared two groups. We used student’s t-test, and set the level of significance at p<0.05.
Results: Patients with night pain were forty-seven shoulders, without night pain were forty-seven shoulders. The mean UCLA score was 16.5 for patients with night pain and 20.6 for without (p=0.001). The mean internal rotation angles of patients with and without night pain were 33.2 degrees, 40.5 degrees, respectively (p=0.052). Mean external rotation angles of patients group and normal group were 72 degrees, 248 degrees, respectively (p=0.0008). And total range of rotation of patients group and normal group were 404 degrees, 65.3 degrees, respectively (p<0.0001).
Conclusion: Patients with night pain were significantly restricted rotational function of rotator cuff. We were able to show this rotational limitation related with night pain.

P1-067  Clinical findings of the rotator cuff tear focused on the intensity of the pain
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The shoulder rotator cuff tear has been considered to be an existence ache-related disease of the old and middle age, but is not clear about the mechanism to become the existence ache characteristics. Regarding the preoperative clinical findings of the cases with rotator cuff tear, we examined 198 shoulders (71 males, 37 females, average age 64 years old), which operated for a rotator cuff tear. We divided these cases into two groups, by pain score of Shoulder 36, less than 2.5 (strong pain group: 26 shoulders) and higher than 3.5 (low pain group: 29 shoulders). We weighed between two groups, on age, gender, disease period, the size of the tear, the presence of the subscapularis muscle tendon tear and the evaluation under anesthesia (range of motion). There was not the significant difference in age, size of the tear, the presence of the subscapularis muscle tendon tear and range of flexion and external rotation. Significant difference in gender, disease period, range of internal rotation between both groups were found in a strong group, which were dominant in women and had a long contraction of a disease period as well as wider range of internal rotation The limitation of the study was restricted patients selection for surgery, which would be analyzed more precisely.

P1-068  Postoperative pain after Arthroscopic Rotator Cuff Repair-Comparison of Double -row and Suture Bridge Repair
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The purpose of this study was to compare the degree of postoperative pain of arthroscopic rotator cuff repair with double-row repair (DR group) and suture bridge repair (SB group). Eighty-seven patients who had undergone arthroscopic rotator cuff repair with a minimum follow-up period of 12 months were enrolled in this study. This study was retrospective study. The patients were divided into two groups according to the repair technique employed. There were 43 shoulders in the DR group (average age 63 years, male 26, female 17) and 44 shoulders in the SB group (average age 58 years). Clinical outcomes were evaluated by VAS at rest, VAS at ADL, PT rate, the JOA score and range of motion. Mann-Whitney U-test was performed for the statistical analyses. P values less than 0.05 were considered significant. SB method of VAS at ADL and at rest after early surgery period was higher than DR method. In 3 months later, there was no difference between both the two groups. There was no difference in JOA and ROM degree between both the two groups.
P1-069  Features of neuropathic pain in patients with shoulder disorders

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It has been reported that some orthopedic disorders may be associated with neuropathic pain. However, there have been few reports of shoulder disorders. We evaluated 278 patients who visited our outpatient clinic, which specializes in shoulder disorders, from April 2015 to March 2016. We assessed each patient’s age, sex and diagnosis and studied the passive range of motion (ROM), impingement, and muscular strength. The strength and description of pain were assessed using the visualized analog scale (VAS) and short-form McGill pain questionnaire (SF-MPQ). Any disturbance of sleep was also assessed by the VAS. The prevalence of Nep was assessed using the Japanese version of the Pain DETECT. In cases where the total score was 19 or higher, we considered the patients as having Nep. We divided the subjects into two groups according to the presence of Nep and compared the above items in the two groups. Nep was observed in 6.1% of the subjects. Then, small number of cases were excluded and the 7 major shoulder disorders were focused. Nep was observed in 33.3% of frozen shoulders, and the prevalence of Nep in frozen shoulders was significantly higher than in the other disorders. The VAS of each pain, feeling of deep sleep, and SF-MPQ were found to be significant factors. We assessed the features and background factors of Nep in 278 patients who visited our outpatient clinic. Nep was observed in 6.1% of the subjects. The prevalence of Nep in frozen shoulders was significantly higher than in the other disorders.

P1-070  Persistent night pain of frozen shoulder involves neuropathic pain

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Tramadol/ Acetaminophene (TRAM) which known as an anti-chronic pain drug is reported to be effective for night pain of frozen shoulder. Chronic pain is considered as a mixed pain of nociceptive and neuropathic pain. If persistent night pain involves neuropathic pain, Pregabalin (anti-neuropathic pain drug; PGB) would have similar effect. The objective of our study was to evaluate the influence of neuropathic pain and the effect of PGB and TRAM on night pain.

23 patients with stiff shoulder who demonstrated persistent night pain (over 1month) and global loss of passive motion were enrolled. Patients with diabetes and traumatic etiology were excluded. The male-to-female ratio was 1:2 and the mean age was 61.6 years. They were divided into 3 groups: treatment with NSAIDs only/ with NSAIDs and TRAM/ with NSAIDs and PGB (Group N/ Group T/ Group P. 7 patients, 8 patients, 8 patients). Neuropathic pain was defined with the Pain DETECT questionnaire. Time point (an onset and an end point of night pain and a therapeutic intervention) was investigated. The Cox regression analysis was used in which an end point of night pain was defined as an event. Diagnosis of neuropathic pain in frozen shoulder patients with persistent night pain were seen in 29%. The whole duration of night pain in Group N was significantly longer than the others. There was no significant difference between Group T and Group P.

P1-071  Clinical results of arthroscopic synovectomy for rheumatoid shoulder

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Objective: We report therapeutic experience of arthroscopic synovectomy for rheumatoid shoulders.

Method: The study examined 7 RA patients. The patients are 6 female and 1 male, mean age 56.6 years and mean disease duration 10.2 years. Clinical result indicators are range of motion, HAQ, pain VAS and DAS28-CRP at preoperative and last follow-up.

Result: The flex angle was improved 18.5 degree. The abduction angle was improved 25.7 degree. HAQ score was improved 0.48 points. Pain VAS was improved 5.00 points. DAS28-CRP was improved 0.90 points.

Conclusion: Arthroscopic synovectomy for rheumatoid shoulder is effective in the mid-term.
P1-072  Silent manipulation therapy for frozen shoulder with diabetes
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We reported the good short-term clinical results of manipulation of severe frozen shoulder under ultrasound guided cervical nerve root block. The technique is called silent manipulation. There are few reports about silent manipulation for frozen shoulder with diabetes. The purpose of this study was to evaluate the effect of silent manipulation for frozen shoulder with diabetes. The subjects were five frozen shoulder patients (average age, 53 years; 3 men, 2 women) with diabetes. Their average value of HbA1c was 7.7% (range, 5.8-10.2). 23 frozen shoulders without diabetes were selected as control (average age, 58 years; 10 men, 13 women). Assessed items are motion pain (NRS: numerical rating scale), forward elevation, external rotation at 1st position, internal rotation, American Shoulder and Elbow Surgeons (ASES) score and Short-Form 36-Item Health Survey (SF-36). They were evaluated at pre-manipulation. 1 week and 24 weeks after manipulation. Although motion pain, forward elevation, external rotation at 1st position, internal rotation and ASES score were all improved in both groups at 1 week after manipulation, diabetes group was not seen more improvement of all items at 24 weeks after manipulation compared with control group. Moreover, there was no significant change in diabetes group at SF-36 between pre- and post-manipulation. Diabetes influenced the result of frozen shoulder therapy with silent manipulation.

P1-073  The use of continuous negative pressure after open debridement for septic arthritis of the shoulder.
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Introduction: Septic arthritis of the shoulder is a challenge for shoulder surgeons. We aimed to investigate the predisposing factors for septic shoulder and review the outcomes following the use of continuous negative pressure after open debridement in septic shoulder.

Methods: A total of 83 patients with septic shoulder underwent arthrotomy, irrigation and debridement. A small diameter suction drain was placed in the glenohumeral joint and a large diameter chest tube was placed in the subacromial space with continuous negative pressure. All patients received appropriate antibiotics treatment for a mean of 5.6 weeks (two to 18).

Results: Forty-eight patients (57.8%) had iatrogenic source of infection such as shoulder injection. Forty-two patients (50.6%) had underlying medical condition, diabetes being the most common (23.8%). Negative pressure was maintained for a mean of 23 days (12 to 34). After drain was removed, 80 patients (96.5%) were cured requiring no further treatment. Repeat surgery was required for 3 patients due to recurred infection. At a mean follow-up of 15 months (two to 72), the mean forward elevation was 124° (60° to 150°) and the mean external rotation was 28° (10° to 50°).

Discussion: Iatrogenic source of infection is common and various underlying medical condition should be carefully evaluated. Continuous negative pressure with large diameter after open debridement proved to be effective in treating septic arthritis of the shoulder. The rate of recurrence was significantly lower than with conventional treatment involving arthroscopic or open debridement reported in the literature. Functional outcomes were excellent even in patients with rotator cuff tears.

P1-074  Use of teriparatide after surgery of proximal humerus fracture
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Introduction: Currently, some studies describe the role of teriparatide in fracture healing in humans. In proximal humerus fractures, little is known about the role of teriparatide. This study aimed to assess whether administration of teriparatide postoperatively enhances fracture healing in humerus fractures.

Methods: Four women (73 to 89 years of age) who had been operated on for proximal humerus fracture were studied. Two of them received hemiarthroplasty, while the other two received intramedullary nail and locking angle plate, respectively. The fractures were classified according to the Neer classification system, there were one 2-part fracture, two 3-part fractures and one 4-part fracture. Teriparatide was prescribed 1 to 8 days postoperatively. Radiological evaluation included callus appearance in all cases, bone union in open reduction internal fixation cases, and bone density of greater tuberosity in hemiarthroplasty cases.

Results: Callus appeared 2 weeks postoperatively in all cases. The mean time from surgery to bone union was 7 and 12 weeks respectively. In hemiarthroplasty, bone resorption of the greater tuberosity occurred soon after surgery, but it was improved thereafter. Discussion: The current cases showed callus formation and bone union much earlier than those in the past reports. Tuberosity healing is critical for good clinical outcomes after hemiarthroplasty for proximal humeral fractures. It was reported that the tuberosity resorption appears in 90% of patients. In the current cases, even though temporary bone resorption of the greater tuberosity occurred postoperatively, it was soon improved with use of teriparatide.

Conclusion: Teriparatide enhanced bone healing in proximal humerus fractures postoperatively.
P1-075  Survey of shoulder pain in the elderly: the Fujiwara-kyo study
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The purpose of this study was to investigate shoulder pain among the elderly. We examined 4427 community residents aged 65 years or older who participated in the epidemiological study: the Fujiwara-kyo study. We examined the musculoskeletal pain and investigated relationship between motor function, falling experience, QOL and other. It was 8% of the total who complained of a pain in shoulder. 72% of them suffered from shoulder pain everyday and 93% of them suffered from shoulder pain, once or more times a week. Only 23% of them visited to the hospital regularly. Shoulder pain was not their risk factor of motor function and fall, but decreased their QOL. In order to decrease shoulder pain among the elderly, we should make a strategy to improvement of hospital rate and educate some homecare method.

P1-076  Fracture of coracoid process associated with superior shoulder suspensory complex injury : Report of eight cases
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Introduction: Fracture of coracoid process is relatively rare injury. The purpose of this study was to evaluate clinical outcomes of coracoid fractures associated with superior shoulder suspensory complex injuries and operative treatments.
Materials and Methods: Between 2011 to 2015, we treated eight coracoid fractures associated with superior shoulder suspensory complex injuries. 6 men and 2 women, average ages were 37.5 years (17-64).
Results: According to Ogawa's classifications, all cases were type 1 fracture, 2 cases treated with conservatively, 6 cases treated with operatively. The surgery conducted fixation by cannulated cancellous screw for coracoid fracture and conducted fixation for superior shoulder suspensory complex injuries. One case conducted conservative treatment resulted in non-union, however other seven cases showed bone union and obtained good results.
The average of JOA score was 97.5 points (80-100).
Discussion: The coracoid process has strong stability due to support mechanism with ligaments and muscles. Therefore, it is often occurs superior shoulder suspensory injuries associated with coracoid process fracture, and surgical treatment is recommended.
Conclusions: Satisfactory results were obtained with operative reduction of both coracoid process and superior shoulder suspensory complex injuries.

P1-077  Clinical outcome of arthroscopic stabilization for acute acromioclavicular joint dislocation
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(Introduction) Arthroscopic stabilization for acute acromioclavicular joint (ACJ) dislocation produces good clinical outcome. We investigated short-term outcome of this procedure in patients with acute ACJ dislocation.
(Materials and Methods) Between April 2014 and March 2015, 4 patients with acute ACJ dislocation (average age of 38.2 ± 18.2 years) underwent arthroscopic stabilization in our hospital. The patients were followed up at least one year after surgery (average follow up of 13.25 ± 1.5 month). All patients had Type III dislocation classified by Rockwood, and then, they underwent arthroscopic surgery using AC Repair-Dog Bone Button (Arthrex, Inc.) within 3 weeks after traumatic onset. Outcome measures consisted of radiographic evaluation of ACJ dislocation and clinical evaluation by Japanese Orthopaedic Association (JOA) score.
(Results) Operation time was 102 ± 36 minutes. ACJ dislocation rate improved 177.4 ± 51.9 %preoperatively to 86.7 ± 14.3% postoperatively. JOA score improved 20.25 ± 12 points preoperatively to 97.25 ± 37 points postoperatively.
(Summary) Arthroscopic stabilization produced good clinical outcome in patients with acute ACJ dislocation.

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P1-078 The Primary Surgical Reduction for Acromioclavicular Joint Dislocations with a ZipTight fixation system.

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To survey an outcome of the primary surgical reduction for acromioclavicular dislocations with a ZipTight fixation system. This study included 5 patients of acromioclavicular joint dislocation surgically treated with a ZipTight fixation system from 2014 to 2015 (All cases were men. Rockwood classification: type21 shoulder, type34 shoulders). Follow up postoperative periods were 7.8 months in the mean. AC score at 3 months after an operation were 89.8 in the mean. On X-ray evaluations, 1 subluxation and 2 dislocations of acromioclavicular joint were recognized as a postoperative complication. The primary surgical reduction for acromioclavicular dislocations with a ZipTight fixation system had a good outcome on early postoperative period.

P1-079 Experience about management of acute acromioclavicular joint dislocation

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Background: We minimally invasive repair the coracoclavicular ligament with the arthroscope. We report 11cases 11 shoulders that we can follow-up for half a year from January,2014.

Materials: The average age: 40 years old (27-72) follow-up period: 10.6M (6-16.3) Rockwood classification,6 persons are type3, 1 person is type4 , and 4 persons are type5. We repair the coracoclavicular ligament by using dog bone button and suture button tape of Arthrex company. The postoperative evaluation used JOA score and JSS-ACJ score. In addition, we evaluated the degree of the correction loss by simple X-rays and measured it about the expansion of the bone aperture in CT.

Results: The results accepted improvement after operation in JOA score and JSS-ACJ score. About the postoperative correction loss, there were three clear correction losses more than 4mm and these cases were Rockwood classification type5. In addition, the bone aperture expansion more than 3mm is seen in four cases; above-mentioned three cases were included inward.

Conclusions: There was an association between the disease severity of the Rockwood classification and a correction loss, and it was thought that bone aperture expansion contributed to a correction loss again.

P1-080 Postoperative outcome after coracoclavicular ligament reconstruction using artificial ligament for acromioclavicular joint dislocation

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Background: The purpose of this study was to evaluate the clinical outcomes of coracoclavicular ligament reconstruction using artificial ligament for acromioclavicular dislocation.

Methods: During the period between 2007 and 2014, we could follow-up on 10 patients (male 9, female 1), whose mean age was 42.6 years old. According to Rockwood’s classification, type 2 was observed in 1 patient, type 3 in 6 patients, type 4 in 2 patients and type 5 in 1 patient. The median time from injury to surgery was 71.5 days. The two methods conducted were an open procedure in 5 patients and an arthrosopic procedure in 5 patients. The median follow-up period was 21.0 months. Clinical outcomes of these cases were evaluated by UCLA score, JSS-ACJ score and postoperative X-rays.

Results: Postoperative UCLA and JSS-ACJ score were an average of 340 points and 95.0 points, respectively. The average preoperative distance of acromioclavicular interval was 10.4mm. At the time of final follow-up, the distance decreased to 1.9mm. We had 1 case of osteolysis, 1 case of acromioclavicular joint osteoarthritis, and 1 coracoid fracture.

Conclusion: Coracoclavicular ligament reconstruction using artificial ligament demonstrated acceptable outcomes in terms of shoulder function and X-ray findings.
P1-081 Clinical evaluation of operative therapy for the greater tuberosity fracture of the humerus
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[Object] We describe the clinical results of the nine cases performed operative therapy for the greater tuberosity fracture of the humerus.

[Materials & Methods] 9 patients who sustained a fracture of greater tuberosity, were treated operatively at our department between 2004 and 2015 and followed more than one year were reviewed and included in the study. Clinical function was assessed using the JOA score.

[Results] we evaluated 9 patients (1 male and 8 female; mean age 66.8 year-old). Mean follow-up period was 16.7 months (12-29). Surgical treatment consisted of 5 cases with plate fixation, 1 with plate and wiring, 1 with tension band wiring, 1 with screw and the last 1 with suture bridging using anchors. The JOA score was an average 77.2 (68-100) point.

[Discussion] the 2 cases using wiring fixation became deformed healing and were poor results. The case using anchor fixation was excellent result.

[Conclusion] we concluded the 9 cases treated operatively for greater tuberosity fracture of the humerus got generally good results.

P1-082 Clinical outcome of arthroscopic surgery for humeral greater tuberosity fracture
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Introduction: Although conservative treatment is effective for the cases of minimally displaced humeral greater tuberosity, operative treatment is recommended for humeral great tuberosity fracture with more than 3mm-upper displacement. The aim of this study was to assess the clinical outcome of arthroscopic reduction and internal fixation (ARIF) for humeral great tuberosity fracture.

Materials and methods: Between October 2005 and December 2014, a consecutive series of 8 patients (4 male and 4 female), with a mean age of 62.1 years, were treated by ARIF. 5 patients with displaced humeral greater tuberosity fracture had suture anchor fixation and 3 patients had trans-osseous fixation by Arthro-Tunneler™. The mean follow up period was 58 months. We evaluated the medial and superior distance from the humeral heads to the displaced bone fragment. The clinical evaluation was performed using the JOA score and active forward flexion and active abduction.

Results: The preoperative distance of medial and superior displacement was 21.3mm and 84.4mm respectively. Preoperative average active forward flexion and active abduction was significantly improved from 109 and 96 degrees to 166 and 165 degrees, respectively. Preoperative JOA score was significantly improved from 53 points to 88 points.

Conclusion: ARIF for humeral greater tuberosity fracture was less invasive procedure and good clinical outcome would be expected.

P1-083 Clinical outcome of arthroscopic surgery for chronic humeral greater tuberosity fracture
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Introduction: Although conservative treatment is effective for the cases of minimally displaced humeral greater tuberosity, some patients complain about pain, subacromial impingement and restricted range of motion of the shoulder. The aim of this study was to assess the clinical outcome of arthroscopic surgery for the sustained symptoms after chronic humeral greater tuberosity fracture.

Materials and methods: Between May 2005 and April 2015, a consecutive series of 21 patients (13 male and 8 female), with a mean age of 56.9 years, were treated by arthroscopic surgery. The mean follow up period was 34 months. We examined the cause of shoulder dysfunction and operation methods. The clinical evaluation was performed using the JOA score and active forward flexion and active abduction.

Results: Impingement syndrome was recognized in all the cases. Eight cases of stiff shoulder, 6 cases of rotator cuff tear and 1 case of Bankart lesion were observed. Twenty-one shoulders of ASD, 8 shoulders of subacromial impingement, 6 shoulders of ASD and capsulolabomy, 1 shoulder of ASD and Bankart repair were performed. Preoperative average active forward flexion and average active abduction was significantly improved from 109 and 96 degrees to 166 and 165 degrees, respectively. Preoperative average JOA score was significantly improved from 53 points to 88 points.

Conclusion: Arthroscopic surgery for chronic humeral greater tuberosity fracture is less invasive procedure and good clinical results would be expected.
P1-084 Intramedullary nailing through the anterocromial portal for 2part proximal humeral fracture: a case report

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We report a case of Intramedullary nailing in which the anterocromial portal approach was used for 2part proximal humeral fracture in a patient with distorted shoulder secondary to trauma. An 93 year old woman suffered a left proximal humeral fracture by falling. In her past history, she suffered the same shoulder dislocation with proximal humeral fracture and had conservative therapy. The X-ray and the CT showed old valgus impact head and deformity around the humeral head and the glenoid, and fresh 2part proximal humeral fracture. Preoperative fluoroscopy confirmed the inability to access the traditional starting point with an anterolateral approach due to a shield acromion and valgus deformity. Intramedullary humeral nail was successfully placed through anterocromial portal. Postoperatively, the patient demonstrated normal clinical and radiographic union. The anterocromial portal approach to Intramedullary nailing is an effective solution to proximal humeral fracture when access to the traditional anterolateral proximal humeral starting port is not possible due to distorted shoulder anatomy.

P1-085 The Straight Locking Intramedullary Nail for Treatment of Displaced Proximal Humeral Fractures

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In this study, we evaluated the functional outcome of the straight locking intramedullary nail procedure for displaced proximal humeral fracture, postoperative avascular humeral head necrosis, and complication after surgery. Based on the Neer’s classification, proximal humeral fractures were classified into 2 groups, 2 part fracture group and displaced 3-4 part fracture group. According as Hertel’s criteria, if the medial metaphyseal extension was below 8 mm, humeral head replacement was performed to avoid humeral head necrosis of humeral head in those cases. Of the 52 patients, 30 patients had 2 part fracture group (age 74±7), and 22 patients had 3-4part fracture group (age 74±11). The follow up periods was 34.5 months in 2 part fracture group and 35 months in 3-4 part fracture group. Both group got good clinical scores. The active forward elevation was over 120±8°, in both group. No significant difference was found between the two groups except for VAS. VAS score was 0.97 points in 2 part fracture group, and 1.64 points in 3-4 part fracture group. All patients had radiographic union without displacement. No avascular osteonecrosis of the humeral head and no pseudarthrosis was found at the final follow-up. We showed that the Straight nail could get reliable fixation without displacement of fragments. By following the Hertel’s criteria, no avascular necrosis of humeral head was found after fixation using the straight nail for the proximal humeral fracture, even if elderly patients had the comminuted 3-4 part fracture.

P1-086 The clinical and structural outcome of Minimally Invasive Plate Osteosynthesis (MIPO) for proximal humeral fractures in patients 65-years and older

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(Purpose) The purpose of this study was to evaluate the clinical and structural outcome of minimally invasive plate osteosynthesis (MIPO) for proximal humeral fracture in patients 65-years and older postoperatively.

(Materials and Methods) 35 patients with proximal humeral fractures underwent MIPO and were followed up for more than 6 months postoperatively. They were 4 males and 31 females with a mean age of 76.8 years (range 65 to 90 years). According to Neer’s classification, there were 23 cases of 2-part, 12 cases of 3-part. The clinical outcome was evaluated using active ROM and JOA score. The structural outcome was evaluated using postoperative Radiological examination.

(Result) The average range of elevation, abduction, and external rotation were 125.3, 107.5, and 25.1 degree. The average JOA score was 78.5 points postoperatively. Postoperative complications were encountered in 4 patients. They included penetration of the screw due to varus displacement in 3 patients. Over 10 degree changes of neck-shaft angle were not seen at 32 patients except these three patients.

(Conclusion) The clinical and structural outcome of MIPO for proximal humeral fracture in patients 65-years and older was not satisfactory.
R2-T7-1  Humeral bone loss after non-cemented humeral head replacement
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Introduction Many studies of femoral bone loss after noncemented total hip arthroplasty were reported, but reports of humeral bone loss after noncemented humeral head replacement were a few. Aim The aim of this study was to investigate the prevalence of humeral bone loss and the risk factor of humeral bone loss after noncemented humeral head replacement. Methods One hundred and forty-seven shoulders were followed more than one year. There are 41 men and 106 women, averaged age at the time of arthroplasty was 72.3 years, averaged follow-up period was 32.9 months. The diagnoses that led to arthroplasty were cuff tear arthropathy in 95, osteoarthritis in 33, rheumatoid arthritis in 10, osteonecrosis of humeral head in 6, and chronic dislocation of the shoulder in 3. Forty-three shoulders underwent glenoid resurfacing at the time of humeral prosthesis replacement. Prevalence of humeral bone loss was investigated with X-rays using Glen classification. Multivariate analysis was performed for investigating the factor of humeral bone loss. Results One hundred and sixteen (78.9%) shoulders had humeral bone loss, and twenty-seven (18.4%) had complete loss of cortex. The risk factors included humeral prosthesis replacement without glenoid resurfacing, female, and mediullary cavity occupation of stem. Conclusion We investigated the prevalence of humeral bone loss and the risk factor of humeral bone loss after noncemented humeral head replacement. One hundred and sixteen (78.9%) shoulders had humeral bone loss, and the risk factors included humeral prosthesis replacement without glenoid resurfacing, female, and medullary cavity occupation of stem.

R2-T7-2  More than 5 year follow-up of one-peg all poly glenoid component insertion evaluated by the X-rays and CT
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[Purpose] The purpose is to evaluate the radiographic and clinical results of TSA with one peg all poly glenoid implant by radiographic and computed tomography. [Patients and Methods] From July in 2006 to June in 2011, 55 cases, 63 shoulders 4 cases were excluded because of patients problems, or inadequate radiographs. Leaving 51 patients, 59 shoulders are available for review. 59 shoulders underwent TSA with a cemented polyethylene glenoid component with one peg. The patients were examined clinically, with fluoroscopically guided radiographs, and with computed tomography. On antero-posterior radiographs radiolucent lines are scored modified by Lazarus MD (2002)[1, 3]. We separate 5 zones and around one peg is zone 2, 3, and 4. [Results] 46 OA cases follow up period is average 7.8 years, longer than RA cases 7.2 years. Both radiographic score and CT score of OA cases are lower than that of RA cases. On CT scoring system, radioluency is frequently seen In zone 1 and 5. Of course, for the stability of one peg zone 2 to 4 is more important. [Discussion] It should be considered that the progression from radioluency to loosening to revision is not fully proven. Radioluency has been associated with revision of TSA; however, radioluency is quite common even immediately postoperatively, and a causal relationship or a common cause leading to radioluency and loosening has yet to be identified. In the present study, the association between glenoid design (one pegged) and radioluency is almost same as rating in previously reported results by Lazarus.

R2-T7-3  Clinical Results of Total Shoulder Arthroplasty and Issues to Be Overcome
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This paper describes clinical results of total shoulder arthroplasty (TSA) and identifies issues to be overcome for improvement of surgical outcome. We retrospectively reviewed 35 shoulders in 34 patients who underwent TSA between 2007 and 2015. Twenty-five patients were female, while 9 were male, with the age ranging from 44 to 89 (mean, 71) years. Preoperative diagnoses included osteoarthrosis in 23 shoulders, rheumatoid arthritis in 10, and hemodiagnosis related arthropathy in 2. The follow-up period varied from 12 to 48 (mean, 21) months. Intra- and postoperative complications occurred in a total of 7 patients, mostly being 80 years or older. These involved deep infection, fracture of the greater tubercle or glenoid, dislodgment of the glenoid component, weakness of thumb extension, and prolonged postoperative pain. One patient with RA underwent reverse arthroplasty four years later. At the final follow-up, the JOA score (pain, function, and range-of-motion domains; full-mark, 80 points), showed 26 to 78 (mean, 49) points, whereas it was 9 to 44 (mean, 25) preoperatively. The improvement ratio of the score was lower in RA than OA patients, and was lower in patients whose rotator cuff was irreparable than those whose rotator cuff was intact or repairable. This poor improvement came from the less improvement in function and range-of-motion domains, compared to the pain domain which showed improvement in any diagnoses or in any rotator cuff pathologies.
R2-T7-4  Effect of subscapularis tendon repair on clinical results of reverse shoulder arthroplasty

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The effects of subscapularis tendon repair on the clinical results of reverse shoulder arthroplasty were evaluated. Total 34 shoulders were included. In all cases, delto-pectoral approach was used for the exposure. In 7 shoulders, subscapularis tendons were not repaired. Three shoulders in these 7 shoulders had the preoperative large defect of subscapularis tendon. One shoulder with preoperative subscapularis tendon defect was dislocated by the severe delirium after the operation. The range of motion in active flexion was significantly improved in these 7 shoulders at 3 months after the operation. The external rotation and internal rotation did not have significant differences. In 27 shoulders, the subscapularis tendons were repaired. The range of motion in active flexion was significantly improved in these 27 shoulders at 3 months after the operation. The range of motion in active internal rotation was decreased significantly after the operation. In 4 shoulders, the subscapularis tendons were cut for the exposure, and left separated without repair. However, these 4 shoulders were not dislocated, and the range of motion in internal rotation was not decreased after the operation. The repair of the subscapularis tendon, which was cut for the exposure, might not be required in reverse shoulder arthroplasty.

R2-T7-5  Medialization vs. Lateralization: which is better in RTSA?

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In 1970s, the new prosthesis design showed up of reverse total shoulder arthroplasty (RTSA) which maintained center of rotation (COR) near that of anatomic shoulder. However, due to the relatively large torque on glenoid fixation and high risk of glenoid loosening, the system created by Paul Grammont in 1985 medialized the COR. But, still other problems appeared such as scapular notching, instability by cam effect, and distraction moment of deltoid pulling the prosthesis. In addition, humerus medialization reduced deltoid wrapping angle and rotator cuff muscles’ tension which consequently resulted in decrease of rotational motion and stability of glenohumeral joint. Thus, the issues on RTSA designs is to find out the best adjustment between medialization of glenosphere COR and lateralization of humerus.

In contrast to the previous articles concerning on lateralization of glenoid fixation, recent studies showed renewed interest on lateralization due to their effect on lowering scapular notching rate and increasing the degree of motions. Virani et al. addressed that a glenosphere with a 10-mm offset provided the greatest degree of motion in all planes compared with a 0-mm offset. And the author also concluded in other study that comparative loads at the baseplate-glenoid surface between standard RTSA and RTSA with lateralized COR. Another benefit of lateralizing glenosphere is enhancing stability by increasing compression force to the prosthetic joint. However, in spite of their positive effects, concerns on shear forces on baseplate-glenoid surface of metallic lateralization still exist. To minimize the increasing shear force applied to the glenoid component, Boileau et al. introduced novel technique of the bony increased-offset reversed shoulder arthroplasty(BIO-RSA) by using autologous cancellous bone graft. In this study, the author concluded that it effectively created a long-necked scapula with low rates of inferior scapular notching, improved shoulder rotation, and no prosthetic instability.

In terms of humerus implant position, many studies addressed that lateralization of humerus restored the tension of rotator cuff muscles and increased deltoid wrapping. The lateralization of humerus depends on humeral linear position of implant and humeral neck shaft angle (NSA). Humeral linear position can be lateralized by increasing glenosphere diameter and using extramedullary stem. And by reducing humeral NSA, more humeral lateralization can be achieved and this also results in less scapular notching. In the design of Grammont prosthesis, the humeral component has the NSA of 155 degrees and despite the advantage of tensioning deltoid muscle to provide a stable and stronger fulcrum, it shortens rotator cuff muscles, reduce deltoid wrapping angle and increase scapular notching. Therefore many other studies were conducted to lateralize humeral component. However, by reducing NSA, another issues, such as increasing contact stress or acromial stress, are still problems to be solved.

Ideal implant design and positions are still on debate and there is no definite modality for each patient yet. However, it is certain that medialization or lateralization of glenoid or humerus components have their own merits and demerits. And therefore, the surgeon should consider each patient’s preoperative functional status, such as pseudoparalysis, rotational deficit, their risk of notching, etc.
R2-0-01 The learning curve of reverse shoulder arthroplasty
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PURPOSE: Reverse shoulder arthroplasty (RSA) requires a certain level of technical proficiency. The purpose of this study was to evaluate learning curve of RSA.
METHODS: We retrospectively evaluated 50 shoulders in 49 patients who had undergone RSA by the same surgeon. Average age at the surgery was 78 years old. 50 shoulders were divided into consecutive blocks of 10 shoulders. We evaluated operation time, intraoperative blood loss and the number of complication.
RESULTS: The mean operation time was 108 minutes, 94 minutes, 99 minutes, 85 minutes and 79 minutes in each block. The standard deviation of operation time was 31 minutes, 15 minutes, 20 minutes, 8 minutes and 9 minutes in each block. The mean operation time was gradually decreased and the standard deviation of operation time was also decreased in 30 shoulders or more. However, intraoperative blood loss was not decreased. The number of complication was 1 shoulder, 2 shoulders, 1 shoulder, 2 shoulders and no shoulder in each block.
CONCLUSION: The mean operation time by the same surgeon was gradually decreased and the standard deviation of operation time was also decreased in 30 shoulders or more.

R2-0-02 Clinical short term results of reverse total shoulder arthroplasty with superolateral approach
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The purpose of this study was to evaluate the short term outcome of reverse total shoulder arthroplasty with superolateral approach for pseudoparalysis shoulders. There were 12 patients, 12 shoulders(3 male, 9 female) with an average age of 77 years(71 to 88 years) who underwent this method for pseudoparalytic shoulders because of irreparable rotator cuff tears, cuff tear arthropathy, or severe OA. Clinical outcomes were evaluated using the JOA score. The mean post operative JOA score improved from 45 to 84. Active forward elevation increased from 48 to 124 degrees. All of 12 patients achieved 90 degrees active forward elevation 6 months after the operations. Severe post operative complications has not seen. This procedure might be good option for pseudoparalytic shoulder.

R2-0-03 Clinical results of reverse shoulder arthroplasty with deltpectoralis approach and non-detouch of subsclaparis tendon.
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It is general to do delpectoral approach for shoulder arthroplasty with de-touch of subsclaparis tendon. Although this merit has a wide view, it is difficult to suture subsclaparis tendon to the bone tightly. If subsclaparis tendon is re-teared, internal rotation may be weak and dislocation rate increase. The purpose of this study is to clarify clinical results, especially internal rotation power, and to compare muscle power between detouch and non-detouch of subsclaparis tendon technique. Detouch group is 14 cases and non-detouch group is 8 cases. Preoperative ROM in detouch group, flexion is 65.7 degree, external rotation is 15 degree and internal rotation is L4. Postoperative after one year ROM in detouch group, flexion is 121.2 degree, external rotation is 17.5 degree and internal rotation is S. Preoperative ROM in non-detouch group, flexion is 45.0 degree, external rotation is 11.9 degree and internal rotation is L5. Postoperative after one year ROM in non-detouch group, flexion is 125.6 degree, external rotation is 28.8 degree and internal rotation is Th9. Biodex muscle power rate between affected and non-affected side is 38.6% in detouch group and 30.5% in non-detouch group preoperatively. And rate is 36.1% in detouch group and 60.2% in non-detouch group postoperatively. Non-detouch group has better results of ROM and muscle power in internal rotation. There is advantage for internal rotation in non-detouch group.
R2-O-04  The risk factor of Scapular notching after Reverse Total Shoulder Arthroplasty, with Scapula-45 radiograph technique

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Background: We investigated the incidence of scapular notching of the patients with reverse total shoulder arthroplasty (RTSA) and the risk factor of that, using our original Scapula-45 radiograph technique.

Materials and Methods: We chose 17 shoulders of 17 patients (4 male, 13 female) with an average age of 77.3 and follow-up of 17.9 months after RTSA. We calculated the degree of scapular upward rotation from the arm at the side to the 45 degree of abduction, and that in the group of scapular notching was compared with no scapular notching.

Results: Radiographs showed scapular notching in 2 patients (11.8%) at 3 months after operation. The degree of scapular upward rotation was 41.0 degree in the group of scapular notching and 27.8 degree in that of no scapular notching.

Conclusion: The group of scapular notching was greater scapular upward rotation than that of no scapular notching. It was suggested humeral was greater adduction position with scapula and the deficit of scapulohumeral rhythm may result in the risk of scapular notching.

R2-O-05  Cadaveric study on suprascapular nerve injury during superior screw insertion in reverse shoulder arthroplasty

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Purpose of this study was to investigate the risk of suprascapular nerve injury by superior screw insertion in baseplate fixation as computer simulation of reverse shoulder arthroplasty. 3 dimensional bone models were established from computed tomography images of 7 cadaveric shoulders. Baseplate and screw of Comprehensive Reverse (Zimmer Biomet) imported as CAD data were set to these bone models. Baseplate with 10 degrees inferior inclination angle was placed at or 3mm superior to inferior margin of glenoid. The position of superior screw tip which penetrate scapular cortex was evaluated and the distance from superior screw tip to suprascapular notch was also measured to compare the effect of baseplate position. The mean height or width of glenoid were 33.7mm, 26.1mm, respectively. In term of baseplates at inferior margin, superior screw tip located inferior to suprascapular notch in 6 shoulders (the mean height: 5.3mm) except a shoulder with small height. However, only 3 shoulders with superior screw tip which located inferior to suprascapular notch were found due to baseplate placed 3mm superior to inferior margin. These results indicates that placing baseplate rigorously at inferior margin of glenoid contributes prevention of suprascapular nerve injury during superior screw insertion. Especially, with regard to the shoulder with small glenoid, it is necessary that baseplate is not only in inferior position as possible, but made to decrease inferior inclination.

R2-O-06  Speed of recovery after shoulder arthroplasty: a comparison between HHR/RSA for cuff tear arthropathy and anatomical TSA for OA/RA

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Purpose: The purpose of this study was to investigate the clinical results in patients with several shoulder arthroplasties and to evaluate the time needed to improve the range of motion.

Materials and methods: We analyzed (preoperative, 3month, 6month, 9month, 12month) active range of motion and pain score for 27 shoulders treated with small size humeral head replacement and rotator cuff reconstruction for cuff tear arthropathy (HHR:RA), 5 shoulders treated with RSA, 16 shoulders treated with TSA for osteoarthritis (OA:TSa) and 7 shoulders treated with TSA for rheumatoid arthritis (RA:TSa).

Results: The average active elevation at preoperative/ 3/6/9/12month were CTA-HHR: 97.2°/97.2°/115.2°/130.9°/137.0°, RSA: 32.0°/60.0°/112.0°/108.0°/112.0°, OA-TSA: 95.6°/134.1°/141.3°/141.7°/145.6°, RA-TSA: 101.2°/124.1°/137.1°/137.9°/145.7°. Significant improvements of active elevation were observed for RSA, OA-TSA at 3months and for RA-TSA at 6month and for CTA-HHR at 9month. The average active elevation at preoperative/ 3/6/9/12month were CTA-HHR:225° /172°/235°/294°/350°, RSA: 4°/8°/80°/140°, OA-TSA:134°/353°/403°/460°, RA-TSA:185°/371°/521°/590°/557°. Significant improvements of active external rotation were observed for OA-/RA-TSA at 3month and for CTA-HHR at 9month. Significant improvement of active external rotation was not observed for RSA. Pain relief was rapid after all groups.

Conclusions: Rapid improvements of active range of motion were observed for TSA. For CTA-HHR, improvements were observed gradually for 12month after surgery. For RSA, active elevation improved rapidly. However, improvement of external rotation was not significant during 12month.
R2-O-07  Sequential motion analyses of the scapula after RSA
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Purpose: The purpose of this study was to examine how to change scapular motion during scapular plane elevation at 3, 6 and 12 months after reverse shoulder arthroplasty (RSA).

Materials and Methods: We evaluated 5 shoulders in 5 patients (3 male, 2 female) who had received RSA with minimum twelve months follow up. The fluoroscopic images were obtained during scapular plane elevation at 0, 30, 60 and 90 degrees at 3, 6 and 12 months after operation. CT derived bone images were matched semi-automatically with the silhouette of the bones at fluoroscopic images by GANESHIA which was originally invented in our institute. We evaluated angle change of scapular after RSA about upward rotation, external rotation and posterior tilt.

Results: There is no significant change of scapular motion between 3, 6 and 12 months after RSA during patients actively elevate their arm at 30, 60 and 90 degrees of elevation in scapular plane.

Conclusion: Three dimensional motion analyses of the scapula after RSA revealed no significant change after 3 months.

R2-O-08  Reverse Total Shoulder Arthroplasty for Cuff Tear Arthroplasty
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It has been 2 years since we could performed the reverse total shoulder arthroplasty(RSA)in Japan. The purpose of this study was to examine the clinical, radiological and to functional outcomes of RSA for cuff tear arthroplasty(CTA). Subjects consisted of 37 shoulders in 37 patients, including 21 males and 16 females with a mean age of 76 years. The surgeries were all performed under general anesthesia in the slight beach-chair position. All patients were immobilized for 4 weeks and active motion was started in 6 weeks postoperatively. Clinical outcomes were assessed using Constant scoring systems at the postop 6 months and 12 months follow-up(18 months on average). Pre- and post-operative 6 months and 12months ROMs were 63 and 129, 141 degrees in active forward flexion, 22.4 and 18, 26 degrees in external rotation at side, L2 and L5, L4 level in internal rotation. Radiological complication was Scapular notching : 1 case. Clinical complications were the acromion fracture : 1 case. Postop 6 months Constant score was improved significantly from 36.0 to 56.1 on average, postop 12 months score was improved to 626 on average. RSA for CTA can be a effective procedure.

R2-O-09  Repair Integrity of the Subscapularis Tendon after Reverse Total Shoulder Arthroplasty for Cuff Tear Arthroplasty
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(Purpose) The purpose of this study was to analyze clinical outcomes and repair integrity of the subscapularis tendon in patients treated with reverse total shoulder arthroplasty (RSA) for cuff tear arthroplasty (CTA).

(Methods) 10 patients treated with RSA for CTA, whose average age was 77.3 years, were the subjects of this study. All patients underwent surgery using a deltopectoral approach under general anesthesia in the beach-chair position. RSA system used was TM reverse Shoulder (Zimmer Biomet). Subscapularis tendon tear was observed in four patients. Subscapularis tendon was securely reduced and repaired using strong sutures in all of the patients. The average follow-up period was 18.1 months on average. Clinical outcomes were assessed using the JOA score, and repair integrity of the subscapularis tendon was evaluated using ultrasound examination.

(Results) The average JOA score in the 10 patients improved from 51.8 points preoperatively to 81.4 points postoperatively. Average postoperative internal rotation was L25 level. Nine patients demonstrated a healed subscapularis tendon with sufficient thickness and length, and one patient demonstrated insufficient healing with thinning. Complications such as instability or dislocation were not observed at the final follow-up.

(Conclusion) RSA for CTA is a reliable procedure to obtain satisfactory outcomes. However, a major complication such as instability or dislocation sometimes occurs in RSA. Secure repair of the subscapularis tendon can provide predictable function of the shoulder motion and prevent instability or dislocation after RSA for CTA.
Outcomes of Reverse total shoulder arthroplasty as a salvage procedure for failed shoulder operation

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Reverse total shoulder arthroplasty (RSA) has been established as a reliable option for pseudoparalysis of the shoulder. We report the outcomes of RSA as a salvage procedure for failed shoulder operation. METHODS: We retrospectively reviewed 16 patients who underwent salvage RSA after failed shoulder operation (ARCR7 cases, Debrideman2 cases, ORIF 4 cases, ORCR1 case, Hemiarthroplasty 1 case, Unknown 1 case) at our institution between 2014 and 2015. Minimum follow-up was 12 months, with a mean follow-up 18 months (range, 12-18 months). Patients who underwent RSA were evaluated for range of motion and JOA score. RESULTS: Patients treated with RSA possess improved Elevation (preRSA: 63.5 degrees, postRSA: 132 degrees) and JOA score (preRSA: 36.3, postRSA: 65.0) but without any changes of External rotation (preRSA: 20.6, postRSA: 23.2) and Internal rotation (preRSA: 14, postRSA: 14). CONCLUSION: This study supports that salvage RSA still has the potential to achieve good outcomes if operation fails.
R2-ST-01  Rotator cuff surgery in geriatric patients over 75 years old
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Introduction: The purpose of this study was to evaluate whether rotator cuff repair improves subjective and functional outcomes in patients aged ≥ 75 years.
Methods: From May 2005 to March 2013, 121 elderly patients who underwent rotator cuff repair for large and massive rotator cuff tears were evaluated retrospectively. Patients with a Society of Anesthesiologists (ASA) Physical Status Classification System grade ≥ 4 were excluded. The patients were evaluated using visual analogue scale (VAS), subjective satisfaction surveys, American Shoulder and Elbow Surgeons (ASES) and Constant scores. The Katz activities of daily living (ADL) and functional independence measure (FIM) motor score were used to evaluate ADL. Postoperative MRI was performed to investigate the structural integrity of repaired cuffs.
Results: In total, 64 patients were enrolled in the study; 80% were satisfied with their results. VAS scores improved from 6.4 to 2.3, ASES scores from 42 to 84, and Constant scores from 42 to 76. Katz ADL scores improved from 34 to 50. FIM motor score improved from 22 to 51. Of the 64 patients, 46 underwent MRI 1 year postoperatively. Follow-up MRI revealed re-tears in 26% of patients. All patients with re-tears had improved subjective outcomes and functional scores. No patients died or experienced complications requiring intensive care or extended hospitalization.
Discussion: Surgical treatment for large to massive rotator cuff tears in elderly patients with ASA grades < 4 provides good functional outcomes without morbidity, even in those with re-tears.

R2-ST-02  Staged bilateral arthroscopic rotator cuff repair: Which side is better and which factors affect outcome?
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Introduction: Purpose of the current study was to compare perioperative characteristics and postoperative outcomes of both shoulders in patients who underwent arthroscopic bilateral rotator cuff repair sequentially.
Methods: 63 patients had bilateral rotator cuff repair between October 2003 and January 2015. Perioperative characteristics and functional outcomes of 6, 12 months and final follow-up and imaging studies for the evaluation of healing failure were retrospectively investigated. Functional evaluation included the VAS for pain and satisfaction of surgery, range of motions (ROMs), ASES score, and SST.
Results: The mean age at first surgery was 58.4 years (range, 43.77). The interval between first and second surgery was 28.5 months (range, 4.96). All postoperative scores were improved significantly compared to preoperative state. Satisfaction, VAS and functional scores were significantly lower in shoulders of second surgery at postoperative 6 months in patients whose surgical interval was shorter than 6 month compared to patients whose interval was longer than 6 months (all Ps < 0.05). The rates of healing failure were 15.9% after first surgery, 22.2% after second one. Seven patients showed bilateral healing failure, and this meant 70% of initial failure followed subsequent failure in the other shoulder, and there was significant relationship between the failure of first and second surgeries (OR = 15.3, P < 0.001).
Discussion: The second shoulder would be better to be repaired after at least 6 months after first surgery. The healing of first rotator cuff repair was most important predictor of healing failure of second surgery.

R2-ST-03  Evaluation of the contralateral rotator cuff in patients undergoing arthroscopic rotator cuff repair
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Purpose: To identify the characteristics and factors associated with rotator cuff tear (RCT) of contralateral shoulder in patients who underwent arthroscopic rotator cuff repair (ACCR).
Materials and methods: 334 patients who underwent ARCR was investigated. They consisted of 147 men and 187 women, with a mean age of 66.4 years (range, 34-93 years). Opposite shoulder rotator cuff of all patients were evaluated by ultrasonography. Demographic information and risk factors related to contralateral RCT were assessed.
Results: Of the 334 patients who underwent ARCR, 189 (66.6%) had RCT of the contralateral shoulder. 94 (49.7%) had partial thickness tear and 95 (50.3%) had full thickness tear. The prevalence of RCT of the contralateral shoulder differed significantly among groups classified by age, arm dominance, and tear size.
Conclusion: The prevalence of RCT of the contralateral shoulder tends to be higher in older patients, in patients with RCT in the nondominant arm, and in patients with larger RCT.
R2-ST-04  Relevance between the JOA score and UCLA score in patients with rotator cuff repair
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Purpose: Japanese Orthopaedic Association (JOA) score and the University of California at Los Angeles shoulder (UCLA) score is often used in the evaluation of the rotator cuff tear repair post-operative patients. It was examined relevance of both in this study.
Methods: Rotator cuff repair subject to the UCLA score and JOA score postoperative 200 patients evaluated 12 months after surgery from preoperative. Relationship of the UCLA score and JOA score was calculated the JOA score corresponding to the UCLA score 4 stage criteria.
Results: The preoperative UCLA score significantly improved from 14.54 to 29.34 and the preoperative JOA score improved from 62.73 to 88.57 postoperatively. Both score total score in the observed strong relationship between (r = 0.854), a significant correlation is also in each of the evaluation criteria were observed: Excellent (r = 0.769), Good (r = 0.701), Fair (r = 0.687). It was analyzed with cutoff value for each criterion with reference to the receiver operating characteristic (ROC) curve UCLA score, Excellent 90 (00) points in the JOA score, Good 83 (00) points, Fair 78.5 (70) it became a point (traditional setting score).
Conclusion: A strong correlation was observed between the JOA and UCLA score of rotator cuff tear repair surgery. "Good" or more JOA cut-off value of Unsatisfactory and Satisfactory when referenced to is 80 points, but was 83 points when referenced to UCLA score.

R2-ST-05  Research and Examination about Patient Satisfaction after Arthroscopic Rotator Cuff Repair
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We have investigated the patient satisfaction (PS) after shoulder arthroscopic rotator cuff repair (ACR), and examined the relationship of PS to the JOA score (JOA) and active shoulder elevation angle (EAP). PS was investigated at the time of outpatient visits as a questionnaire format in 40 cases (48 shoulder) after surgery more than a year. 1) How much improved after surgery (101 points), 2) Whether it was good to undergo surgery (10-4 points), 3) Satisfaction (10-4 points). The satisfaction score (SS) composed from these three items (each 10 points) was evaluated in a 3-point scale. The correlation between SS and each index (JOA, EA before and after the surgery) was examined. In addition, patients were divided into two groups of satisfied group (SS by 30 points) and unsatisfied group (SS by 29 points or less), the average value of each index in both groups were compared. The average SS were 18.9 points, 29.3 points, 36.9 points, and the total 27.6 points. The average JOA were 64.1 points preoperatively, 98 points postoperatively. The average EA were 131 preoperatively, 162 postoperatively. The correlation coefficient between SS and each index was 0.373 (preoperative JOA), 0.285 (postoperative JOA), 0.318 (preoperative EA), 0.349 (postoperative EA). In all, that showed a weak correlation, respectively. The average SS of both satisfied group and unsatisfied group, were respectively 64.7 points and 57.9 points (preoperative JOA), 99.4 points and 96.7 points (postoperative JOA), 141 and 123 (preoperative EA), 167 and 158 (postoperative EA). Significant difference was observed between the two groups.

R2-ST-06  Effectiveness of synthetic opioids in arthroscopic rotator cuff repair
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This is a prospective study. 60 patients who underwent arthroscopic rotator cuff tear repair were randomly divided into 2 groups. Patients in T group took tramadol/acetaminophen combination tablet for 6 weeks after the surgery. We evaluated visual analog scale (VAS), pressure pain threshold (PPT), range of motion and JOA score. VAS of resting pain was significantly lower and PPT was significantly higher in T group at 1 and 3 months after surgery. The range of motion was significantly improved in the T group in 3 and 6 months after surgery. There was no significant difference in two groups for the range of motion and JOA score at 12 months after surgery. The results of our study showed synthetic opioid reduced pain for 3 months after surgery. In addition, patient in T group made good recovery of range of motion up to 6 months after surgery. It suggests that early functional recovery was obtained by relief of postoperative pain.
R2-ST-07  Use of low-intensity pulsed ultrasound on acute small rotator cuff tears
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Objective: We previously reported that the rate of enlargement of the drill holes of bioabsorbable anchors were significantly higher than that of non-bioabsorbable anchors. But because analyzed anchors had different designs, the relationship between materials and the change of anchor holes was unclear. To investigate the postoperative change of the diameters of drill holes of bioabsorbable and non-bioabsorbable anchors with similar designs after Arthroscopic Bankart Repair (ASBR) surgeries.

Methods: Materials were the case who were performed ASBR surgeries using Bioaprot (BR: Non-bioabsorbable) or Osteoaprot (OR: Bioabsorbable) anchors at our hospitals. Patients who got follow-up CT scan at within a month postoperatively and at 6 months or 1 year postoperatively, were included. We measured each hole's diameter of 3D-CT scans of each time point, and classified it as reduction, no change, mild-enlargement, enlargement compared with the diameter of early postoperative period.

Results: At 6 months postoperatively, diameter change of both groups were not significantly changed. At 1 year postoperatively, the rate of enlargement and mild-enlargement of drill holes of OR group were significantly higher than that of BR group.

Conclusion: It is reported to take more than 10 months that biodegradable process of PLLA which was made OR anchors from occurs. This might be one of the causes of OR group's tendency to enlarge its drill holes. In conclusion, the rate of enlargement of anchor holes of OR group was significantly higher than that of BR group, and the biodegradation process of PLLA might be a possible cause.

R2-ST-08  Comparison of clinical results among three different surgeries for irreparable massive rotator cuff tear.
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For irreparable rotator cuff tear, three different procedures (arthroscopic debridement; AD, arthroscopic partial repair; APRCR, and latissimus dorsi transfer; LDT) has been performed in our institute according to subjects' cuff condition. The purpose of this study was to compare the clinical results among three different surgeries, and clarify the advantages and limitations these procedures. Of 69 subjects with large or massive rotator cuff tear, 24 subjects who could not be repaired anatomically (9 of AD, 14 of APRCR, 7 of LDT) were enrolled in this study. Active elevation angle and abduction power were compared among three group both pre and post surgery. Both active elevation angle and abduction power was significantly improved after surgery and APRCR group had a good results compared with AD and LDT group. In the LDT group, concomitant subscapularis tendon tear associated with not only preoperative function but also insufficient functional recovery after surgery. According to our study, it might be important to exert maximum effort to repair the tear cuff even if it is estimated to impossible to repair according to pre and intraoperative findings. LDT might be useful alternate methods to recover shoulder function for irreparable massive rotator cuff tear especially in the case of intact subscapularis tendon

R2-ST-09  The results of arthroscopic partial repair of irreparable massive rotator cuff tears
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Objective We retrospectively reviewed the results of arthroscopic partial repair of irreparable massive rotator cuff tears to evaluate this procedure. Material and Method) One hundred fifty-four patients underwent arthroscopic partial repairs for massive rotator cuff tears between March 2012 and April 2016. 50 patients, who were able to be followed up over 6 months, out of 145 were chosen. Operative indication was for patients having irreparable massive rotator cuff tears with pain as chief complaint and over 90 degrees arm elevation. The results before and after 6 months of the surgery were measured by ROM, isometric muscle strength,VAS and Shoulder36, they were evaluated with using T-test. Results VAS of motion and night was significantly improved from 49.0 and 37.9 to 22.0 and 12.7 after the surgery[P<0.03, 0.02]. Others were improved with no significant differences. Active ROM was significantly improved from 118.6 degrees to 141.7 degrees in arm elevation and from 110.5 degrees to 142.3 degrees in abduction. Isometric muscle strength was improved from 47.9N to 62.7N in flex and from 57.5N to 72.2N in abduction. Also improved in Shoulder36. Discussion and Conclusion It has been known that arthroscopic partial repair is simple and less invasive. This study showed that pain and motor function were improved after arthroscopic partial repair of irreparable massive rotator cuff tears. This procedure was concerned as beneficial surgery of irreparable massive rotator cuff tears with pain as chief complaint and arm elevation due to its simpleness and less invasion.
R2-ST-10  Short term clinical outcomes of subscapularis tendon partial transfer for massive rotator cuff tear.

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Purpose: The purpose of the current study was to evaluate clinical outcomes of subscapularis tendon partial transfer for massive rotator cuff tears.

Methods: Sixteen cuff tears (all massive) were assessed with a mean age of 66 years old and a mean follow-up of 26 months.

Results: Clinical scores were significantly improved at the final follow-up compared to the preoperative status. Re-tear was found in 2 shoulders (13%), with severe fatty infiltration (Goutallier stage 2 or more) of subscapularis tendon.

Discussion: The current result showed that short-term clinical result of subscapularis tendon partial transfer for massive rotator cuff tear was comparable to those of latissimus dorsi muscle transfer as previously reports. High re-tear rate was particularly found in patients with severe fatty infiltration. Further investigation is required for better outcomes.

R2-ST-11  A Limitation of Arthroscopic Rotator Cuff Repair Combined with Muscle Advancement Procedure for Irreparable Massive Rotator Cuff Tear

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[Purpose] The purpose of this study was to evaluate the relationship between fatty infiltration of the torn cuff and cuff integrity after modified Debeer-Patte procedure for irreparable massive rotator cuff tear.

[Materials and methods] 24 shoulders with massive rotator cuff tear went through the procedure. The mean age was 67.6 years old. After short skin incision was made on the scapular spine, medial detachment and advancement of the supraspinatus(SSP) and infraspinatus(ISP) muscle was performed. The torn cuffs were repaired using suture anchors arthroscopically. We evaluated the clinical results by JOA score. The cuff repair integrity was assessed by Sugaya’s MRI classification 6 months after surgery. The fatty infiltration of the cuff was graded on Y-shaped view of the preoperative MRI according to Goutallier’s classification. GFDI(global fatty degeneration index) was calculated as the mean value of SSP, ISP and subscapularis(SSC) muscles.

[Results] The average GFDI in repaired group was 1.9, whereas the average index in retear group was 2.7. A cutoff value was 1.85. There was no statistical significance between the repaired group and the retear group JOA score after the operation.

[Conclusion] Although there was a limitation of GFDI, the rotator cuff repair combined with muscle advancement for irreparable massive tear provided satisfactory clinical outcomes. This procedure should be considered before considering the reverse shoulder arthroplasty.

R2-ST-12  Clinical results of fascial patch graft for irreparable massive rotator cuff tears

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Background: We reported clinical results of fascial patch graft for irreparable massive rotator cuff tears.

Methods: Between 2010 and 2015, we operated on 17 shoulders of 17 patients with an average age of 65.1 years old. Arthroscopic repair was performed on 9 patients, and mini open repair was done on 4 patients, and open repair was done on 4 patients. Fascial patch was grafted as un-folded fashion in 12 shoulders, and as twice-folded fashion in 5 shoulders. 11 shoulders were repaired using the single row configuration, and 6 shoulders using the double row configuration. At the year after surgery, surgical outcomes were evaluated by using the Japanese Orthopaedic Association(JOA) score. Postoperative cuff repair integrity was assessed with MRI according to Sugaya’s classification.

Results: JOA score was improved from 61.6 points preoperatively to 81.2 points postoperatively. Postoperative MRI revealed 5 type1, 6 type2, 2 type3, and 4 type4. Retear was occurred in 3 patients with single row method and in one patient with double row method. As for the retear site, 3 cases were occurred at patch-bone junction and 1 case was failed at cuff-patch junction.

Conclusion: Because fascial patch grafts were more frequently reteared at patch-bone junction, we recommended double row repair as an effective treatment.
R2-ST-13 Two cases report of revision surgery after superior capsular reconstruction

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[Purpose] We experienced two shoulders which needed revision surgery because of complications after superior capsular reconstruction (SCR). The purpose of this study is to report the clinical course of the two shoulders and the condition of the grafts.

[Case1] A 60 years old male. Five months after SCR for irreparable rotator cuff tear in his right shoulder, he underwent re-operation because he had erosion at great tuberosity of humerus and a suture anchor was backed out. We removed the anchor in an arthroscopy. In histopathological examination, the grafted fascia was wrapped with collagen fiber and had vascularization. A year after re-operation, he could elevate his shoulder until 90 degrees and MRI showed the graft had maintained.

[Case2] A 76 years old male. Six months after SCR for recurrent dislocation with irreparable rotator cuff tear in his right shoulder, he underwent re-operation because of infection. We performed arthroscopic debridement and removed suture anchors and thread. Because we recognized bleeding from surface of the graft, we didn’t remove the infection. The infection healed up with administration of antibiotics without recurrent revision surgery. A year after re-operation, he could elevate his shoulder until 105 degrees and MRI showed the graft had maintained.

[Conclusion] It was revealed from case1 that after SCR the graft took root in the shoulder with vascularization and collagen fiber wrapping. In addition, it was revealed from case2 that the graft had a resistance against bacterial infection because of vascularization.

R2-ST-14 Clinical outcome of superior capsule reconstruction at our institute

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Purpose In our institute, superior capsule reconstruction is primary surgical method for treating irreparable rotator cuff tears of patients younger than 70 or older than 70 with high demand. We report our clinical outcome.

Material and methods From April 2014 to April 2015, three patients underwent superior capsule reconstruction, two male and one female. All the patients complained of shoulder pain. Preoperative active and passive shoulder flexion angle were 70-170 and 130-170 degrees respectively and two of the patients showed gap between active and passive shoulder flexion. Preoperative MRI showed that all had irreparable massive rotator cuff tear with severe fatty degeneration of supraspinatus and infraspinatus. Two of the patients underwent all arthroscopic surgery and one partially open surgery with fascia lata used as graft.

Results At 6 month after operation, active and passive shoulder flexion angle were 75-120 and 130-140 degrees respectively. At one year, both active and passive shoulder flexion angle were 145-170. Postoperative MRI at one year showed that graft continuity was preserved. Two manual workers returned to the previous job. None of the patients complained of shoulder pain. All the patients were satisfied with the result.

Discussion Superior capsule reconstruction at our hospital had good clinical result, though it took as long as one year to fully recover shoulder range of motion. Previous report also showed that in some cases it took long to recover shoulder range of motion. Considering long time for recovery, younger and/or high demand patients are best treated with superior capsule reconstruction.

R2-ST-15 Rotational infraspinatus muscle transfer for cuff tear arthropathy

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We had satisfactory results with rotational infraspinatus muscle transfer for cuff tear arthropathy. Rotational infraspinatus muscle transfer-Supraspinatus and infraspinatus tendon stamp detached from the rim of the glenoid with the arthroscope. Infraspinatus muscle detached from the scapula with another incision on the spine of scapula. The postero-inferior stamp of infraspinatus tendon was moved to the superior facet of the greater tubercle of humerus on the supraspinatus tendon rotationally. This surgery performed rotational infraspinatus muscle transfer with supraspinatus muscle tendon stamp to avoid suprascapular nerve injury.

Case: He was 72 years old. He was a cook for long time. He had right shoulder pain for eight months and gradually could not elevate his upper arm. He had the pain in his right shoulder at night. Active-ROM (a-ROM) of his right shoulder of flexion/abduction/external rotation/internal rotation was 90/60/35/0, supraspinatus test was positive, VAS score was 40. X-ray was showed sclerotic change in his right humeral head. MRI was showed several cysts at the subchondral bone in his right humeral head and massive rotator cuff tears with supraspinatus and infraspinatus muscle atrophy. We operated him with infraspinatus muscle rotational transfer. His right shoulder pain was improved and a-ROM of flexion/abduction/external rotation improved 140/120/50. L2 supraspinatus test became negative. JOA score improved 84 in eighteen months after surgery.

Conclusion: Infraspinatus muscle rotation transfer is an effective method for massive irreparable rotator cuff tears.
R2-ST-16 Predictive factors of HHR using smaller humeral head prosthesis with cuff reconstruction for Rotator cuff deficient arthropathy

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We have performed HHR using smaller humeral head prosthesis for Rotator cuff deficient arthropathy. However there are some cases that can’t gain expected motion in our cases. The aim of this study is to investigate the predictive factors of this surgery.

(Materials and Methods) This study included 52 shoulders in which follow-up was performed over a period of more than 3 years that were treated with HHR using smaller humeral head prosthesis and cuff reconstruction for rotator cuff deficient arthropathy. The average age was 71.2 years old and the average follow-up period was 59.8 months. We classified into 3 group by flexion postoperatively. Group E: more than 130. Group S: more than 90less than 130, and Group U: less than 90. We investigated past history, age, height and weight at the time of surgery, ROM (flexion and ER) and JOA score, X-ray (Seebauer classification, AH, Ozumi classification) and MRI (Ozumi classification, muscle fatty degeneration and atrophy) preoperatively.

(Result) There are significant differences for AHI on X-ray between Group E and S, and for age and AHI on X-ray between Group E and S+U. There isn’t significant difference for muscle fatty degeneration and atrophy on MRI.

(Conclusion) It was suggested that the predict factors of our surgery are upper migration of humeral head and age.

R2-ST-17 Postoperative Results of ASCR and RSA for Irreparable Rotator Cuff Tear

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[Purpose] As a new surgical procedure for irreparable rotator cuff tear, Mihata devised arthroscopic superior capsular reconstruction (ASCR) and reported its positive postoperative outcomes. As of April 2014, reverse total shoulder arthroplasty (RSA) has introduced in Japan. Regarding indication of operation for irreparable rotator cuff tear, we select ASCR for rotator cuff tear with no or minimal osteoarthritis, and RSA for tears with osteoarthritis that is meet the surgical criteria of Japan Shoulder Society. In this study, for the purpose of assessing the validity of our surgical strategy and considering whether ASCR can become a surgical procedure for irreparable rotator cuff tear, we investigated the surgical results of the two operative procedures.

(Materials & Methods) We examined 19 shoulders with irreparable rotator cuff tears. 10 patients underwent ASCR (Group A) and 9 patients underwent RSA (Group B). We researched range of motion (ROM), muscle strength, and JOA score of two groups and evaluated the repair integrity of group A using Sugaya’s MRI classification.

(Results) Postoperative active ROM in flexion, abduction, and external rotation of Group A were 159.5° , 159.5° , 125.0° , 115.7° , 25.6° , whereas Group R were 125.0° , 115.7° , 25.6° . Preoperative JOA score of Group A were 55.2, whereas Group R were 37.8. Postoperative JOA score of Group A were 68.3, whereas Group R were 59.8.

(Conclusions) Postoperative outcomes of ASCR were mostly satisfied. Even though two surgical results cannot be compared due to the difference of indication for operation, ASCR for irreparable rotator cuff tear with no or minimal osteoarthritis is useful.

R2-ST-18 Replacement surgery for Hamada grade 4B deformation using CTA prosthesis in 2 cases

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Hamada grade 4B (4B) arthropathy shows acromial acetalubration and gleno-humeral arthritis; joint stability is often high and range of motion restriction is small. We used a cuff tear arthroplasty (CTA) prosthesis (Lima, Italy) with good results in 2 patients. A 71-year-old woman with right shoulder pain retained 130 elevation and 50 external rotation. Radiography revealed humeral head inward displacement and upward deviation (4B). MRI revealed massive rotator cuff tear. The preoperative JOA score was 54. Surgery was performed using a CTA prosthesis because of worsening pain. A prosthesis the same size as the extracted humeral head was inserted. Postoperatively, fixed pillow abduction and pendulum movement were permitted. Range of motion exercise to pain tolerance commenced after 6 weeks. Pain remitted by postoperative month 12, and the JOA score improved to 88, with 150 elevation and 60 external rotation. A 72-year-old man had right shoulder pain with gradual worsening starting 2 years after rotator cuff surgery at age 61. He retained 125 elevation and 30 external rotation. Radiography revealed humeral head inward displacement and upward deviation (4B). MRI revealed a massive rotator cuff tear. The preoperative JOA score was 52. Surgery was performed using a CTA prosthesis because of persistent pain. Pain remitted within 2 postoperative years, and the JOA score improved to 84, with 140 elevation and 20 external rotation. We performed CTA prosthesis surgery in 2 4B patients with good results. This technique appears effective for cuff tear arthropathy when joint stability is retained.
R2-ST-19  First report of prospective clinical trial of transcatheter arterial micro embolization (TAME) for persistent pain after shoulder arthroplasty.

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Background: There is a possible risk of persistent pain after almost any surgical procedure. In a review of 40 studies of shoulder arthroplasty including 3584 patients, 9% experienced severe pain after 2-12 years (Sandel et al. 2006). Based on the notion that increased abnormal vessels and accompanying nerve fibers are possible source of pain, we conducted prospective clinical trial of transcatheter arterial micro-embolization (TAME) for persistent pain after joint replacement surgery and have performed to 22 cases after knee joint replacement and 3 cases after hip joint replacement surgery. The present study reported the first case of TAME for persistent pain after shoulder joint arthroplasty.

Case presentation: An 80-year-old female underwent reverse total shoulder replacement for rotator cuff arthropathy. Post-operative radiographs showed the prosthesis in satisfactory position and her pain was self-limited while she used immobilizing brace. She reattended clinic one month postoperatively having developed worsening pain located on the anterior aspect of the shoulder but without any evidence of infection nor loosening. Conservative treatments including oral pain killer and nerve blocks failed and at 7 months after surgery, she received TAME with written informed consent. Angiographic findings demonstrated increased blood flow at painful site. Local tenderness decreased after infusing temporary embolic material during procedure. At 1 week after TAME, the patient had no pain symptoms and it maintained for 52 weeks. There was no obvious complications related to the procedure.

Conclusion: The result of first case of our prospective study was encouraging and warrant further enrollment and evaluation.

R2-ST-20  The causes and results of the revision surgeries after hemiarthroplasty and total shoulder arthroplasty

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Hemiarthroplasty (HHR) and total shoulder arthroplasty (TSA) for primary and secondary osteoarthritis and rheumatoid arthritis have been increased recently. The purpose of this study was to evaluate the causes and outcomes of the revision surgery after HHR and TSA. We investigated 21 shoulders (six males, 15 females) that had a revision surgery after HHR or TSA. The mean age was 70.1 years old. In the 21 shoulders, 13 shoulders had been performed HHR and eight had been performed TSA before a revision surgery. The clinical outcomes after the revision surgery was evaluated by modified Neer result-rating score. The mean follow-up period was 29.1 months. In the 21 shoulders, there were five shoulders treated without the replacement of the components, three by HHR, and 13 by TSA for the revision surgery. In the 13 shoulders after HHR, seven had revisions to TSA because of the wear of the glenoid and two had revisions to HHR because of anterior instability and humeral loosening. In the eight shoulders after TSA, seven had revisions to TSA because of the loosening of the glenoid or humeral component, anterior instability and rotator cuff tear. In the outcomes after the revision surgeries, 13 shoulders (62%) were excellent and satisfactory. Seventy percent of them were revisions to TSA. The results suggested that patients whose revisions are because of glenoid wear or component loosening can have to expect satisfactory outcomes.

R2-ST-21  Cross-sectional area and fatty infiltration of the deltoid correlate to outcomes after reverse total shoulder arthroplasty

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Background: We researched whether associations exist between shoulder elevation after reverse total shoulder arthroplasty (RSA) and preoperative (1) cross-sectional area (CSA) of the deltoid; and (2) fatty infiltration of the deltoid.

Methods: The subjects were 6 patients (average age, 78.7 years; four males, two females), followed up one year. They were measured preoperative MRI and JOA score (pain, function, ROM). The CSA and fatty infiltration of the deltoid were measured on axial T2-weighted MRI. To measure slices of consistent location, the slice with the largest humeral head was selected for analysis. The CSA divided by humeral head area was CSA index. Fatty infiltration graded by Goutaller scale.

Results: The averaged each factor: preoperative /postoperative was as follows. Flexion (degrees): 58±10, Abduction (degrees): 51±89, External rotation (degrees): 11±20, Internal rotation: S/L5, JOA score (points): 23.3/38.1. We showed the significant differences of Flexion and Abduction and JOA score. Preoperative CSA index of the deltoid correlated positively with postoperative flexion. Preoperative fatty infiltration of the deltoid correlated negatively with postoperative flexion.

Conclusion: We suggested that preoperative CSA and fatty infiltration of the deltoid had influence on shoulder elevation after RSA. To evaluate preoperative condition of the deltoid might expect prognosis after RSA.
**R2-0-11** The change in the width and thickness of LHB and thickness of coracoacromial ligament correlated with rotator cuff tear pattern

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(Purpose) We measured the width and thickness of LHB in GH joint and at biceps groove, and thickness of coraco-acromial ligament (CAL) to clarify the etiology for LHB lesion in cadavers.

(Materials) Fifty-four cadaveric shoulders of 29 men and 25 women, whose average age was 84.1 years old, for anatomical study were evaluated. LHB width (J-W) and thickness (J-T) in GH joint, those at biceps groove (BG-W, BG-T), and thickness of CAL (CAT) were measured by caliper, and associated rotator cuff tear (RCT) and SGHL tears were investigated. These shoulders were classified into four groups with or without SSC, posterior cuff and SGHL tear: R- without RCT and SGHL tear, PR posterior cuff tear without SSC and SGHL tear, SG+SC- SSC tear without SGHL tear, SG+SC+ with SSC and SGHL tear. In these four groups the W, T, and CAT were compared, and correlation between CAT and W, T was evaluated.

(Result) J-W in SG+SC+, SG-SC+, PR and R- was 11.3, 9.2, 9.1, 7.8 respectively, and JW of SG+SC+ was statistically significant wider than those in any other groups. J-T in SG+SC+ was thicker than that in R-. BG-T in SG+SC+ was statistically significant thicker than those in any other groups. CATs had no significant differences. The coefficient ratio between CAT and J-W in PR was 0.70, and that between CAT and J-W in PR was 0.46.

(Conclusions) Posterior cuff tear induces CAL and LHB hypertrophy with correlation, and SGHL tear may cause LHB hypertrophy without CAL change.

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**R2-0-12** Effect of long head biceps tenotomy on muscle strength in arthroscopic rotator cuff repair

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[Purpose] The purpose of the present study was to assess the shoulder abduction, elbow flexion and grip strength in arthroscopic rotator cuff repair with or without the long head biceps (LHB) tenotomy.

[Subjects and Methods] Seventeen patients (17 shoulders) followed up for at least one year after surgery were subjects of this study. Tenotomy group (T group) consisted of 9 shoulders and non-tenotomy group (N group) of 8 shoulders. All patients were repaired by the suture bridge technique. Arm circumferential diameter and muscle thickness and width were measured with LHB contracted or not. The muscle strength in elbow flexion, shoulder abduction, internal/external rotation and grip strength were evaluated and the relative ratio of affected/unaffected side was calculated.

[Result] There was no significant difference in arm circumferential diameter and muscle width of LHB between the groups; however, muscle thickness in I group showed significantly larger than in the T group (P<0.01). Muscle strength in shoulder abduction and elbow flexion and grip strength was significantly larger in I group (P<0.01, respectively).

[Conclusion] Muscle strength in shoulder abduction and elbow flexion and grip strength decrease after arthroscopic rotator cuff repair with LHB tenotomy.

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**R2-0-13** "Gap sign", a new indicator for small subscapularis tear, can be improved after arthroscopic rotator cuff repair

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**Objectives.** To preoperatively diagnose subscapularis tendon (SSc) tear is often hard to do. We propose here a "Gap sign" (GS) that is formed between SSc and scapula bone (Sc) and can be visualized in oblique-sagittal view of MRI. We already reported that GS correlated well with SSc tear and the best position of oblique-sagittal slice was defined as one in coracoid base level (JSS2014 and JOA2015). GS can prospectively be a useful diagnostic tool in case of SSc tear (JSS2015). Objectives in this study were to investigate presence of GS for SSc tear after ARCR.

**Methods** Eighty eight cases (39 males and 49 females, average age at the operation 63.9+/−11.1 years old) who underwent arthroscopic rotator cuff repair between 2012 and 2015 were enrolled in the study. GS was determined as (+) (+/−) or (−) preoperatively and presence of GS was recorded one year after the operation.

**Results** GS was defined preoperatively as GS(+) in 47 cases, and nine cases out of 47 remained GS(+), all of which had medium or large sized SSc tear. Twenty three cases out of 47 were improved as GS(+/−), and fifteen cases were as GS. Thirteen cases were defined preoperatively as GS(+/−), and nine of which remained the same, but four of which were improved as GS(−).

**Conclusions** "Gap sign" can be improved after ARCR.
R2-O-14 Repair integrity and functional outcome after arthroscopic suture bridge subscapularis tendon repair
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Introduction: The retear rate following rotator cuff repair is variable. Recent biomechanical studies have demonstrated that suture bridge technique excels in initial fixation strength and footprint coverage compared with double-row tendon-to-bone fixation. The purpose of this study was to report the repair integrity and clinical outcome following arthroscopic suture bridge subscapularis tendon repair.

Material and Methods: From September 2010 to May 2014, a consecutive series of 165 patients with full-thickness rotator cuff tear including subscapularis tendon tear during an arthroscopic procedure were included retrospectively. Forty-four patients lacked complete follow-up data or were lost to follow-up. Thirty-five patients were classified Lachman type I. Seven patients were revision cases. They were excluded from this study. The seventy-three study subjects included forty-five men and thirty-two women, with an average age of 65.3 years. Clinical outcomes were evaluated at an average of thirty-one months. Repair integrity was estimated with use of magnetic resonance imaging (MRI), which was performed on the average, fourteen months postoperatively, and was classified into three categories using Sugaya classification. Type I and II were classified into no tear, type III into thinning, type IV and V into re-tear.

Results: The average clinical outcome scores all improved significantly at the time of the final follow-up. At a mean of fourteen months postoperatively, MRI revealed that seventy-three shoulders had a no-tear; three, a thinning, three, re-tear. The overall rate of re-tear was 3.8%.

Conclusion: Arthroscopic subscapularis tendon repair using suture bridge technique can result in improved repair integrity and clinical outcomes.

R2-O-15 Correlation of superior glenohumeral ligament injury with subscapularis tendon tear.
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Subscapularis tendon tear is not uncommon, but correct diagnosis of it is sometimes difficult even with arthroscopy. Since the most superior part of the subscapularis tendon and the superior glenohumeral ligament (SGHL) insert to same anatomical area, lovea capitatis, there may be some relationship between the SGHL injury and subscapularis tendon tear. To examine this relationship, we analyzed arthroscopic findings of SGHL and subscapularis tendon in 277 shoulders who had treated between 2012 and 2015. SGHL was normal in 98 shoulders, elongated in 68 shoulders, and torn in 111 shoulders. Subscapularis tendon tear was observed in 19.4%, 64.7%, and 97.3%, respectively. We concluded that SGHL injury was closely related to the subscapularis tendon tear.

R2-O-16 Effect of Mirror Therapy on Rehabilitation after Arthroscopic Rotator Cuff Repair
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Introduction: Patients frequently experiences severe shoulder pain after ARCR, causing CRPS (incidence: 10~20%). Mirror therapy has shown to be effective for phantom limb pain or CRPS or hemiparesis in stroke patients, by stimulating primary motor cortex and mirror neuron in brain. Central nervous system is associated with shoulder dysfunction; therefore, we examined effect of mirror therapy on rehabilitation after ARCR.

Method: Seventy one patients who underwent ARCR (mean age at surgery: 63.0 years) were subjects for this study; 34 patients with mirror therapy and 37 patients as controls. Control group were treated with conventional rehabilitation protocol for ARCR, mirror therapy group were with mirror therapy for 10 minutes.

Result: Preoperative profiles were not significantly different among the groups. Mean VAS scores significantly improved from 2.49 in rest, 4.40 at night, 5.57 in motion to 0.14, 0.32, 1.20 in control group, and from 2.85, 4.87, 5.89 to 0.28, 0.59, 1.08 in mirror therapy group (p<0.0001, respectively) Similarly, mean JOA score significantly improved from 67.0 to 88.5 in control group and from 65.1 to 86.7 in mirror therapy group (p<0.0001, respectively). Mean UCLA score also improved from 16.0 to 28.6 in control group and 15.3 to 28.6 in mirror therapy group (p<0.0001, respectively). However, there was no significant difference between the groups.

Conclusion: In conclusion, we failed to find the effectiveness of mirror therapy on rehabilitation after ARCR.
R2-O-17  
Return to sport after arthroscopic rotator cuff repair in middle aged and older athletes

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Purpose: The purpose of this study was to examine the surgical outcomes of arthroscopic rotator cuff repair (ARCR) and the factors influencing post-surgical return to sport in middle-aged and older athletes.

Methods: Seventy-three patients (78 shoulders), with a mean age of 61.7 years, who underwent ARCR at a single institution following rotator cuff tear were retrospectively selected. Patients playing sports prior to injury and who had two years of post-surgical follow-up were included. Tear size, level of sport activity, pain, shoulder range of motion, shoulder strength, post-surgical imaging, and three shoulder function questionnaires were assessed. Patients were grouped by outcome, including a good return group and a poor return group for comparison and stepwise logistic regression was performed to determine independent predictors for return to sport.

Results: Sixty patients (76.9%) were classified into the good return group. The rate of return to pre-injury sport level was 77.6% for recreational athletes and 75.9% for competitive athletes. Preoperatively, the good return group exhibited smaller tear size, greater range of motion in flexion and abduction, greater shoulder strength, and higher Constant scores. Postoperatively, the good return group had lower VAS scores, greater range of motion in external and internal rotation, greater shoulder strength, fewer recurrent tears, higher JOA scores, and higher Constant scores compared with the poor return group.

Conclusions: Our findings suggest that ARCR may be indicated for middle-aged and older athletes for return to sport in addition to pain reduction and functional restoration.

R2-O-18  
Is the high angle abduction brace necessary after rotator cuff repair for large or massive tear?

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Background: The 30 degrees abduction brace is usually used after rotator cuff repair. And, the high angle abduction brace is often used after rotator cuff repair for large and massive tear because retear rate is higher. However, the availability of the high angle abduction brace is unclear. The purpose of this study was to evaluate the necessity of the high angle abduction brace after rotator cuff repair for large and massive tear.

Materials and methods: 54 subjects who had undergone ARCR for large or massive rotator cuff tear were evaluated. The subjects were divided into 2 groups: 60 degrees abduction brace group (K group: male 12, females 16, 70 yrs) and 30 degrees abduction brace group (S group: male 16, females 10, 65 yrs). ROMs on postoperative (PO) 3, 6 and 12 months, cuff integrity (Sugaya’s classification) on PO 12 months were statistically compared between 2 groups.

Results: Anterior elevation on PO 3, 6 months in S group was statistically better than K group. Retear rate was 42.9% on K group and 19% on S group.

Discussion: This study could not indicate the necessity of the high angle abduction brace after rotator cuff repair for large and massive tear, rather there are possibility the risk of slow recovery for ROMs and increase of retear rate.

R2-O-19  
Time-dependent changes in the Activities of the Shoulder Abductors and Glenohumeral Joint Kinematics after Rotator Cuff Repair

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Background: Although surgery for rotator cuff tears is performed to restore shoulder function such as the activities of the shoulder abductors and glenohumeral (GH) joint kinematics, little has been known regarding the postoperative changes.

Methods: Sixteen patients who had undergone repair of rotator cuff tears participated in this study. Muscle activities were assessed by measuring the elasticities of the middle deltoid (MD) and supraspinatus (SSP) at 0, 30, and 60 degrees of active arm elevation in the scapular plane by using ultrasound elastography. Acromiointernal distance (AHD) was also measured in ultrasound images at each arm position. GH elevation angle was defined as the difference between arm elevation and scapular upward rotation angles. All measurements were performed at 6 weeks, 8 weeks, 3 months, and 6 months postoperatively.

Results: At 30 and 60 degrees of arm elevation, the elasticity of the SSP and the GH elevation angle were lower at 6 weeks than those at 3 months, but there were no significant differences between 3 months and 6 months. At 30 degrees of arm elevation, the elasticity of the MD at 6 weeks was higher than that at 6 months. At 0 degree of arm elevation, the AHD at 6 weeks was narrower than that at 6 months.

Conclusions: The GH elevation angle increased over time after rotator cuff repair, which was accompanied by the increased activities of the supraspinatus and decreased activities of the middle deltoid.
R2-O-20 The sequential analgesic effect of the tramadol-acetaminophen combination in the subjective pain after arthroscopic rotator cuff repair
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Postoperative night pain after arthroscopic rotator cuff repair (ARCR) is relatively strong and continuous, which makes some patients agonize. The purpose of this study is to evaluate the effect of tramadol-acetaminophen combination (TA) for the night pain after ARCR. The patients were requested to answer the self-assessment questionnaire of postoperative pain as visual analogue scale (p-VAS) for 2 weeks after surgery. In 389 cases undergone ARCR in our hospital from 2011 to 2015, 191 cases answered the questionnaire. The patients who took analgetics except NSAIDs and TA were excluded and 130 cases were include in this study. 94 cases took only NSAIDs (group N) and 36 cases took TA before sleep in addition to NSAIDs (group T). 37 cases in group N and 13 cases in group T showed low pain score less than 5 points of p-VAS at day 1 after operation and these patients tended to decrease night pain spontaneously afterward. 37 cases in group N and 23 cases in group T showed high pain score more than 6 points of p-VAS. In these patients, group T had the tendency to decrease pain score afterward and showed significant decrease of the pain at 9 days after surgery and later compared with group N. Night pain after surgery was prolonged when pain control was done only by NSAIDs if pain score immediately after surgery was relatively high. However, combining NSAIDs with TA significantly reduced the persistent night pain after ARCR, which suggests TA is effective forth night pain after ARCR.

R2-O-21 The relation between clinical outcomes and pressure pain threshold in rotator cuff repair
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The purpose of this study is to identify relationship between pain and clinical outcomes of rotator cuff repair, we measured the pressure pain threshold (PPT) on shoulders. 84 patients who underwent arthroscopic rotator cuff repair were included. PPT on rotator cuff was measured by the electronic pressure algometer. We divided patients into 2 groups by PPT ratio at 3 months postoperatively (PPT ratio affected/unaffected side, cut off value = 60%), and evaluated difference of range of motion, VAS for pain, JOA score between 2 groups. VAS of low PPT ratio group was higher. It suggests that there was relationship between PPT and VAS at same time. Forward elevation, lateral elevation and JOA score at 12 months after the surgery was significantly lower in low PPT ratio group. Pain sensitization by inflammation or surgery causes increment of pain, muscle spasm and adhesion of tissue, and finally leads to functional decline. In our study, joint range of motion and JOA score postoperatively were significantly lower in low PPT ratio group. It suggests that there was relation between PPT and functional outcomes after rotator cuff repair. In addition, PPT is effective measures in that it is objective evaluation whereas VAS score is subjective evaluation of pain. The measurement of PPT may be useful for predicting postoperative function.
G2-T6-1 The changes of the strain ratio of rotator cuff depending on shoulder positioning monitored by ultrasound elastography

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Introduction: Ultrasound elastography is a new procedure for assessment of tissue elasticity by measurement of the strain ratio. However, the strain ratio may change depending on tension or relaxation of soft tissue. The purpose of this study was to evaluate the changes of the strain ratio of rotator cuff depending on shoulder positioning.

Methods: This study included twenty healthy male volunteers (mean age 32 years old). The strain ratio of subscapularis tendon (SSC), supraspinatus tendon (SSP) and infraspinatus tendon (ISP) were assessed using ultrasound elastography with six shoulder positioning (the arm at the side of body, sling, the brace at 40 degrees flexion, the brace at 40 degrees scaption, the brace at 40 degrees abduction and the brace at 40 degrees scaption and 30 degrees external rotation).

Results and discussion: The strain ratio of SSC, SSP and ISP significantly changed by shoulder positioning. These results demonstrated that the strain ratio of rotator cuff changes depending on tension or relaxation in addition to elasticity. Based on the findings in this study, shoulder elevation brace relaxes SSP, shoulder flexion brace relaxes SSC and tenses ISP, shoulder abduction brace and shoulder scapulation and external rotation brace tense SSC and relax ISP.

G2-T6-2 The evaluation of the elasticity of the rotator cuff tendon by mean of share-wave ultrasound elastography

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Purpose: The purpose of this study was to investigate the elasticity of the intact or repaired rotator cuff tendon by using ultrasound shear wave elastography.

Methods: Twenty-four patients (mean age, 69.5 years) who have undergone arthroscopic rotator cuff repair and 10 patients (mean age, 63.8 years) who have no rotator cuff tear were examined. One orthopaedic surgeon obtained all sonograms using Aplo750 300 (Toshiba medical), LOGIQ9M E9 (GE Healthcare) and AixplorerSM (Super Sonic Imagine) which can measure the tissue elasticity without probe compression. The patients were seated upright in a stool and placed with the shoulder slightly extended with neutral rotation. The transducer was placed on the antero-superior part of the shoulder to visualize the supraspinatus tendon. The elasticity of the repaired or intact rotator cuff tendon was measured by both short axis scan (SA) and long axis scan (LA).

Results: The average elasticity of the control group was 88.8 kPa on SA, 104 kPa on LA, and the elasticity of the repaired group was 48.4 kPa on SA, and 58.9 kPa on LA respectively, showing significant lower elasticity in repaired group (P=0.0046). There was mild correlation between the elasticity and the post-operative period or patient’s age.

Conclusion: The present study demonstrated the different elasticity depending on the condition of the rotator cuff.

G2-T6-3 The use of MRI and ultrasonography for achieving the safe surgery for the proximal humerus fracture

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It is necessary to pay sufficient attention to the axillary nerve, when performing the MIPO method for proximal humeral fracture. However, it would not be easy, because of swelling and deformity. In that cases, preoperative MRI and intraoperative ultrasonography were useful for prediction and detection of the neurovascular bundles.
G2-T6-4  Biceps radial MRI for the novel evaluation of LHBPT lesions
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Background: The long head of the biceps tendon (LHBPT) and pulley lesions of the shoulder are difficult to evaluate on conventional MRI preoperatively. The purpose of this study was to investigate the diagnostic accuracy of new radial MRI for the evaluation of LHBPT lesions.

Methods: We prospectively analyzed 42 cases using biceps radial MRI and arthroscopy. The protocol of biceps radial MRI included sequences acquired in radial planes vertical to the LHBPT. MRI findings were classified in the Habermeyer classification.

Results: Habermeyer classification type (1, 2, 3, 4) were (0, 3, 2, 9) cases by biceps radial MRI. There were 32 LHBPT lesions noted at arthroscopy. Biceps radial MRI showed a sensitivity of 100%, and a specificity of 80%. Sensitivity of type (1, 2, 3, 4) were (0, 0, 50, 88.9) %, specificity were (100, 92.7, 97.5, 66.7) %.

Conclusion: Radial MRI of the shoulder has been reported for the usefulness in diagnosing the rotator cuff tear and glenoid labrum lesions, but was not useful for LHBPT lesions. This study shows the efficacy of new radial MRI for detecting LHBPT lesions is higher than that of conventional methods. Biceps radial MRI provides high accuracy of evaluation of LHBPT lesions preoperatively.

G2-T6-5  Assessment of Muscle Atrophy and Fatty Infiltration of Symptomatic Rotator Cuff Tear: A Prospective Study of 150 shoulders
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Introduction: Our prospective study revealed that the tear size of symptomatic rotator cuff tears progressed in 55% of the patients in average 17 months. The purpose of this study was to demonstrate the relationship between tear progression and muscle atrophy or fatty infiltration.

Subjects and Methods: One hundred and fifty shoulders with symptomatic rotator cuff tears who took MRI more than two times were reviewed at mean follow-up of 17 months. Muscle atrophy and fatty infiltration were evaluated with use of Warner and Goutallier classification, respectively. Between the tear progression and non-progression groups, muscle atrophy and fatty infiltration were compared.

Results: In the tear progression group, muscle atrophy and/or fatty infiltration progressed in 29/82 shoulders (35%), whereas in the non-progression group, they progressed in 9/68 shoulders (13%). The progression of both muscle atrophy and fatty infiltration was seen in 14/29 shoulders in the tear progression group but only the progression of muscle atrophy was seen in 6/9 shoulders in the non-progression group. In 29 shoulders with progression of muscle atrophy and fatty infiltration in the tear progression group, 17 shoulders had moderate tears.

Conclusions: In the tear progression group, muscle atrophy and/or fatty infiltration progressed in most cases, whereas in the non-progression group, only the progression of muscle atrophy was seen in most cases. In moderate tears with fast tear progression, muscle atrophy and fatty infiltration progressed fast.

G2-T6-6  Application of virtual reality to shoulder joint diseases
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Introduction: The year 2016 has been regarded as the dawn of virtual reality (VR), and applications for immersive head mount displays (IMDs) and the likes have been increasing rapidly. At this conference last year, we reported on the fabrication of a 3D model and a custom-made guide using OsiriX, CAD software, etc., and a 3D printer as patient-specific instrumentation for reverse total shoulder arthroplasty (RSA). This time, we report on the application of data from the shoulder to VR using an immersive IMD.

Methods: DICOM data were read into OsirIX using a computer, and the glenoid and proximal humeral fracture were output as an STL file. The STL data for a baseplate and screws were created using Autodesk Fusion 360, which is CAD software, and Meshmixer, which is free design software. This was converted to an .fbx file using Blender, read into Unity, and then output as VR content. By sending the result to a smartphone, 3D viewing was made possible from any angle by wearing a IMD. This enabled the stereoscopic understanding of the glenoid and fracture shape as well as the direction of insertion for the baseplate and screws for TSA and RSA.

Discussion: The development of IMDs is remarkable, and they are useful devices for blurring the boundaries between real and virtual through VR and augmented reality.

Conclusion: Data of the screws, and baseplate for a TSA,RSA, proximal humeral fracture and the glenoid created by using free software such as OsiriX were experienced stereoscopically using an immersive IMD.
G2-O-01 Fractures of the glenoid of the scapula - Redefinition of Ideberg's classification type 3 and 4-
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(Purpose) Fractures of the glenoid of the scapula is often classified according to Ideberg's classification. But Ideberg type 3 and 4 fractures are confused. Purpose of this study is redefinition of Ideberg type 3 and 4 fractures.

(Materials and Methods) Thirty two Ideberg type 3/4 fractures were divided into 3 fracture types according to main transverse fracture line. A-line fracture; the fracture line passed the coracoid base and went through the superior border of the scapula. B-line fracture; the fracture line passed the coracoid base and went through the medial border of the scapula. C-line fracture; the fracture line passed the inferior the acromial spine and went through the medial border of the scapula. In all cases, the associated injuries of the shoulder girdle were investigated.

(Results) All A-line fracture (11cases) and B-line fracture (4 cases) were associated the injuries of the acromioclavicular joint, acromion or clavicle. Those injury patterns were looked like the coracoid bised fractures. All C-line fracture were associated the inferior glenoid fractures and become to Ideberg type 5 fracture.

(Conclusion) It is concluded that A-line and B-line fractures should be defined Ideberg type 3 fracture, and C-line fractures should be defined Ideberg type 4 fracture.

G2-O-02 Conservative treatment using an immobilization with external rotation position for the anterior glenoid rim fracture
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Purpose: The purpose of this study was to investigate the conservative treatment using an immobilization with external rotation position for anterior glenoid rim fracture of the scapula.

Materials and methods: We indicated this method on the patients with anterior glenoid rim fracture of Ideberg's classification type IA who had no anterior subluxation of the humeral head and gained reposision of fracture with external rotation position. Thirteen shoulders were evaluated. There were 5 males and 8 females. The average age of patients was 63 years old (range, 49 to 79), and the follow-up period was 8.3 Japan Orthopaedic Association score (JOA score), shoulder range of motion, and CT were evaluated at the final visit.

Results: The average shoulder range of motion on the final visit were the following: the affected side/the opposite side flexion:159/161, extension:47/47, abduction:153/166, external rotation:54/59 degrees, internal rotation: T11/T10 level. The JOA score on the final visit was 92.1 points. All cases achieved bony union without osteoarthrosis progression on CT on the final visit.

Conclusions: Conservative treatment using an immobilization with external rotation position for the anterior glenoid rim fracture of Ideberg's classification type IA was supposed to be useful to achieve good shoulder range of motion and function.

G2-O-03 Prognosis of proximal humeral fracture in children
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Proximal humeral fracture in children can result in sequelae such as humeral shortening caused by premature epiphyseal closure and shoulder joint dysfunction associated with humeral head deformity. The purpose of this study was to investigate clinical outcome of 19 proximal humeral fractures and assess their treatment and sequelae. We investigated fracture type with Neer-Horwitz classification and Salter-Harris classification, treatment choice, and sequelae. Fracture types of Neer-Horwitz classification were 1 in 3 cases, 2 in 4, 3 in 6, and 4 in 7. Those of Salter-Harris classification was 1 in 2 patients, 2 in 10, and type 3 and 4 were not identified. Sixteen patients were treated conservatively and 3 were treated surgically. At the time of latest follow-up, Humeral shortening were identified in 4 cases and varus or valgus deformity of humeral head in 8. In humeral-shortening cases, growth plate seemed to be partially compressed by distal fragment of humerus, followed by physeal bar formation. In most cases, which resulted in humeral head deformity, fracture displacement were severe and older than 11 years old at injury. In conclusion, We should pay special attention to the age and the positional relationship between growth plate and the distal fragment.
G2-O-04 Which classification of proximal humerus fractures leads to postoperative avascular necrosis of the humeral head?
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Background: The purpose of this study was to determine which classification of proximal humerus fractures leads to postoperative avascular necrosis of the humeral head.

Methods: Between January 2008 and June 2015, 76 patients with proximal humeral fractures underwent open reduction and internal fixation. There were 24 males, 52 females. Mean age was 66.9 years old (21-93 years old) and average follow-up was 17.9 months (6-42 months). Fracture types in all patients were evaluated using Neer classification, AO classification, and Yamane classification. The number of postoperative avascular necrosis was recorded in each fracture type.

Results: Seven patients (9.2%) had avascular necrosis of the humeral head after surgery. In Neer classification, 3 of 3-part fracture (11%), 1 of 4-part fracture (17%), 3 of 3-part dislocated fracture (60%), and head-split fracture (100%) had postoperative avascular necrosis. In AO classification, 1 of B2.2 (17%), 1 of C1.1 (23%), 2 of C2.2 (67%), 2 of C3.2 (67%) and 1 of C3.3 (100%) suffered postoperative avascular necrosis. In Yamane classification, 4 of Type1B (80%), 2 of Type3 (100%) and 1 of Type4 (100%) resulted in AN.

Discussion: The 3-part and head-split fracture in Neer classification, C2.2, C3.2, C3.3 in AO classification, and Type1B, Type3, Type4 in Yamane classification had high rate of postoperative avascular necrosis of the humeral head. Preoperative evaluation of fracture types using some classifications is useful to predict the risk of postoperative avascular necrosis.

G2-O-05 Restriction of arm elevation after intramedullary fixation for proximal humeral fractures
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Restriction of arm elevation after intramedullary fixation for proximal humeral fractures
(Purpose) Some existing short nails for proximal humeral fractures reportedly had a problem of their entry points causing shoulder impingement. The purpose of the study was to show clinical and radiographic results of patients treated with the Polaris short nail in view of impingement syndrome.
(Materials and Methods) The study included 23 cases treated with the Polaris short nail at mean age of 70 years for proximal humeral fractures. They included 10 cases of 2-part fracture, 13 cases of 3-part fracture. At final follow-up, they underwent both clinical and radiographical evaluations. Clinical outcome was assessed with Constant and Japanese shoulder association scores. Bony union, alignment including retroversion of the head, and entry point of the nail were evaluated using CT scans. The subjects were evaluated to confirm whether they could reach maximum elevation in the plain radiograph with arm elevation.
(Result) Constant and Japanese shoulder association scores averaged 54+12 and 71+8.9 points respectively. All cases showed bony union. No case showed greater tuberosity height or protrusion of the nail at its entry point. Head alignment including its retroversion was considered acceptable. Only five cases could reach maximum elevation above the zero position in their radiographs with arm elevation.
(Conclusion) Arm elevation can be restricted by the short nail inserted around the top of the humeral head even in cases without impingement caused by protrusion of the greater tuberosity or its nail.

G2-O-06 Postoperative outcomes of open reduction and internal fixation for humeral surgical neck fractures
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Background: The purpose of this study was to evaluate the clinical outcomes of open reduction and internal fixation(ORIF) using antegrade intramedullary nail for humeral surgical neck fractures.

Methods: The study included 42 shoulder 42 cases. Mean age at surgery was 72(22-94) years of age, and average follow up the period was 11.9 months(6-48). All patients were evaluated by JOA score, range of motion(ROM), bone union, the varus change of the humeral head in the X-ray image at the operation and the final follow up.

Results: The ROM at the final follow up was 134.9 degrees flexion on average. JOA score 82.4 (44-100) point average, bone union was achieved in all cases. 14 cases of the 42 enrolled patients had a varus deformity of the humeral head at the final follow up. JOA score, flexion ROM in the varus deformity group were significantly poorer than those in the no-varus deformity group.

Conclusions: Clinical outcomes of ORIF using antegrade intramedullary nail for humeral surgical neck fractures were generally satisfactory. The presence of a varus deformity of humeral head after surgery seems to affect the poorer clinical outcomes. It seems important to achieve adequate reduction at operation for good clinical outcomes.
G2-O-07  The factor of the humeral head varus position with the locking plate

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Purpose: We report the factor of the humeral head varus position by using the X-rays for the humeral neck fractures with Locking plate system.
Method: We included 22 patients with Locking plate fixations for humeral neck fractures and followed up at least 6 months. Mean age was 63.1 years. We defined the varus position after this operation that, in comparison with pre and postoperation X-ray, the distance from a to top of humeral head to a greater tubercle is 2 mm and up, that the Neck/shaft angle (NSA) changings are 10 degrees and up. 5 cases were dislocated (GroupA) and 17 cases weren’t dislocated (GroupB). The itemize of AO classification was A3, 1 : B1, 2 : B2, 1 (GroupA) and A2, 1 : A3, 1 : B1, 5 : B2, 2 : C1, 3 (GroupB). We assessed the comparison just post-operation NSA with normal side NSA and the distance from top of humeral head to the proximal of a plate (DHP) and saw whether there are any comminution of medial cortex of humeral neck, whether interomedial screws are inserted.
Result: Mean of the difference of NSA was 12.4 degrees, GroupA : 1.7 degree,GroupB(p<0.05). The comminution of medial cortex was 5, GroupA : 5, GroupB(p<0.05). Mean of the DHP was 12.9 mm, GroupA : 14.0 mm, GroupB. The interomedial screw was 3 GroupA : 15, GroupB.
Conclusion: We suggested that the factor of the humeral head varus position was the lack of reduction for humeral head and the comminution of medial cortex.

G2-O-08  Minimally invasive plate osteosynthesis for proximal humerus fracture

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(Introduction) We evaluated the results of MIPO technique for proximal humerus fracture.
(Material and Method)We reviewed 65 patients who required therapy for proximal humerus fracture between 2010 and 2015 at final follow-up. Mean age was 65 years. 65 patients had minimum 3 month follow-up(3month mean follow up). We used NCB-PH(R Zimmer) for MIPO. Investigation items are range of motion(ROM),Japanese Orthopaedic score,(OAr score),operation time and complication in M group.
(Result) Union occurred in all cases. (ROM) Elv: 134 degree, ER :HI degree, IR: L2. Peri-implant fracture were 4cases. Malunion was 3 cases,4 patients had subacromial impingement that healed but required hardware removal. There were no infections, nerve injuries, vascular injuries and avascular necrosis.
(Conclusion)We performed internal fixation using NCB-PH(R) for proximal humerus fracture and got satisfactory outcome. But there were some complications in MIPO, we need to be aware that complications can arise. We report our result and problems for MIPO.

G2-O-09  Does cortical thickness predict the loss of reduction after fixation of proximal humeral fracture with locking compression plate?

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(Back ground) Varus deformity (VD) of humeral head when treating proximal humeral fractures (PHF) with locking compression plate (LCP) is one of a complications . Incidence of post-operative VD is reported 30% and low bone mineral density (DXA) is one of the factors that preclude poor result in treating PHF. However DXA is not always accessible in emergency setting. We hypothesized cortical bone thickness (CBT) of proximal humerus will substitute for the DXA and predict the post-operative VD.
(Methods) Consecutive 50male18 female 32 cases treated with LCP in our hospital from 2010 to 2015 were evaluated retrospectively. Average age of subjects was 71.3 (48-87) and modified Neer classification were as follows, type 1: 2, type 2: 28, type3: 9 ,type4:1, Vargas Impacted type10. Radiographically preoperative CBT were measured as same manner as Tintag and loss of head-shaft angle in A-P view at last follow up compared to post-operative examination were recorded and correlation between both variants were measured. Average follow-up period was 6.4 (1-26) months, in which subjects with early failure were evaluated at the time of re-operation.
(Results) 14cases (28%) showed VD more than 10 in which seven cases require re-operation. There was negative correlation between CBT and VD (correlation coefficient:0.460; p <0.05). VD more than 10 was observed In 12 cases out of 21 (57%) whose CBT were less than 43mm.
(Conclusion) CBT is easy and useful predictor of VD. Patients whose CBT is less than 45 mm must be treated carefully.
G2-O-10  Clinical results of the hemiarthroplasty for humeral neck fractures using the cable wire system-trick and pitfall

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We had used the cable wire system (the compounded needle wire with compression device) to fix greater and lesser tuberosity fragment and humeral prosthesis. The average postoperative JOA score was 85.1. The average angle of the active flexion was 126 degrees. Using this system, greater and lesser tuberosity were held on tight and overlapped the humeral shaft. We are of the opinion that trick of humeral prosthesis is to overlap greater and lesser tuberosity fragment on the humeral shaft, not to fix anatomically.

G2-O-11  Correlation of functional and anatomical results after arthroscopic repair of middle and large rotator cuff tears: A prospective study

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Background: There have been some studies which reveal good clinical results in many cases of retears of the tendons following arthroscopic rotator cuff repair (ARCR). The purpose of this prospective study was to investigate the relation between functional result and structural integrity after ARCR.

Methods. From June 2012 to March 2014, 51 shoulders with middle and large rotator cuff tears were completely repaired by arthroscopic procedure. Clinical examination and MRI evaluation were performed before surgery and at 3, 12 months after surgery. Active ROM exercise was initiated 8 weeks postoperatively.

Results: Forty-one patients were available for clinical and MRI evaluation until a minimum 1 year postoperatively. There were 28 male and 13 female with a mean age of 62 years (range, 40-76). Retears were occurred in eight shoulders (19.5%) at 12 months postoperatively, and two of eight retears were not detected at postoperative 3 months evaluation. There were no significant differences in sex, age, and preoperative JOA total score, JOA endurance score, flexion, external rotation, and internal rotation angle between patients with retear (group R) and intact (group I) cuff. Though the postoperative JOA total score and flexion angle were significantly improved in both groups (p=0.017, 0.018 and p=0.000, 0.000 for group R and I, respectively), the postoperative JOA endurance score was significantly improved only in group I (p=0.002).

Conclusion: Though the clinical outcome of ARCR was relatively good regardless of anatomical results, cuff integrity was significantly associated with the shoulder endureance.

G2-O-12  Conventional En-Masse-repair versus separate double layer double row-repair for treatment of delaminated rotator cuff tears: A prospective randomized study

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Introduction: To determine the optimal surgical method for the treatment of delaminated rotator cuff tear.

Methods. Between August 2007 and March 2014, 82 patients who underwent arthroscopic rotator cuff repair of delaminated tear were enrolled and randomized into 2 groups. In group 1 (n = 48), arthroscopic conventional en masse repair was performed. In group 2 (n = 34), separate double-layer double-row repair was performed. The American Shoulder and Elbow Surgeons score, Constant score, Simple Shoulder Test score, and visual analog scale (VAS) score for pain and range of motion (ROM) were assessed before surgery; at 3, 6, and 12 months after surgery; and at the last follow-up visit. Magnetic resonance imaging (MRI) was performed at 12 months postoperatively to examine the re-tear rate and pattern.

Results: The mean follow-up period was 25.9 months. The group 2 had significantly lower VAS pain scores (P<0.05) at postoperative 3, 6, and 12 months. The functional scores and ROM showed no significant difference between the groups at each time point. Eight of 48 patients in group 1 and six of 34 patients in group 2 showed re-tears on MRI at 12 month follow up, but the difference was not significant statistically (p > 0.05).

Discussion: Both conventional en masse repair and separate double-layer double-row repair were effective in improving clinical outcomes in the treatment of delaminated rotator cuff tears. Lower pain scores were seen in patients who underwent separate double-layer double-row repair.
G2-O-13  The relationship between the postoperative muscle strength and fatty degeneration after arthroscopic large or massive rotator cuff repair

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The purpose of this study was to clarify the relationship between postoperative muscle strength and fatty degeneration of the rotator cuff muscles after arthroscopic large or massive rotator cuff repair. This included 21 patients who underwent arthroscopic primary repair for large or massive rotator cuff tears. All patients were followed-up for more than 2 years and had no contralateral rotator cuff tears by ultrasound and remained asymptomatic over follow-up duration. We evaluated fatty degeneration of the rotator cuff muscles by using MRI at postoperative 1 year. We measured muscle strength with a hand-dynamometer preoperatively, and until postoperative 2 years, and compared with contralateral shoulder. According to degree of fatty degeneration, we divided the following 2 groups: 11 patients who had no fatty degeneration (Goutallier classification: Stage 0-1) and 10 patients who had them (Goutallier classification: Stage 2-4) for supraspinatus, and 8 patients who had no fatty degeneration and 13 patients who had them for infraspinatus. All cases had the continuity of repaired tendons. The muscle strength of the group that had fatty degeneration was inferior significantly to the group that had no fatty degeneration at postoperative 2 years, though there was not different between both groups at postoperative 1 year. We should consider the progress of fatty degeneration of the rotator cuff muscles for long periods when there were fatty degeneration even if repaired tendons had the continuity.

G2-O-14  Clinical features of the patients with fatty degeneration in full-thickness rotator cuff tears

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(Purpose) The purpose of this study was to analyze clinical features of the patients with fatty degeneration in full-thickness rotator cuff tears.

(Methods) Forty patients with full-thickness rotator cuff tears treated by arthroscopic repair were the subjects of this study. There were 21 females and 19 males whose average age was 70.8 years. There were 15 patients who had history of trauma. The average duration of disorder was 29.5 weeks. On types of the tears, small tear was observed in 9 patients, medium tear in 14 patients, large tear in 8 patients, and massive tear in 9 patients. The average size of tear was 1.98cm. Subscapularis tear was observed in 4 patients, infraspinatus tear in 13 patients, and supraspinatus tear in all patients. 24 patients whose Goutallier's stage 0, 1 and 2 were divided into Mild Group, 16 patients whose Goutallier's stage 3 and 4 into Severe Group. Factors compared between two groups were as follows; characteristics of the patients, preoperative history of trauma, duration of disorder, width of torn cuff and distance of tear stump from tendon insertion.

(Result) The width of tear and the distance of tear stump of Severe Group was significantly larger than that of Mild Group. Larger the width of tear and the distance of tear stump were, more severe the fatty degeneration of supraspinatus and infraspinatus muscles became.

(Conclusion) The decrease of muscle contraction force and anatomical destruction such as rotator cable are important to the causes of fatty degeneration of rotator cuff.

G2-O-15  Hidden longitudinal partial-thickness rotator cuff tear causing subacromial impingement syndrome: a rare case in an adult

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Longitudinal rotator cuff tears without avulsion are uncommon, and are usually identifiable on magnetic resonance imaging (MRI). This article presents a rare case of a longitudinal partial-thickness rotator cuff tear that escaped detection on MRI. A 59-year-old woman with a 2-year history of shoulder pain was diagnosed with subacromial impingement syndrome without rotator cuff tear because radiographs showed a marked subacromial spur, and T2-weighted MRI showed a normal rotator cuff. However, 3 months of conservative treatment failed to relieve her shoulder pain. Computed tomography (CT) after bursography showed a longitudinal partial-thickness rotator cuff tear at the infraspinatus. We arthroscopically resected the subacromial spur and trimmed the torn flap of the infraspinatus tendon, and achieved a satisfactory outcome 6 months post-operatively. Even on follow-up fat-suppressed T2-weighted MRI, the longitudinal partial-thickness rotator cuff tear could not be identified. Longitudinal partial-thickness rotator cuff tears that are non-identifiable on MRI can cause subacromial impingement syndrome, and CT bursography is useful for diagnosis. Patients diagnosed with chronic subacromial impingement syndrome without rotator cuff tear using MRI should receive CT bursography to rule out a hidden longitudinal partial-thickness rotator cuff tear.
G2-O-16  A case of knot impingement with unusual acromion osteolysis

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Case: A 45-year-old man received arthroscopic rotator cuff repair for left supraspinatus tendon rupture at 10 months ago. He got full range of motion with no shoulder pain, but he felt mild crepitus when elevating his arm. MRI showed the repaired rotator cuff and osteolyses of acromion. CT revealed unusual osteolysis like a cave. We diagnosed "knot impingement", so he was admitted to our hospital for re-arthroscopy and removal of stitches. We checked the repair of rotator cuff by arthroscopy, and then stitches were removed. The cave-like osteolysis was found in acromion. Fragments of sutures were founded in ‘cave’.

Discussion: He guessed the knot impingement was caused by both mechanical factor and chemical factor. By only physical factor, the direct knot impingement made a wear surface. But in this case, we guessed the biological reaction initiate by sutures made a cave-like osteolysis.

G2-O-17  Comparison of clinical results between arthroscopic surface-holding repair and suture-bridge repair for small or middle rotator cuff tears

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Purpose: The purpose of this study was designed to compare the clinical outcome of arthroscopic surface-holding (SH) repair and suture-bridge (SB) repair for small or middle rotator cuff tears.

Materials and Methods: 95 cases (65 male and 40 female) were performed arthroscopic repair for rotator cuff (SSP and/or ISP, within 2cm) tears. The subjects were divided into two groups according to method of repair: SH group (64 cases, mean age: 59.6 years) and SB group (41 cases, mean age: 56.7 years). SSC repairs were performed simultaneously in 42 cases (41.2%) by dual-row or suture-bridge procedure. We evaluated the operation time, the clinical outcome before and after the operation and re-tear rate. The outcomes were assessed on the basis of the Japanese Orthopaedic Association (JOA) shoulder score and postoperative MRI findings according to Sugaya classification.

Results: The average JOA score increased from 66.5 to 88.3 in SH group and from 69.1 to 91.8 in SB group. The mean operation time was 3 hours 30 minutes in SH group and was 3 hours 16 minutes in SB group. There were no significant differences in preoperative and postoperative JOA scores and operation time in each group. Re-tear rates were 0 % in SH group and 9.8 % in SB group.

Conclusion: The arthroscopic SH procedure is considered to be an effective treatment for preventing the re-tear after arthroscopic rotator cuff repair.

G2-O-18  Arthroscopic Repair (Suture-bridge) of Partial-Thickness Rotator Cuff Tears: Comparative Study of Articular Side Tears Versus Bursal Side Tears

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[Introduction] Diagnosis and treatment of partial-thickness rotator cuff tears (PTRCT) remains controversial. In this study, we comparatively analyzed clinical outcomes of patients with articular-sided tear (APRCT) and those with bursal-sided tear (BPRCT) treated by arthroscopic cuff repair using suture-bridge technique.

[Material and Methods] Between November 2012 and May 2015, 36 shoulders with APRCTs and 38 with BPRTCs were subjected for the analysis. Clinical outcomes were evaluated at pre- and postoperative term by using visual analogue scale (VAS), Japanese Orthopaedic Association (JOA), the Constant score (CS), the active range of motion (ROM) of shoulder flexion and abduction, and the strengths of shoulder abduction and external rotation arm at side. Statistical analysis was performed using Mann-Whitney’s U test and the p-value of less than 0.05 was considered significant.

[Result] In demographic data, the average age and the number of women were significantly higher in APRCT group than BPRTCT group. Preoperative JOA, CS, ROM of shoulder flexion and abduction, strengths of shoulder external rotation were significantly lower in APRCT group than BPRTCT group. Postoperatively all scores improved significantly in both APRCT and BPRTCT groups. In contrast, JOA, CS, ROM of shoulder flexion, strengths of shoulder external rotation remained significantly lower in APRCT group.

[Discussion] Arthroscopic cuff repair using the suture-bridge technique significantly improved the clinical outcomes of both APRCT group and BPRTCT group. This supports the therapeutic efficacy of this procedure. In contrast, preoperative inferior clinical features of APRCT continued postoperatively, suggesting the presence of pathology beyond the rotator cuff issue in APRCT.
G2-O-19  The clinical results of ten years after Arthroscopic Transosseous Suture (ATOS) for rotator cuff tear

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We examined the clinical results of ATOS passed after more than ten years. Nine shoulders among 13 shoulders that operated from April, 2005 to March, 2006 (average age 63.4 years old at operation, five men and four women, 8 right shoulders and one left shoulder, 9 right-handed) were evaluated. Those cases had JOA score more than one year after operation and were sent the questionnaire using shoulder 36 by mail. We got seven effective answers (average age 69.7 years old, four men and three women, seven right shoulder and seven right-handed). We had evaluated JOA score at average 27.7 months after operation, and ‘Pain’ was significantly improved from 143 points to 293 points. ‘ADL’ and ‘ROM’ were similarly but not significantly improved from 90 and 25.7 points to 99 and 28.7 points. Shoulder 36 was evaluated at average 127.3 months after operation, and the average of each domain was 39 points of ‘Pain’, 38 points of ‘ROM’, 38 points of ‘Power’, 38 points of ‘General Health’, 39 point of ‘ADL’ and 34 points of ‘Ability for Sports’. ATOS could maintain the shoulder QOL for a long term, and was thought to be useful as an operative method for rotator cuff tear.

G2-O-21  Post-operative results of arthroscopic rotator cuff repair in diabetic patients

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Object: We examined postoperative results of operations and rehabilitation intervention period of ARCR in DM patients compared with non-DM patients.

Methods: The 427 patients who underwent after 2010 ARCR targeted. Among the average age was 63.2 (29-91) years age. DM group is 107 people, non-DM group was 320 people. In tear size, DM group, significant difference in the non-DM group does not recognize. We have compared the JOA score and flexion angle and the rehabilitation period of before and after surgery in both groups. Cuff integrity was using the MRI 5 stage evaluation (Sugaya classification). Postoperative 3 months, 6 months, were evaluated in one year.

Results: In the preoperative JOA score was DM group 65.7 points and non-DM group 65.7 points, at 6 months after surgery DM group 88.1 points and non-DM group 86.7 points. Flexion angle at postoperative three months was significant difference in the DM group 119.0 degrees, non-DM group 132.8 degrees. Period of up to rehabilitation ended, DM group 5.4 months, it takes a non-DM group 7.3 months, the flexion angle at the time of the end was equivalent to about 150 degrees in both groups.

Conclusion: Between DM group and the non-DM group, significant difference in JOA score in the preoperative and postoperative 6 months was not observed. The difference between the flexion angle at the time of rehabilitation the end both groups was not, but the DM group, took about 2 months rehabilitation period than the non-DM group.

G2-O-22  The U-shaped rotator cuff tear is perfectly repairable by using arthroscopic rotation cuff plasty

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[目的] The goal for rotator cuff repair is to reconstruct the cuff without re-tears. We perform an arthroscopic ‘rotation cuff plasty’ for U-shaped posteroslateral full-thickness rotator cuff tears.

[患者と方法] Forty-five shoulders of 45 patients (26 male and 19 female) who had had U-shaped cuff tears at least 12 months after surgery were enrolled. An average age at surgery was 66.2 years old. We release the posteroslateral cuff from its insertion to avoid the over-tension with side to side suture, rotate posterior cuff tendon antero-medially then fix it to anteromedial bone bed using multiple suture anchors. The bone marrow vent was made against anterolateral small cuff defect.

[結果] The size of cuff tear classified into massive 21, large 19 and medium-sized 5 after DeOrio & Cofield. The functional outcome improved from 61.2 to 94.9 points 12 months after surgery by Japanese Orthopaedic Association Shoulder Score (JOA-SS). The isometric muscle strength using handheld dynamometers also improved after surgery in abduction, external and internal rotation. Postoperative MRI showed no re-tear in all shoulders at 12-months after surgery. We conclude that the rotation cuff plasty for U-shaped rotator cuff tear was effective and led perfect cuff repair after arthroscopic repair even in large and massive tears.
G2-O-23  Quality of the Rotator Cuff at the Medial Mattress Suture after Arthroscopic Transossous Suture Repair of the Rotator Cuff

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Purpose  We operated arthroscopic transossous suture repair of the rotator cuff (ATOS) with two different threads at the medial mattress suture (unabsorbable thread and absorbable thread), and evaluated clinical outcome.

Methods  38 shoulders, which were operated same surgeon, were included. 18 shoulders were operated with absorbable thread (VSORB, named Group V) at the medial mattress suture and 18 were with unabsorbable (Teldessor, named Group T). We evaluate the MR imaging by Sugaya classification at three and twelve months after surgery. Also the intensity of the cuff at the medial mattress suture was assessed by three grades; low intensity (LOW), iso intensity (ISO), and low-iso mixed intensity (LOW-ISO).

Results  Three months after surgery, in Group T/V type1: 7/14 shoulders, type2: 5/3 shoulders, type3: 5/1 shoulders, type4: 1/0 shoulder were assessed. And after twelve months, type1: 12/15 shoulders, type2: 4/3 shoulders, type3: 0/1 shoulder, type4: 2/0 shoulder were examined. In Group T, two shoulders showed re-tear. About the intensity of the cuff, in Group T/V: low 9/9 shoulders, iso 2/7 shoulders, low-iso 6/2 shoulders were evaluated three months after surgery. Twelve months after surgery, low 11/15 shoulders, iso 0/0 shoulder, low-iso 5/3 shoulders were examined. Group V showed good results at the point of the cuff quality.

Discussion  To compare clinical outcome between Group T and Group V, Group V showed no case of re-tear, and good quality of the cuff more than Group T. We consider absorbable threads come lose and the cuff flexibility improve better than unabsorbable threads.

G2-O-24  Rotator cuff can regenerate itself in 16.1mm to the edge of greater tuberosity

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Purpose  We reported in Katakansetsu 2015; 39 that rotator cuff can regenerate itself to the edge of greater tuberosity after being attached to the medial portion of footprint. The purpose of this study is to examine what character the regenerated cases have in common.

Material and methods  91 cases whose stump of rotator cuff attached to the medial portion of footprint with ARCPR by DAFF using marrow vessels were examined. Evaluation was done by MRI. When the same signal of rotator cuff stretched to the edge of the greater tuberosity, we considered that process a ‘regeneration’ (regenerated group). The cases whose stump of rotator cuff remained at the same position or re-tear cases were divided into no-regenerated group. We defined ‘Gap’ as the distance between attached rotator cuff stump and the edge of greater tuberosity. We compared Gap, age and the tear size between the two groups. And the threshold of regeneration of Gap was calculated.

Result  Smaller Gap, younger age and smaller tear size had statistically higher possibility of regeneration. If Gap is under 16.1mm, the possibility of regeneration will be higher over 50%. If the Gap is 9.4mm, 95% of the rotator cuff will regenerate.

Discussion  Even if we attach the stump of rotator cuff to the medial portion of footprint, many cases showed regeneration of rotator cuff on footprint. The smaller Gap, younger age and the smaller tear size can contribute to regeneration of rotator cuff. If Gap is under 16.1mm, the possibility of regeneration will be higher.

G2-O-25  MR evaluation of the subacromial insertion of the coracoclavicular ligament for avoiding insufficient subacromial decompression

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Neer reported that subacromial impingement syndrome was due to alterations on the undersurface of the anterior 1/3 of the acromion in 1972, and developed the anterior acromioplasty procedure. With the advent of arthroscopy, Ellman has popularized the arthroscopic subacromial decompression. We experienced several patients who have the coracoclavicular ligament covering the entire undersurface of the acromion and leading to subacromial impingement. Little information exists about subacromial insertion of the coracoclavicular ligament. Eighteen shoulders with the full-thickness rotator cuff tears were evaluated for subacromial thickness of the coracoclavicular ligament at the anterolateral, middle-lateral and posterolateral aspect of the acromion on oblique sagittal MR images. The mean subacromial thickness of the coracoclavicular ligament was 2.52mm, 1.70mm, 0.75mm, respectively. A preoperative understanding of the subacromial thickness of the coracoclavicular ligament is crucial in avoiding insufficient subacromial decompression.
G2-O-26  evaluations of the teres minor in patients with postero-superior rotator cuff tears with tear and atrophy of the infraspinatus.

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Background: We reported the teres minor (TM) muscle appeared hypertrophic in rotator cuff tears involving the infraspinatus (ISP), and the progression of ISP muscle atrophy seemed to induce the development of this compensatory hypertrophy. And in patients with postero-superior rotator cuff tears (PS-RCT) and atrophic ISP, shoulders with compensatory hypertrophy of the TM had greater strength and range of external rotation than shoulders with normal or atrophic TM. This study aimed to investigate the evaluations of TM in PS-RCT with atrophic ISP and hypertrophic TM, and compare this with those with PS-RCT and normal or deficient TM.

Methods: Thirty-six shoulders with PS-RCT and atrophic ISP were included. TM muscles were classified as hypertrophic (type A, n = 18), normal (type B, n = 19), or deficient (type C, n = 8). Hornblower sign, dropping sign for each type were evaluated.

Results: All but one had negative hornblower sign and all had negative dropping sign in type A. Four had positive hornblower sign and 5 positive dropping sign in type B. All had positive both hornblower sign and dropping sign in type C.

Conclusion: Hornblower sign and dropping sign were useful for evaluating the state of teres minor in PS-RCT with atrophic ISP.

G2-O-27  Sleep Disturbance Due To Nocturnal Pain Improves After Rotator Cuff Repair.

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BACKGROUND: We presented the features of sleep disturbance due to nocturnal pain in patients with a rotator cuff tear during the last Annual Meeting. However, few studies have evaluated the sleep disturbance after surgery. The purpose of this study was to clarify the postoperative changes of sleep disturbance observed postoperatively.

METHODS: Forty-three patients with a rotator cuff tear suffering from sleep disturbance postoperatively were enrolled. Nocturnal pain (visual analog scale = VAS) and sleep disturbance (Athens Insomnia Scale = AIS) before surgery and 2 weeks, 1, 2, 3, 6, and 12 months after arthroscopic rotator cuff repair were assessed. AIS measures 8 factors (0 points [normal] to 3 points [severe sleep disturbance]) each sleep induction: awakenings during the night; final awakening; total sleep duration; sleep quality; well-being during the day; functional capacity during the day; and sleepiness during the day.

Factors related to persistent sleep disturbance after the surgery were evaluated.

RESULTS. There were significant improvements in AIS after 12 months of surgery (5.7/30= preop/postop, p<0.05); the number of awakening during the night decreased from 1.6 times to 0.6 times (p<0.05); and total sleep duration remained unchanged. VAS also significantly decreased from 50 to 12mm (p<0.05).

The total AIS scores and the number of awakening significantly improved from 6 months after surgery and NRS significantly improved from 1 month after surgery. The re-tears of repaired rotator cuff were highly observed in patients with persistent sleep disturbance after surgery.

CONCLUSION: Rotator cuff repair is useful in improving nocturnal pain and sleep disturbance.
G2-ST-01 Outcomes of plate fixation for anatomical humeral neck fracture

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The purpose of this study is to evaluate the risk factor of humeral head necrosis and postoperative clinical outcomes after osteosynthesis of proximal humeral fracture. Eight patients who were diagnosed as proximal humeral fracture (AO classification C1 and C2) and underwent plate fixation, were enrolled in this study. Fracture morphology was assessed using preoperative radiograph and CT. Range of shoulder motion and Japanese Orthopaedic Association score (JOA score) were assessed as postoperative outcomes. All patients showed fracture healing, but two cases showed humeral head necrosis. The two cases did not show disruption of medial hinge; however, they were four segment fracture and length of the metaphysial head extension was 0mm and they showed displacement of the tuberosities. The range of shoulder motion and JOA score were significantly inferior in cases with humeral head necrosis than cases without necrosis. Even in case with intact medial hinge, short length of the metaphysial head extension and displacement of the tuberosities are risk factors of humeral head necrosis after osteosynthesis.

G2-ST-02 The treatment of 3 and 4-part humeral neck fracture over 70 years old

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Background The treatment of 3 and 4-part humeral neck fracture remains one of the most difficult shoulder pathologies to treat, because of complication: necrosis, non-union of greater tuberosity. The aim of this study was to investigate the results of the treatments for 3 and 4-part humeral neck fracture over 70 years old.

Method We studied 27 shoulder who underwent osteosynthesis (Intramedullary Nail: 18 shoulders, Locking Plate 9 shoulders) and 28 shoulders who underwent humeral head replacement. The mean age was 75 years old in osteosynthesis group (OS group) and 78 years old in humeral head replacement group (HHR group). All patients were investigated ROM of the shoulder (flexion, external rotation, internal rotation). Student t test was used for statistical analysis.

Results In OS group, the average flexion was improved to 105.2 degrees and the average external rotation was improved to 27.3 degrees. Humeral neck necrosis was occurred in 5 shoulder. In HHR group, the average flexion was improved to 78.3 degrees and the average external rotation was improved to 239 degrees. Non-union of greater tuberosity were occurred in 9 shoulder, and the flexion was poor. The flexion of OS group was significantly higher than HHR group. On the other hand, the external rotation was no statistical differences between both groups.

Conclusion The flexion of OS group was significantly higher than HHR group. In non-union of greater tuberosity group, the flexion was poor.

G2-ST-03 Outcome of second surgery in proximal humeral fractures

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Purpose To proximal humeral fractures, which experienced a case that requires a second surgery, such as post-operative dislocation and nonunion. A purpose of this study is to weigh a postoperative treatment outcome of ORIF group given humeral head replacement(following HHR) for the secondary after one of ORIF against the HHR group which performed HHR in primary.

Materials and Methods Between 2010 and 2016, 16 patients(2 males, 14 females) with proximal humeral fractures underwent HHR. The mean age was 79.6 years. HHR group 6 shoulders, ORIF group 10 shoulders. A use model of HHR is Lima company SMR System. We weighed it between both groups about range of motion and JOA score at postoperative last observation.

Results In mean range of motion at postoperative last observation and mean JOA score, we recognized a significant difference between both groups.

Conclusion We think about postoperative greater and lesser tubercle resorption of bone and synostosis defectiveness being common the reconstruction of the soft tissue being difficult as the cause that ORIF group was underachievement. An important thing is to design treatment strategy not to require a method and the reoperation that movable training can be given early.
G2-ST-04 A case of bilateral lesser tubercle fracture

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Introduction: We report a rare case of patient with bilateral lesser tubercle fracture.
Case report: sixty-two years old woman complained bilateral shoulder pain when she supported her body by grasping the tree branch in the abducted position, and get off from the tree. She visited a nearby hospital, and computed tomography (CT) revealed bilateral lesser tubercle fracture. Then, she came to our hospital 2 days after the symptom appeared. She felt severe anterior shoulder pain and showed severe limited range of motion in both shoulder. She underwent open reduction and internal fixation using suture anchors at 2 weeks after the symptom appeared. CT revealed good fracture healing at 3 months after the surgery, and the range of motion in her shoulders improved from 6 months after the surgery.
Discussion: Isolated lesser tubercle fracture is rare injury, and this fracture has been thought to be caused by forced or extreme external rotation in the abducted position. In the present case, her arm position at the time of injury was same as previous reports. Regarding the therapeutic strategy for this fracture, it has been reported that more than 3 mm of displacement is an acceptable threshold for operative treatment. In addition, it has also been reported that anchor fixation have higher mechanical strength and tolerance than screw fixation in treating greater tuberosity fracture. Thus, surgical treatment using suture anchors for this fracture might be appropriate treatment method.

G2-ST-05 A case report of chronic isolated lesser tuberosity fracture

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A 38-year-old man presented to our hospital with a history of falling down from the bicycle seven weeks ago. On clinical examination of the right shoulder, he had almost full range of motion except for internal rotation. The muscle strength of subscapularis was decreased and he felt pain at belly-press and lift-off test. The radiograph and CT images showed the displaced isolated lesser tuberosity fracture. At ten weeks after the injury, the operation was performed. A deltoidpectoral approach was performed and the fracture site of the humeral head was decorticated. Then the fragment of lesser tuberosity was reduced to its original location. After the reduction the fragment was fixed with the 4.5mm bioabsorbable screw and to prevent displacement, the bioabsorbable suture anchor was inserted and the suture was passed to the subscapularis. Although the fracture has not yet united on the radiograph and CT images at 1 year, range of motion of the right shoulder and the muscle strength of subscapularis fully recovered. JOA score at the final follow-up was 100 points and he had no inconvenience in the activity of daily life. Lesser tuberosity fracture has been seen in cases of posterior shoulder dislocation and three or four parts proximal humeral fracture, isolated lesser tuberosity fracture was rare. As isolated fracture is difficult to diagnose on the radiograph, the fracture was missed occasionally. Even if the fracture was neglected cases, the reduction to the original attachment and rigid fixation were keys for the full functional recovery.


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We report a case of impingement syndrome after fracture of humeral greater tuberosity. The patient was 44-year-old male who is a kendo player. He sustained approximately 1mm displaced fracture of greater tuberosity. He was treated conservatively. Three months later, he obtained bone union. However, he remained in a pain when he elevated his left arm 1 year after injury. We diagnosed impingement syndrome from malunion of the greater tuberosity. Arthroscopic surgery was performed for this case. The rotator cuff was detached from the greater tuberosity and then the tuberoplasty was performed, followed by reattachment of the rotator cuff using suture anchors. At follow-up 6 months later, he had no complaints and returned to a competition. Minimally displaced greater tuberosity fractures are normally treated conservatively. In this case, to practice kendo, the patient needed to raise his arms repetitively. He might have remained in pain because of this.
G2-ST-07  Proximal humeral nonunion after shoulder arthrodesis: a case report
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Purpose: Shoulder arthrodesis has been a treatment option for shoulder joint dysfunction. Although fracture around the fixed joint is sometimes observed as one of the postoperative complications, there are few reports on how to treat these fractures.
Case: 59 years old male sustained right brachial plexus injury from a motorcycle accident at the age of 19. He received right shoulder arthrodesis and elbow flexion reconstruction, which restored his upper extremity function. Three months ago, he had a fall and sustained a right proximal humerus fracture which developed to nonunion, despite the conservative treatment by the previous doctor. We performed bone graft, plate fixation with external fixation for the treatment of nonunion. Bone union was achieved in 3 months, and after the removal of the external fixator, he was able to regain his normal ADL.
Discussion: Due to the diminished motion of the shoulder after arthrodesis, large pressure will be applied to the proximal humerus during falls, which will then lead to fractures. As one cannot adduct the shoulder to achieve firm fixation for the treatment of proximal humerus fracture after shoulder arthrodesis, conservative treatment becomes very difficult. The combination of internal and external fixation at a functional shoulder angle allowed us firm fixation of the fracture, which lead to satisfying result.

G2-ST-08  2 cases outcomes of type 5 glenoid fracture treated with ORIF; case report
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The glenoid fracture (Idenberg classification: type 5) is rare. We report 2 cases of the glenoid fracture (Idenberg classification: type 5) that were treated with open reduction and internal fixation (ORIF).
[Case1] A 46-years-old male. He was injured by motorcycle accident. It was shown the glenoid and clavicle fracture with displacement on X-ray and CT, which was classified as type 5 by Ideberg classification. We treated with ORIF using screws, and sling fixation for 2 weeks after surgery. Then active shoulder motion was allowed at 3 weeks after surgery. At 9 months after surgery, his active motion was 180 degrees in flexion, 45 degrees in external rotation, and Japanese Orthopaedic Association (JOA) shoulder score was 90 points.
[Case 2] A 47-years-old male. He was injured by motorcycle accident. It was shown the glenoid and acromioclavicular dislocation with displacement on X-ray and CT, which was classified as type 3 and 5 by Ideberg classification. We performed ORIF using screws and plate by both posterior and Delta-pectoral approach. After sling fixation for 3 weeks, active shoulder motion was allowed. At 8 months after surgery, active shoulder motion was 120 degrees in flexion, 20 degrees in external rotation, and JOA score was 81 points.
[Conclusion] Two cases of type 5 glenoid fractures was reported. We got good clinical outcomes with ORIF. In case 2, the combination of posterior approach and Delta-pectoral approach was useful for reduction.

G2-ST-09  Glenoid fracture associated with full thickness rotator cuff tear: results of arthroscopic treatment of 2 cases.
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We encountered two cases of glenoid fracture associated with full thickness rotator cuff tear. The first case, a 77 year old female was injured in a fall, after which her shoulder showed severe instability that persisted despite manual reduction. MRI images revealed a middle size rotator cuff tear, so the bone fragment and rotator cuff tear were repaired arthroscopically 14 days after injury. The second case, a 68 year old female was injured in a fall while riding a bicycle. Subsequently her shoulder tended to dislocate easily due to glenoid fracture associated with a massive rotator cuff tear. Surgery was performed 21 days after injury for the simultaneous reduction of the bone fragment and repair of the rotator cuff. The rotator cuff was irremovable but her subscapularis was intact and we were able to reattach the infraspinatus to the greater tuberosity, so we opted for a partial rotator cuff repair. Favorable shoulder function was achieved in both patients, with JOA scores of 89 and 93 points respectively. For the restoration of shoulder function it was important in these cases to repair both the rotator cuff tear and the glenoid rim fracture.
G2-ST-10 Arthroscopic reduction and internal fixation for the glenoid fractures

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We investigated the clinical results of arthroscopic reduction and internal fixation for the glenoid fractures. Fracture type of three patients (1 male and 2 females), mean age 33 years (23-45), were classified into Ideberg type 2 (2) and type 4 (1). The fractures were reduced under arthroscopy and fixed with screws inserted from Nevisar portal. DTJ screw for 2 patients and cannulated cancellous screw for 1 patient were used. One patient had bucket handle tear of anterior labrum, so it was resected. All fractures healed at 3 months postoperatively. No complication was occurred. The average range of motion of affected shoulders at final follow-up was 160 degree for forward flexion, 75degree for external rotation at 0 degree of abduction, and T9 for internal rotation. In conclusion, arthroscopic reduction and internal fixation for the glenoid fractures was a minimally invasive, safe and effective method.

G2-ST-11 Arthroscopic surgical procedure is effective for fracture of coracoid process with acromio-clavicular dislocation: a case report

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Isolated acromioclavicular (AC) joint dislocation is frequent injuries that account for approximately 9% of all shoulder girdle injuries. On the other hand, AC joint dislocation associated with coracoid process (CP) fracture is an uncommon combination of injuries. Surgical and conservative treatments are still controversial by current literature. We report the case of a 74-year-old man presenting a AC joint dislocation with CP fracture due to a fall on the left shoulder. Both injuries are treated surgically. First, the AC joint dislocation is reduced anatomically under macroscopic and radiologic control and temporarily transfixed with a K-wire. Then, we check gleno-humeral joint and clean rotator interval to identify the base of the coracoid under arthroscopy. The displaced CP fracture was visualized, and then with arthroscopic-assisted and fluoroscopy-guided technique, percutaneously fixation was made with a 3.5mm cannulated screw. Postoperatively, the patient was followed up for 2 weeks with the application of a simple shoulder sling. Active-assisted rehabilitation of the shoulder was initiated 4 weeks after surgery. At the last follow-up of 12 months, the patient had painless full shoulder functions and X-rays show bony union. Early recovery to normal life is possible with surgical treatment in patients with AP dislocation combined with CP fracture.

G2-ST-12 Open Reduction and Internal Fixation by Using Self-lokcing Pin and Circumferential Wiring, "Himawari Method" for Acromion Fracture ; A Case Report

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Appropriate treatment of acromion fractures with severe displacement of bone fragment or multiple bone fragments, which are rare conditions, is important to prevent shoulder external impingement caused by malunion and pseudoarthrosis. We report herein a case of acromion fracture treated successfully with open reduction and internal fixation by self-locking pin and circumferential wiring, "Himawari method". A 53-year-old man fell down and he was taken to a neighboring clinic with his right shoulder painful and immobile. He consequently referred to our hospital because of an acromion fracture in the radiogram. Plain radiographs and CT imaging of the right shoulder showed the fracture of the right acromion whose third bone fragment was located in the acromial angle. An open reduction and internal fixation by "Himawari method" was performed six days after the injury. The reduction and internal fixation of the acromion fracture were done by four self-locking pins drove into from the anteromedial, the anterolateral angle of the acromion, the third bone fragment and the distal end of the scapular spine to the contralateral bone fragment and circumferential wiring. One month after surgery, he had almost no limitation of the activity of daily life and return to his work. Three months after surgery, plain radiographs and CT imaging showed the union of the acromion fracture. JOA score and JSS AC joint score were 100 points and 100 points, respectively. We conclude that open reduction and internal fixation by self-locking pin and circumferential wiring, "Himawari method" may be useful in cases of acromion fractures.
G2-ST-13 Open reduction and internal fixation for pseudoarthrosis of the scapula body fracture: A case report

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We report a case of open reduction and internal fixation for pseudoarthrosis of the scapula body fracture. 50-year-old male, who was injured by bicycle accident and was diagnosed left scapula spine and body fractures. Traction therapy with zero position for one month carried out and rehabilitation was started within pain. Even five months after the injury, he had still shoulder pain and limitation shoulder range of motion. Internal fixation with two reconstruction plates was performed with diagnosis of pseudoarthrosis. He got 90 degree of active elevation and released from left omalgie from early postoperative period. After surgery four months, he went back into business because he got almost full range of motion of shoulder. Open reduction and internal fixation was considered to be effective to treat for pseudoarthrosis of scapula body fracture that was unresponsive to conservative treatment.

G2-ST-14 A report of three cases of complex injuries of the shoulder girdle.

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Complex injuries of the shoulder girdle with scapular fractures are relatively uncommon. We report three cases of complex injuries of the shoulder girdle on a discussion of the literature. A 51-year-old woman was injured by falling at the stairs. The diagnosis is left clavicle distal end fracture, left acromion fracture, and left glenoid fracture by a simple X-ray image and 3D-CT examination. The operation was performed on the injury 10 days. We did not perform the internal fixation for the clavicle and acromion fractures because their displacement was a minor. The glenoid fracture was fixed with a screw from the coracoid process. JOA score at eight months after the surgery was 74 points. A 60-year-old man was injured by falling from the loading platform. The diagnosis is left clavicle diaphyseal fracture, left acromion fracture, and left glenoid fracture including the coracoid process. On the injury 7 days, we performed open reduction and internal fixations with plates and screws for the clavicle fracture and acromion fracture. The scapular glenoid fracture was fixed with a screw from the coracoid process. JOA score at 16 months after the surgery was 89 points. A 67-year-old man was injured was injured by falling at the stairs. The diagnosis is left clavicle distal end fracture and left coracoid process fracture. On the injury 7 days, we fixed with Kirschner wires for the clavicle fracture, and with a screw for the coracoid process fracture. JOA score at 13 months after the surgery was 92 points.

G2-ST-15 Arthroscopic labrum and cuff repair in the case of intramedullary nail fixation for the humeral fracture

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A case is 39-year-old woman.She made contact with the passenger car while riding on a bicycle.She injured her left femur shaft fractures, and admitted to our hospital.The next day we went to her surgery of intramedullary nail fixation.Because of good bone fusion, we extracted the intramedullary nails nine months after the operation.After 4 months she again admitted.When we moved her left shoulder,she showed clicks and her shoulder pain.In the physical examination we showed anterior instability of her left shoulder.From the results of CT after arthrograpy and MRI, we doubted the damage to anterosuperior labrum.We recognised a complete rupture of SSP on the around the insertion of intramedullary nail.Eight months after the nail removal, we did the arthroscopic surgery.In the surgery we found the dysfunction of MGHL and anterior laxity of the femoral head.We found partial tear of subscapularis tendon and complete tear of supraspinatus tendon.We repaired the labrum,MGHL and rotator cuff using the anchors.At 6 months after arthroscopic surgery,anterior instability and her shoulder pain were improved,JOA score improved with 93 points after 6 months from 65 points before surgery.Inserting and removing the intramedullary nail,there will be the possibility of damaging the rotator cuff.We should consider that there is the possibility that humeral fractures will complicate with injury of rotator cuff and labrum.
G2-ST-16 Concomitant ipsilateral humeral neck and shaft fractures in an elderly patient treated with hemiarthroplasty and periprosthetic cable-plating system

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Concomitant ipsilateral humeral neck and shaft fractures are extremely rare. This is a case of concomitant ipsilateral humeral neck and shaft fractures in an elderly patient successfully treated with a prosthetic replacement for the humeral neck fracture and locking compression plate with a cable-plating system and periprosthetic screws for the humeral shaft fracture. An 85-year-old woman fell onto her right side. Plain radiographs and computed tomography showed four-part proximal humeral fracture and mid-shaft spiral fracture. Surgery: After removal of the humeral head, the trial humeral long stem was inserted. With the trial stem inserted, the humeral shaft was fixed with a 6-hole locking compression plate placed under the radial nerve with four cables and two periprosthetic screws. After the fixation of the humeral shaft, a prosthesis with bone cement coated on the stem was inserted. Finally, the greater and lesser tuberosities were repaired with heavy nonabsorbable sutures. One year after the operation, plain radiographs showed bone alignment was maintained without loosening of the prosthesis. She had acceptable active range of movement in her shoulder with forward flexion of 100 degrees, external rotation 20 degrees, and internal rotation up to L5. This case is classified into type A fracture according to Maresca’s classification. But internal fixation was not applicable because the proximal humeral fracture was four-part fracture. Bone graft with wiring or long humeral stem prosthesis were treatment options in this case. However, in order to achieve early rotational stability, we used cable system and periprosthetic screws in this case.

G2-ST-17 A case of glenoid cavity fracture and proximal humerus fracture with anterior shoulder dislocation

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Surgical osteosynthesis for glenoid cavity fracture and proximal humeral fracture with anterior dislocation of the shoulder joint was underwent. Case 54-year-old woman. She was diagnosed with a shoulder fracture dislocation in fall injured riding the bike. Anterior infraglenoid cavity fracture accounted for 25% of the transverse diameter, proximal humerus fracture is in the Neer classification type 4 with humerus head dislocated in axillary cavity. Glenoid fracture was fixed by Twin Anchor Footprint Fixation procedure (TAF) and proximal humerus fracture fixed by using the plate. After Varus deformity of humerus head was progressed postoperatively. Plate was removed at one year after surgery. Humerus head cartilage was not degenerated with union of the glenoid cavity fracture arthroscopically. Range of motion is sitting automatically flexion40 external rotation 40 and internal rotation at the level of 7th thoracic spine (JOA score 74.5 points) were observed. Anterior infraglenoid cavity was fixed by TAF. 4-part fracture dislocation of the humeral head would be often selected hemiarthroplasty. In this time osteosynthesis was selected because she was young. But we must carefully observe her because of the risk of humeral aseptic bone necrosis in the future.

G2-ST-18 Treatment of proximal clavicle fractures

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Proximal clavicle fractures treated by open reduction and internal fixation with anatomical locking plate (Acumed locking clavicle J plate) were reviewed retrospectively. Four proximal clavicle fractures operated between December 2014 and February 2016 were included in this study. There were 3 male and 1 female, mean age was 69.0 years old. According to Robinson's classification, there were 1 typeIB1 fracture and 3 typeIB2 fractures. Mean follow up period was 90 months. We investigated operative time, complications and JOA score at final follow up. Mean operative time was 63.9 minutes, there were no intraoperative complications such as pneumothorax and vascular injury. There were no infection and implant breakage. Mean JOA score at final follow up was 96.7 points (One case was excluded because of short follow up period). The clinical results of locking clavicle J plate was almost good and suggested this plate is one of the useful material.
G2-ST-19 Fracture of the proximal clavicle with locking plate
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Background: We reported what type of proximal clavicle fracture required operative treatment, but conservative treatment is apt to be chosen. We treated proximal clavicle fracture with locking plate for distal radius fracture which could fix the fracture by mono cortical screw.

Methods: This series included 5 cases. There were 3 males and 2 females. The mean age at operation was 65.4 years old. The Robinson classification of fractures was type 1A1 in 1, Type1B1 in 3, Type1B2 in 1 cases. Four cases were complicated with other injuries around the shoulder girdle. In all cases, we fixed the fracture by locking plate for distal radius fracture and isolated cannulated screw. In non union case, we performed autogenous cancellous bone graft from iliac bone.

Results: All cases are good results, without non-union, hardware complications and any other complication.

Conclusion: We could use locking plate safely, because it enable us to fix fracture without penetrating contralateral cortical bone with screw. But using locking plate was insufficient for rotational instability, so additional screw was necessary for rigid fixation. We hope development of locking plate for proximal clavicle, which can fix the fracture sufficiently.

G2-ST-20 CT analysis of the complicated midshaft clavicle fractures
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Purpose We aimed to analyze fracture patterns of the complicated midshaft clavicle fractures and compared with simple midshaft clavicle fractures. Material and Methods Fourteen patients with midshaft clavicle fractures associated with scapula or rib fractures and 14 patients with simple clavicle fracture were enrolled. CT data of the bilateral clavicle were used. The length of the proximal and distal fragments were measured. The distance from the proximal end to the proximal point of the fracture line was defined as the length of the proximal fragments. And the distance from the distal end to the distal point of the fracture line was defined as the length of the distal fragments. We calculated the percentage of the distal and proximal fragments regards to the intact clavicle. Mann Whitney U-test was used to compare the length percentage of the proximal and distal fragments in complicated fracture group and simple fracture group.

Results The length percentage of the proximal fracture group was 49.6% in the simple fracture group and 43.1% in the complicated fracture group (p=0.03). The length percentage of the distal fragment was 32.7% in the simple fracture group and 34.6% in the complicated fracture group (p=0.23).

Conclusion The length of the proximal fragment was shorter in complicated fracture group. To achieve fixation in the proximal fragments is often difficult due to risk of vascular injuries. Therefore in case of complicated fractures, rigid fixation such as locking plate will be recommended.

G2-ST-21 Arthroscopic surgical technique with Dog Bone Button for distal clavicle fracture
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The purpose of this study is to evaluate the clinical results of surgery with Dog Bone Button for distal clavicle fracture. 18 cases (male 14, female 4, 48.9±9.0) were followed up over 6 month. Post-operative rehabilitation was no sling, no limited IR and ER. Abduction and flexion were limited to 90 degree for three weeks after operation. 16 cases had union of fractures. In 3 month after surgery, VAS was 4.0±6.9cm, JOA score was 83.4±10.4, Constant score was 78.7±8.5, Flexion was 162.0±19.9 degree, Abduction was 165.3±22.2 degree, External rotation was 90.6±12.0 degree. In 6 month after surgery, VAS was 1.6±5.2cm, JOA score was 88.0±7.7, Constant score was 81.9±7.7, Flexion was 160.3±15.5 degree, abduction was 160.3±18.6 degree, External rotation is 52.0±13.2 degree. All cases are pleasure with their cosmetic results. Although this surgery is a minimum invasive technique and the results is satisfied. It is necessary to get special skill for this operation.
G2-O-28  Clinical outcome in patients with complex regional pain syndrome after arthroscopic rotator cuff repair
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Purpose: We have previously reported an incidence of complex regional pain syndrome (CRPS) after arthroscopic rotator cuff repair (ARCR), therefore, the present study investigated clinical outcome in patients with CRPS after surgery.

Materials and Methods: 144 patients with ARCR who were available for at least one year follow-up were subject of this study. Utilizing the criteria advocated by Ministry of Health, Labor and Welfare CRPS study team in Japan, those who had 2 points or more were diagnosed as CRPS. According to the onset period, the subjects were divided into 3 groups: Early group (occurred within 6 weeks), late group (beyond 6 weeks), and non-CRPS group.

Functional outcome measures consisted of Japanese Orthopaedic Association score (JOA score), visual analog scale, range of motion, muscle strength.

Results: A total incidence of CRPS after ARCR was 29.9 % (44 of 141 patients): 22.2% (22 of 141 patients) in the early group and 8.3% (12 of 141 patients) in late group, with significant difference (p < 0.01). The CRPS score in the early group significantly improved from 1.9 points at onset to 0.2 points at one year after surgery, and improved from 2.3 points to 0.5 points in the late group (p < 0.01, respectively). There were no significant difference of JOA score among the 3 groups, throughout the periods.

Conclusion: On the basis of the results we obtained, the present study conclude that CRPS after ARCR does not affect postoperative shoulder function.

G2-O-29  Complex regional pain syndrome (CRPS) after rotator cuff repair
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Background: Complex regional pain syndrome (CRPS) is a serious complication after rotator cuff repair. We report a retrospective study of patients that we diagnosed CRPS after rotator cuff repair, and we performed an oral medical treatment.

Materials and methods: 409 shoulders which performed rotator cuff repair between January 2009 and April 2015 were included for this study. Oral medical treatment was performed for 31 shoulders. There were 18 males and 13 females. The mean age at surgery was 65.1 years old. Oral medical treatment drug was mainly steroid. According to the last time of CRPS symptom, the subjects were divided into 2 groups: improvement group (within 2 months) and resistance group (beyond 2 months). We analyzed sex, age, dominant side, tear size, trauma, diabetes, shoulder contracture, insurance, the onset period and the period between the day diagnosed CRPS and the day started oral medical treatment.

Results: CRPS rate was 7.6%. Improvement group was 21 cases. Resistance group was 10 cases. The onset period in improvement group was 37.5 days postoperatively and that in resistance group was 25.1 days postoperatively. The onset period in resistance group was significantly earlier. There was no significant difference in the other items.

Discussion: The average onset period was about 5 weeks. This matches to the removal time of the sling. We have to adjust the removal time of the sling according to the pain. We suggested that the earlier the onset is, CRPS is easy to proceed to the resistance.

G2-O-30  Pneumothorax and subcutaneous emphysema in arthroscopic rotator cuff repair
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We experienced 15 patients of pneumothorax and subcutaneous emphysema in 646 arthroscopic rotator cuff repair during 6 years. The incidence was 2.3%. The lateral position under general anesthesia was used in all cases. There were 8 male and 7 female, 11 right and 4 left shoulders. In all 15 cases, pneumothorax and subcutaneous emphysema occurred on the operative side. The average age was 69.6 years old. The tear size was moderate in 2, large in 9 and massive in 4 shoulders. The mean surgical time was 138 minutes. There were 11 with pneumothorax alone, 3 with pneumothorax accompanied by subcutaneous emphysema, and 1 with subcutaneous emphysema alone. In 11 patients, pneumothorax was confirmed in X-ray images of the shoulder immediately after surgery. A chest drainage tube was inserted in the operating room. Pneumothorax was overlooked in 3 patients. Oxygen saturation was low in these 3 patients on the day after surgery. Therefore, chest X-ray examination was performed to confirm pneumothorax. Then, a chest drainage tube was inserted in 2 patients. One patient had conservative treatment. Possible causes of pneumothorax and subcutaneous emphysema include the following; 1) positive pressure on the lung under endotracheal intubation; 2) extensive infiltration of irrigation fluid into subcutaneous tissue in the thoracic wall, resulting in insufficient extension of the thorax; 3) load imposition on the thoracic region due to pressure of the perfusion pump; 4) low temperature burn by heated irrigation fluid due to the use of a radiofrequency device.
G2-O-31  Pulmonary embolism after arthroscopic shoulder surgery: cases report and the study of D-dimer value
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We experienced two cases of pulmonary embolism after ARCR and investigated the value of D-dimer after shoulder arthroscopic surgery.

Cases report: Case1. A 59 years old man felt chest pain on the next day following ARCR. The blood sampling showed low SaO2 and high value of D-dimer. CT declared pulmonary thrombus. Case 2: A 51 years old man felt discomfort in chest in walking on next day following ARCR. CT showed thrombus at pulmonary arteries and leg vein. Both cases were nonsmoker and had no medical histories. Both were medicated with low molecular weight heparin intravenous drip injection for 1 week and oral medicine of edoxaban for 3.6 months. D-dimer study after shoulder arthroscopic surgery: Subjects were 31 patients and the value of D-dimer was measured pre-op, 1day, 2days and 7days after surgery. The values beyond the normal range were observed in 11 cases on the next day, and 16 cases after 7days. In one case high value over measurable range was observed on the next day without abnormal finding and any symptom. CT study declared the small pulmonary embolism (PE).

Discussion: Few cases of PE following shoulder arthroscopic surgery has been reported. In these reports, PE diagnosed after two weeks following operation at the earliest, when severe symptoms appeared such as dyspnea or DIC. In our three cases measurement of D-dimer could definite diagnosis of PE in early stage without severe symptom or SaO2 decrease. Our study declared the usefulness of the measurement of D-dimer for early diagnosis of PE.

G2-O-32  Intraoperative neuro-monitoring in reverse total shoulder arthroplasty
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[Objective] To evaluate the risk of nerve injury with neuro-monitoring during reverse total shoulder arthroplasty (RSA).

[Materials & Methods] This study included 15 shoulders of 15 patients (11 females and 4 males) who underwent RSA. The mean age was 74±8 years old.
Nine shoulders had cuff tear arthropathy, four had massive rotator cuff tear, two had osteoarthritis and one had rheumatoid arthritis. Somatosensory evoked potential (SEP) of median nerve, transcranial motor evoked potentials (TcMEP) and free-electromyograms (free-EMG) from all arm myotomes were continuously monitored. We defined a nerve alert as 50% amplitude attenuation or 10% latency prolongation of SEP and TcMEP, and sustained neurotetic discharge on free-EMG.

[Results] Nineteen alerts were recorded in 10 patients. Twelve alerts associated axillary nerve. Eight alerts occurred in glenoid implantation. A patient without recovering from nerve alert had clinical axillary nerve palsy.

[Conclusion] This study suggested that the axillary nerve was highly exposed to injury during glenoid implantation.

G2-O-33  Investigation of patients with shoulder joint palsy
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The purpose of this study was to investigate the characteristics of the patients with shoulder joint palsy. Twenty one patients were admitted shoulder joint palsy until April, 2016. Finally, they were diagnosed as neuralgic amyotrophy, cervical spondylosis, OPLL, cervical cord tumor, ALS, SMA, axillary nerve palsy, and long thoracic nerve palsy. Two cases of peripheral nerve palsy were 20's. ALS were 44 and 57 years old. Six of 7 cases more than 70 years old were neuralgic amyotrophy or cervical disease. All three bilateral palsy were motor neuron disease. Seven cases of 9 acute development were neuralgic amyotrophy. The appearing slowly but progressive in 2 cases with ALS. Muscle atrophy was observed in 12 cases. Though all patients were preserved passive motion, most patients could not perform active forward elevation. Sensory disturbance was not observed in most cases. Rotator cuff tear was observed in 9 cases by MRI. Clinical investigation with body check is necessary to determine genuine shoulder joint palsy. Cooperation with spine surgeons, neurological physicians, and electromyogram specialists is important.
G2-O-34  Assessment of shoulder function and morbidity of shoulder destruction in patients with rheumatoid arthritis

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[Background] The purpose of this study is to assess shoulder functions and morbidity of shoulder destruction in patients with rheumatoid arthritis (RA) in our hospital.

[Material and methods] In 244 patients with RA, we investigated shoulder pain, disorder of range of motion (ROM). If the patients have pain and/or ROM disorder, we took X-ray of the shoulder and assess the joint destruction grade according to Larsen grading scale. In term of upper extremity function, we used mHAQ (modified health assessment questionnaire).

[Result] Among 244 patients (488 shoulders), 41 shoulders (8.4%) had pain and/or ROM disorder. Especially, 19 patients (7.8%) had bila-lateral shoulder pain. 5 shoulders finally did not have pain although they showed Larsen grade 5 and low functions because of Mutilans type. According to Larsen grade, grade I was 1 shoulder, grade 2 was 3 shoulders, grade 3 was 8 shoulders, grade 4 was 7 shoulders, grade 5 was 12 shoulders.

[Conclusion] In our hospital, morbidity of shoulder destruction in patients with RA was 8.4% and bila-lateral morbidity was 7.8%, which supported patients with RA usually have bila-lateral joint pain. In the Mutilans, 5 shoulders (1.2%) have painless although the shoulder had Larsen grade 5 destruction and low functions.

G2-O-35  Study of the usefulness of the shoulder Virtual Reality Arthroscopic Trainer: Training by VRAT improves the shoulder arthroscopic surgery skills?

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Purpose of this study was to evaluate whether training with shoulder Virtual Reality Arthroscopic Trainer (VRAT) improved surgical skill.

Materials: Twelve orthopedic surgeons (training(T) group: 5, non-training (N) group: 7). no age, years of experience in the significant difference between two groups.

Methods: pre-assessment: During arthroscopic surgery spending time to probe 9 points was measured, and the instructor evaluated skill of arthroscopy by five items (accuracy and the roughness of the scope and probe handling, and time: each of 0, 1, 2 points) . total Global Score: GS 10 points) Three cases (AS Bankart 1 case, ARCR 2 cases) was carried out. Correcting time ratio (material's time/instructor's time) was calculated. Training: T group was trained for 25 hours using VRAT. N group without training. Ex-post evaluation was carried out in three cases the same probing a priori.

Results and Discussion: N group: there was no change in time, time ratio, and GS. The significant shortening of time after training in T group (44to139 seconds P<0.05) shortening of the time ratio 6.17to2.17: P=0.05) was observed. GS was the improvement trend. Training by VRAT was confirmed that improve the shoulder arthroscopic surgery skills, think that would contribute to reducing the learning curve for shoulder arthroscopic surgery and patient safety.

G2-O-36  Propionibacterium acnes contamination of the suture in the shoulder arthroscopy: a prospective randomized study

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During the arthroscopic rotator cuff repair (ARCR), sutures from the anchor are exposed on the wet skin, which could be a potential risk of bacterial contamination, especially Propionibacterium acnes. Preoperative skin antisepsis has the potential to decrease the risk of surgical-site infection. Purpose of this, single-center, randomized, controlled trial, was to evaluate whether the use of chlorhexidine alcohol for preoperative skin antisepsis with or without a plastic adhesive drape were superior to the use of iodine for the prevention of bacterial contamination.

Methods: Patients undergoing ARCR were randomly assigned into four groups according to skin preparation: group I for iodine use, group I+ for iodine with a plastic drape, group C for chlorhexidine alcohol, and group C+ for chlorhexidine alcohol with a plastic drape. The suture tails from the first tied knot were sent to culture.

Results: A total of 125 patients were enrolled; 30 patients were assigned to group I, 33 to group I+, 30 to group C, and 32 to group C+. Suture contamination was diagnosed in 14 patients (47%) in the group I, in 11 (33%) in group I+, in 10 (33%) in group C, and in 3 (9%) in group C+. Comparing with group I, the contamination risk was significantly reduced in group C+ (risk ratio, 0.20; P = 0.001). The use of chlorhexidine alcohol with a plastic drape for preoperative skin antisepsis resulted in a significantly lower risk of suture contamination of Propionibacterium acnes at ARCR.
G2-O-37  The distance between catheter orifice and C5/C6 nerve influences the effectiveness of continuous nerve blockade after shoulder surgery

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Surgery in the shoulder region is frequently associated with severe postoperative pain. Continuous C5/C6 nerve block has been used in this setting. Previous reports demonstrated that the configuration of the catheter orifice is associated with the clinical results. However, the positional relationship of catheter orifice and nerves after the operation had not been examined. We hypothesized that malposition of the catheter orifice was concerned with postoperative severe pain. Twenty patients receiving a patient controlled interscalene analgesia catheter for elective shoulder surgery were included in this study. 0.75% ropivacaine 15ml was administered preoperatively via the catheter before surgery under general anesthesia. A ropivacaine 0.25% 4 ml/hour infusion with mandatory 24 hours, and on-demand half an hourly, 3 ml boluses was allowed as rescue. Patients were examined visual analogue scale (VAS) score, decrease in perception of C5/C6 nerve area and manual muscle test of biceps in the recovery room and at 24 hours after the operation. Concurrently, we measured the distances between catheter orifice and C5/C6 nerve by using carbon dioxide(CO2) contrast-enhanced ultrasonography technique and examined the correlation between these distances and clinical results. The orifice of the catheter was clearly detected by CO2 contrast-enhanced ultrasonography. The distances between catheter orifice and nerve were spread at 24 hours examination. The distances showed close correlation with VAS score, decrease in perception of C5/C6 nerve area and MMT of biceps. These results demonstrated that the positional relationship of the catheter orifice and nerve was associated with the postoperative shoulder pain.

G2-O-38  Shoulder arthroscopic surgery under ultrasound-guided interscalene brachial plexus block

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Purpose: The purpose of this study was to report the shoulder arthroscopic surgery under ultrasound-guided interscalene brachial plexus block alone.

Materials and Methods: Sixty patients (28 males and 32 females) who underwent shoulder arthroscopic surgery under ultrasound-guided interscalene brachial plexus block between August 2013 and April 2016 were enrolled. The mean age of patients was 61.8 years (range: 29-78 years). The anesthesia was carried out using a nerve stimulator. We used 1% mepivacaine and 0.75% ropivacaine for anesthesia. The efficacy of the nerve block was classified into grades 1 to 5. The time to induction completion from the beginning of anesthesia, and time to initial postoperative pain-killer use within 24 h after starting anesthesia were evaluated.

Results: Concerning the efficacy of the nerve block, 45 patients were grade 1, 13 patients were grade 2, and 2 patients were grade 4. The average time to induction completion from the beginning of anesthesia was 14 minutes. The average time to initial postoperative pain-killer use within 24 h after starting anesthesia were 9 hours and 3 minutes.

Conclusion: There was not the complication with the general anesthesia and seemed to be a useful method.
B2-O-01  Fascia lata augmentation for massive rotator cuff tear in a rabbit model
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Introduction: Graft augmentation using fascia lata for massive rotator cuff tear has shown a good clinical result. However, its biological effect during early healing period is not clearly understood. The purpose of this study was to evaluate the efficacy of fascia lata augmentation for rotator cuff tear at the early healing period using a rabbit rotator cuff defect model.

Methods: General anesthesia was administered to Japanese white rabbits. To create a rotator cuff defect, the infraspinatus tendon was resected from the greater tuberosity. Edge of the tendon was sutured directly to the humeral head (re-attachment group). On the contralateral shoulder, a fascia lata autograft was harvested and transplanted over the rotator cuff repaired site (augmentation group). Histological and mechanical examinations were conducted at 4 and 8 weeks postoperatively.

Results: The stronger expressions of type III collagen was seen in the augmentation group compared with the re-attachment group at 4 and 8 weeks postoperatively. The ultimate failure load of the augmentation group was significantly higher than that of the re-attachment group at 4 weeks.

Discussion: Type III collagen was reported to be expressed during the tendon healing process. Biological action similar to natural ligament healing occurred around the fascia lata grafts, and type III collagen gradually replaced by type I collagen as the tissue matured. Our results suggested that the fascia lata augmentation could stimulate biological healing and provide initial fixation strength of the repaired rotator cuff.

B2-O-02  Effect of osteoporosis on the tendon-to-bone healing after rotator cuff repair in a rat model
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Purpose: Imbalance of bone metabolism be caused by osteoporosis has possibility to affect on the tendon-to-bone healing after rotator cuff repair. The purpose of this study is biomechanically-histologically to evaluate the tendon-to-bone healing using an osteoporotic rat rotator cuff repair model.

Materials and Methods: 12 female Sprague-Dawley rats (OVX group N=6, control group N=6) were underwent detachment and immediate repair of the both supraspinatus tendon at 17 weeks after ovarietomy. The animals were sacrificed at 2, 4 and 8-weeks after surgery. At each time point, bone mineral density and new bone formation at the bone side of the repaired tendon attachment site were assessed with micro computed tomography. Furthermore, biomechanical and histomorphometric analyses were also assessed using tensile testing, and HE, SafraninO, Picrosirius red staining at each time point respectively.

Results: At 8 weeks, bone mineral density was significantly lower in OVX group than in control group (OVX group was 6827 ± 60, control group was 7698 ± 486 (P<0.001). At 8-weeks after surgery, there were no significant differences between OVX and control group in mechanical properties. However, ultimate load-to-failure seemed to be lower in OVX group than in control group (P=0.280). In histomorphometric analysis, at 2 and 4-weeks after surgery, the volume of the fibro-vascular tissue between the repaired tendon and bone in OVX group was smaller than in control group.

Conclusion: These data indicate that imbalance of bone metabolism be caused by osteoporosis would affect on the tendon-to-bone healing after rotator cuff repair.

B2-O-03  The differentiation of bone marrow-derived cells at the tendon-to-bone insertion after rotator cuff repair
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Purpose: The ideal method for foot preparation during rotator cuff repair has not been established. Drilling into the footprint allows bone marrow-derived cells to infiltrate the repaired tendon. In the present study, we examined the histologic effects of drilling into the footprint for repair of tendon-to-bone insertions.

Materials and Methods: Male Sprague-Dawley rats and green fluorescent protein bone marrow chimeric (GFP-BMC) rats were used. Three rotator cuff repair models were prepared. In group A, rotator cuff repair was performed after separating the supraspinatus tendon from the greater tuberosity and removing the residual tendon tissue. In group B, we also drilled into the footprint. In group C, the footprint was excavated until cancellous bone was exposed. Histologic repair of the tendon-to-bone insertion was evaluated at 4 weeks postoperatively.

Results: Significantly higher cartilage matrix production was observed in group B than in groups A and C. In GFP-BMC rats in group B, bone marrow-derived chondrogenic cells infiltrated the fibrocartilage layer and some of GFP-positive cells were oval shaped. In group C, GFP-positive cells were observed in tendon tissue, and tended to be spindle shaped. In group A, there were very few GFP-positive cells at the tendon-to-bone insertion.

Conclusion: Drilling into the footprint and preserving the fibrocartilage tissue induced bone marrow-derived cell infiltration into tendon-to-bone insertion and enhanced fibrocartilage regeneration after rotator cuff repair.
B2-O-04  The effect of tendon-to-bone remodeling with the use of bone morphogenetic protein-2 delivered by beta-tricilium phosphate
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Introduction: Bone morphogenetic protein-2 (BMP-2) plays an important role in tendon-to-bone remodeling. However, there was no previous literature about tendon-to-bone remodeling accelerated by BMP-2 delivered beta-tricalcium phosphate (beta-TCP). The purpose of this study was to investigate the effect of tendon-to-bone remodeling with the use of recombinant human BMP-2 (rBMP-2) delivered by beta-TCP.
Materials and methods: The infraspinatus tendon of retired female Japanese white rabbits was detached from its insertion on the humerus. The bone tunnel (4mm) was created at the original insertion of infraspinatus tendon. Infraspinatus tendon was separated by McLaughlin procedure after filling in beta-TCP (porosity 75%) without BMP-2 (Control group) or 10 ug rBMP-2 (BMP group). The rabbits were sacrificed at the 2nd, 4th, or 8th weeks after surgery for histological assessment. We also evaluated the maturity of tendon-to-bone insertion with use of tendon-to-bone maturing score.
Results: Histologic analysis revealed no significant difference between both groups at 2 weeks, but more abundant organized fibrocartilage at the tendon-to-bone interface in BMP groups at 4 and 8 weeks. The tendon-to-bone maturing score was improved sequentially.
Conclusion: The tendon-to-bone remodeling was facilitated by use of rBMP-2 with delivered by beta-TCP.

B2-O-05  TGF-beta1 contributes the increase of the amount of collagen in the reparative tissue during rotator cuff tendon-to-bone healing in rats
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Background: This study aimed to investigate the influence of TGF-β1 administration on collagen synthesis and degradation during the rotator cuff healing process in rats.
Methods: Seventy-two male Sprague Dawley (SD) rats that underwent unilateral supraspinatus tendon-to-bone repair surgery were treated with gelatin hydrogel sheets containing 100 ng of TGF-β1 (TGF-group) or PBS (Control group). At 6 and 12 weeks postoperatively, the volume and collagen content of the supraspinatus tendon-to-bone tissue were analyzed by using micro-computed tomography (CT) and a Total Collagen Assay Kit, respectively. At 2, 6, and 12 weeks postoperatively, mRNA expression and protein levels of type I and III collagen, matrix metalloproteinase (MMP)-9, and MMP-13 were analyzed by qPCR and immunostaining, respectively.
Results: Reparative tissue volume at 6 and 12 weeks postoperatively and collagen content at 12 weeks postoperatively were significantly higher in the TGF-group compared to that in the Control group. qPCR analysis showed that MMP-9 and MMP-13 expression were significantly lower in the TGF-group compared to that in the Control group at 2 weeks postoperatively. Immunostaining analysis showed that the percentage of MMP-9 and MMP-13 positive cells was significantly lower in the TGF-group compared to that in the Control group at 2 weeks postoperatively.
Conclusion: Administration of TGF-β1 at the repair site may inhibit the degradation of collagen in the early phase, resulting in larger reparative tissue volume in rat rotator cuff tendon-to-bone healing.

B2-O-06  Evaluation of rotator cuff tendon-to-bone healing with fibroblast growth factor-2-impregnated gelatin hydrogels in a rat chronic rotator cuff tear model
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Purpose: To investigate the histological and biomechanical effects of fibroblast growth factor-2 (FGF)-impregnated gelatin hydrogels on tendon-to-bone healing after rotator cuff (RC) repair.
Methods: In our chronic RC tear rat model, the insertion site of the supraspinatus tendon was transected and refixed 3 weeks later. Seventy-two adult male Sprague-Dawley rats treated with unilateral surgery were assigned to either the FGF-2 group (gelatin hydrogel containing 5 μg/mL of FGF-2) or control group (carrier only). Effects of the FGF-2 were assessed using a semiquantitative histological score at 2, 6, and 12 weeks, and biomechanical testing at 6 and 12 weeks postoperatively.
Results: Results of the histological evaluation showed hypervascular reparative tissue at the insertion site in both groups at 2 and 6 weeks. At 12 weeks, loose fibrovascular tissue was observed at the insertion site in the control group, whereas dense, tendon-like tissue was observed in the FGF-2 group. The histological score at 12 weeks was significantly higher in the FGF-2 group than in the control group, which indicated mature tendon-like repair tissue. Regarding biomechanical testing, significantly higher ultimate load to failure, stiffness, and stress were demonstrated at 6 and 12 weeks in the FGF-2 group than in the control group. The cross-sectional area was significantly larger in the FGF-2 group than in the control group at 6 weeks, but no significant differences were observed between the groups at 12 weeks.
Conclusion: FGF-2-impregnated gelatin hydrogel sheets improved tendon-to-bone healing histologically and biomechanically after RC repair in a chronic RC tear rat model.
B2-O-07  Effect of FGF-2-impregnated gelatin hydrogel sheet incorporation into the bony trough on rotator cuff healing: A rabbit model

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Purpose: To determine whether fibroblast growth factor (FGF)-2-impregnated gelatin hydrogel sheet incorporation into the bony trough on the greater tuberosity facilitates tendon-to-bone healing histologically and biomechanically after rotator cuff (RC) repair in rabbits.

Methods: We allocated 60 adult male Japanese white rabbits treated with unilateral surgery for supraspinatus tendon repair at its insertion site into 4 groups: suture-only group (Suture), suture and gelatin hydrogel sheets with phosphate-buffered saline (Carrier), suture and gelatin hydrogel sheets with 3 μg of FGF-2 (F3); and 30 μg of FGF-2 (F30). The repair-promoting effect of FGF-2 was assessed using histological, biomechanical, and micro-computed tomography (CT) evaluations 12 weeks postoperatively.

Results: At 12 weeks, loose fibrovascular tissues emerged at the tendon-to-bone repair site in Suture and Carrier groups and dense tendon-like tissues in F3 and F30 groups. The F3 and F30 groups demonstrated significantly higher ultimate load-to-failure and stress-to-failure at 12 weeks than the Suture and Carrier groups. Micro-CT imaging showed formation of ectopic calcifications and osteophytes proximal to the healing site in some specimens from each group, and the appearances or frequencies were similar among groups. No significant differences were observed between F3 and F30 groups in any evaluation.

Conclusions: The incorporation of FGF-2-impregnated gelatin hydrogel sheet into the bony trough on the greater tuberosity before surgical repair of RC tendon is feasible and results in histological and biomechanical improvements during RC healing process in rabbits 12 weeks postoperatively. No effect on ectopic calcification or osteophyte formation was observed in this model.

B2-O-08  Assessment of rotator cuff enthesis in a senescence accelerated mouse

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Rotator cuff tears could occur with acute injury, but most are the result of age-related degenerative changes. However, there is no report to prove detailed mechanisms of those changes in rotator cuff. We analyzed the age-related changes in rotator cuff using senescence accelerated mouse (SAM). 40 weeks old SAMP6 were used as an aging mouse model and SAMRI (senescence-resistant strain) as a control. An infraspinatus muscle with humerus was sacrificed for histological assessments, and a tissue around an enthesis of supraspinatus tendon was obtained for qPCR. The safranin O staining showed more positive stained tissue in SAMRI compared with SAMP6. The immunostaining revealed more type II collagen in SAMRI compared with SAMP6; while there are no differences in the expressions of RANKL or TRAP between 2 groups. In the qPCR, the gene expressions of type II collagen and tenomodulin were significantly greater in SAMRI compared with SAMP6. These results indicated that degenerative changes of hyaline cartilage and tendon were occurred in the rotator cuff enthesis but not in the bone tissue.

B2-O-09  Contribution of oxidative stress in human rotator cuff tears

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Background: Rotator cuff tear is caused by extrinsic factors such as trauma, and intrinsic factors such as degeneration. It is known that tissue degeneration is deeply involved in oxidative stress. Our studies showed that Sodl deficiency-induced rotator cuff degeneration is associated with oxidative stress. However, it is unclear whether oxidative stress is related in human rotator cuff. The purpose of this study was to investigate the contribution of oxidative stress in human rotator cuff tears.

Methods: 19 patients (19 shoulders) of rotator cuff tear (T group, 64±11 years old) and 7 patients (7 shoulders) which were surgically treated for humeral fractures (C group, 48±19 years old) were participated in this study. Specimens were collected during surgery in both group, and stained with hematoxylin-eosin (HE) and dihydroethidium (DHE). HE staining were used for histologic analysis and DHE staining were used for detection of oxidative stress marker. The statistical analyses were performed by using Unpaired t-test.

Results: The roundness of nucleus and the irregularity of collagen sequence were seen in T group. There was no significant difference between both groups in the cell numbers. Fluorescence intensity in T group was 1.28 times higher than in C group. Positive cell numbers was significantly larger in T group (2.3x10^5/mm^2) than C group (1.4x10^5/mm^2).

Discussion: Torn rotator cuff had higher fluorescence intensity and greater positive cell numbers than normal. It suggests that oxidative stress might contribute to human rotator cuff tears.
B2-O-10  Histological assessment of the rotator cuff tendon in the rat brachial plexus palsy model

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The causes of massive rotator cuff tear have not been fully clarified. However, Ochiai reported that as the size of the tear increases, the number of cases with coexisting neuropathy due to the cervical spine lesion increases. According to these results, cervical spine lesion was thought to be more frequently coexisting with massive rotator cuff tears. Furthermore, massive rotator cuff tear is thought to be easily occurred because of pre-existing extensive fatty degeneration due to pre-existing neuropathy. Although we created a rat model of brachial plexus paralysis and to evaluate the effects of the paralysis on the supraspinatus and infraspinatus tendons and showed that pre-existing neuropathy is thought to be one of the causes of massive rotator cuff tears last year, histological change of rotator cuff tendon is not evaluated. The purpose of this study was to evaluate the histological change around musculotendinous junction of supraspinatus and infraspinatus tendons semiquantitatively using Donar scale at 12 and 16 weeks after operation. There were no degeneration around musculotendinous junctions at both 12 and 16 weeks in the sham group. To the contrary, degeneration around musculotendinous junction of the supraspinatus and infraspinatus muscles was observed at 12 and 16 weeks in the paralysis group. According to our results, pre-existing neuropathy caused the vulnerability of the rotator cuff tendon histologically. Furthermore, it was thought that rotator cuff tear would be easily occurred in the paralysis due to the degeneration of rotator cuff tendon.

B2-O-11  The effects of teriparatide and denosumab on cancellous bone metabolism in the proximal humerus

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(Purpose) Differences in detailed histological appearance of cancellous bone of humerus after administration of PTH, anti-RANKL or switching from PTH to anti-RANKL antibody have not been clarified. The objective of this study was to analyze these differences in structural and histological appearance using ovariectomized (OVX) mice.

(Materials and Methods) Twelve-week-old female C57BL/6 mice were either ovariectomized or sham operated (SHAM group). Four weeks after the surgeries, the OVX mice were subjected to one of the following four treatment options: phosphate-buffered saline (PBS) for 8 weeks (OVX group), PTH (80 µg/kg/day, 3 days a week) for 4 weeks followed by PBS for 4 weeks (PTH4W group), PTH for 8 weeks (PTH8W group) and PTH 4 weeks followed by anti-RANKL antibody (RANKL-MCA, single injection of 5 mg/kg) (SWITCH group). All mice were euthanized 12 weeks after the surgeries. Humeruses were subjected to histomorphometric analysis.

(Results) Histomorphometric analysis demonstrated that in proximal humerus cancellous bone, bone volume was highest in SWITCH group and lowest in PTH8W group. There were significant differences between SWITCH group and OVX, PTH4W, PTH8W group. Bone resorption, formation, and formation speed were lowest in SWITCH group and again there were significant differences between SWITCH group and other groups.

(Conclusion) Bone mass decreases if we don’t treat osteoporosis after administration of PTH compared to no treatment. Switching from PTH to anti-RANKL antibody increase cancellous bone volume compared to PTH continuation.

B2-O-12  The effects of teriparatide and denosumab on cortical bone metabolism in the proximal humerus

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(Purpose) Differences in detailed histological appearance of humeral cortical bone after administration of PTH, anti-RANKL antibody or switching from PTH to anti-RANKL antibody have not been clarified. The purpose of this study was to analyze these differences in histological appearance using ovariectomized (OVX) mice.

(Materials and Methods) Twelve-week-old female C57BL/6 mice were either ovariectomized or sham operated (SHAM group). Four weeks after the surgeries, the OVX mice were subjected to one of the following four treatment options: phosphate-buffered saline (PBS) for 8 weeks (OVX group), PTH (80 µg/kg/day, 3 days a week) for 4 weeks followed by PBS for 4 weeks (PTH4W group), PTH for 8 weeks (PTH8W group) and PTH 4 weeks followed by anti-RANKL antibody (RANKL-MCA, single injection of 5 mg/kg) (SWITCH group). All mice were euthanized 12 weeks after the surgeries. Humeruses were subjected to histomorphometric analysis.

(Results) Histomorphometric analysis demonstrated that the rotator cuff tendon insertion has 4 layers (tendon, unmineralized fibrocartilage, mineralized fibrocartilage, lamellar bone). In the tendon insertion, the cortical bone and mineralized fibrocartilage widths were widest in SWITCH group. There were significant differences between SWITCH group and other groups. The cortical bone width of medial and lateral part of tendon insertion was widest in SWITCH group. In addition, there were significant differences between SWITCH group and other groups.

(Conclusion) In proximal humerus, Switching PTH to anti-RANKL antibody increased cortical bone width compared to PTH continuation. Rotator cuff tendon insertion has 4 layers and anti-RANKL antibody increases mineralized fibrocartilage layer width.
B2-O-13  Role of necroptosis, a novel type of cell death, in the development of steroid-induced osteocyte necrosis
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[Abstract] The role of necroptosis, a novel type of cell death, in the development of steroid-induced osteocyte necrosis was investigated.

[Method] Dexamethasone (DEX) 1μM was added to cultured osteocytes MLO-Y4 that were left in a hypoxic environment for 24h (Hypoxia+DEX) group. Another group was treated in the same way but with necrostatin-1 (Nec-1), a specific inhibitor of necroptosis, added at the same time as DEX (Nec). As a control, osteocytes were cultured at a normal concentration of oxygen for 24h (N). Using an Apoptosis-Necrosis assessment kit the state of cell necrosis was determined. Furthermore, RIP1 activation upon necroptosis induction was studied immunohistochemically and by Western blot.

[Results] The development rate of osteocyte death was 22%, 14% in N, 133%, 123% in HD, 58%, 21% in Nec, with a significant osteocyte necrosis inhibiting effect found with Nec. In both immunohistochemical and Western blot studies HD increased RIP1 expression. In contrast, Nec-1 administration suppressed RIP1 expression.

[Conclusion] In the developmental process of steroid-induced osteocyte necrosis, RIP1 expression increased. With Nec-1 administration RIP1 expression was inhibited and the osteocyte necrosis development rate significantly decreased, suggesting involvement of necroptosis. Necroptosis may be an attractive target to clarify the mechanism of steroid-induced osteonecrosis and devise countermeasures.

B2-O-14  A study of relationship between expression of pain-related factors and Interleukin-1β and IL-1β (IL-1&beta) in patients with rotator cuff disease
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INTRODUCTION Recent study reported that elevation of Interleukin-1β and IL-1β expression in subacromial bursa is correlated with increased pain in patients with rotator cuff disease. However, the pain pathways are not fully understood. Here, we investigated the relationship between regulation of IL-1β pathway and shoulder pain using synovial cells derived from rotator cuff disease.

MATERIALS AND METHODS A total of 7 patients underwent arthroscopic rotator cuff repair at our institution. A sample of synovial tissue was harvested from subacromial bursa and glenohumeral joint of each patient. The obtained cells were cultured and stimulated with IL-1β (50 ng/ml), IL-1&beta and COX2 inhibitor, NGF (50 ng/ml) and PGE2 (10 &micro;M) for 24 hours. Cells were then harvested for RNA isolation, and we analyzed the expression levels of NGF, COX-2 and PGE2 by performing Real-Time PCR.

RESULTS Expression of NGF and COX2 increased significantly than control cells in the presence of exogenously added IL-1β. Stimulated with IL-1&beta, there was no suppression of NGF in the presence of COX-2 inhibitor. The expression level of COX-2 and IL-1&beta was not increased with NGF stimulation. No differences in IL-1β and NGF expression levels were detected under stimulated with PGE2.

CONCLUSION Although COX-2 expression increased significantly in the presence of added IL-1β, the expression levels of NGF was independent on COX-2. There is a possibility that IL-1β is correlated to pain through NGF, which is another way of arachidonic acid cascade in patients with rotator cuff disease.

B2-O-15  Targeting of PDGFR α Suppresses Fat Infiltration After Rotator Cuff Tear
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(Background) Muscle fat infiltration often occurs after rotator cuff tear (RCT) and renders surgical repair of the rotator cuff formidable. Therefore, it is crucial to develop a therapeutic method to prevent fat infiltration. Recent reports have shown that PDGFR α positive mesenchymal stem cells (MSCs) are associated with fat infiltration in muscle. The aim of this study is to investigate if targeting of PDGFR α can be a therapeutic option for preventing fat infiltration.

(Methods) 9 weeks old C57BL/6 male mice were used in the present study. The left supraspinatus nerve and the supraspinatus muscle tendon were exposed and severed. In addition, the humeral head was resected to minimize the chance of tendon healing. Mice were treated p.o. with a PDGFR inhibitor Imatinib (30 mg/kg, Tx-group) or PBS (Ctrl-group). The gene expression profiles in the supraspinatus muscle were analyzed 2 weeks after surgery. Histology and Western blotting were performed using the specimens collected 4 weeks after surgery.

(Results) Gene expression analysis revealed a significant decrease in the transcripts of adipogenic differentiation markers, including Cebpα, and Pparγ, in the Tx-group compared to the Ctrl-group. In accordance, fat infiltration was markedly suppressed in the Tx-group. The decrease in the number of the PDGFR α positive cells and the expression of PDGFR α protein were confirmed by Histology and Western blotting respectively.

(Conclusion) Our data suggest that fat infiltration can be prevented thorough targeting PDGFR α after RCT.
B2-O-16  Histological analysis on shoulder arthritis in rotator cuff patients
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The purpose of this study was to investigate the relationship between the degree of arthritis and expression of protein on inflammation in rotator cuff tear patients. We studied 74 patients (74 shoulders) who had been diagnosed the degree of arthritis before or during surgery. The patients were 38 males and 36 females. The mean age at surgery was 61 years old (range, 41-81). We divided them into 3 groups: 26 shoulders without arthritis (OA-), 24 shoulders with arthritis (OA+), and 24 shoulders with cuff tear arthropathy (CTA). We harvested tissues from rotator interval, bursa, and stump of rotator cuff during surgery. These specimens were immunostained by antibodies of IL-1β, TNFα, and NFκB, and evaluated the degree of expression by use of a semiquantitative scale (grade 0 to 4) previously reported. It is said that IL-1β, TNFα, and NFκB express in early stage of inflammation, but in rotator cuff patients, these proteins showed the lowest expression in CTA group. The expression of IL-1β in OA+ group was higher than OA− group in bursa tissue significantly.

B2-O-17  Anatomic Study and Electromyographic Analysis of the Teres Minor Muscle
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(Introduction) The teres minor muscle, an external rotator in the cuff muscles, has recently become a focused topic on the treatment of massive rotator cuff tears. However, its precise anatomy and function have not been completely investigated yet. The purposes of this study were to anatomically investigate the muscle and to analyze electromyographic (EMG) activities during shoulder motion.

(Methods) Twenty cadaveric shoulders (average 75.0 years) were used for anatomic study. EMG data were recorded from ten young healthy subjects (mean age, 21.7 years) during flexion, abduction, and external rotations at 0°, 90°, and 180° of flexion, abduction, and external rotation, respectively.

(Result) In all specimens the muscle consisted of two independent muscular bundles: the upper and lower portions which ran and intersected. The muscle always engaged force during each shoulder motion in the initial phase. EMG activities of abduction and the three forms of external rotation (ER) were similar; however, difference muscle activity was identified in flexion. Percent of maximal voluntary contraction in the three forms of external rotation were 60% in maximum ER of neutral position, 84% in flexion, and 145% in abduction.

(Conclusion) The teres minor consists of distinct upper and lower portions. The muscle engages force in all ranges of four shoulder motions and maximum ER in abduction is the reliable method to evaluate potential activity of the muscle.

B2-O-18  A histoanatomical study of the rotator cable
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Object: We performed histoanatomical investigation about the rotator cable (RC) and rotator crescent (rc).
Method: The capsules of 22 fixed shoulders were detached and macroscopically observed. The anteroposterior diameter of the humeral head and X, which was a distance between the capsule attachment site and the medial edge of RC, were measured. The position of RC was marked on the humeral head and the character of the RC location on the humeral head was examined. Histological slices including the superior and middle impressions of the greater tuberosity were examined in two additional shoulders.
Result: One shoulder with unidentified RC and another one with two RCs were excluded. Residual 20 specimens whose X were measurable included 7 shoulders which showed ambiguous borders between RC and rc. The anteroposterior diameter of the head had a strong negative correlation with X. The medial border of RC was located on the flexion point of the head, which was also observed in the histological sections.
Discussion: RC appeared to fill the gap between the rotator cuff and capsule on the flexion point of the humeral head. The compression lord between the rotator cuff and humeral head might be distributed to RC like the knee-meniscus which converts the bearing weight into hoop stress. The negative correlation between the humeral head diameter and X might show that subjects with the smaller humeral head tend to have larger X in order to hold broader surface of RC as they can distribute more tensile lord to RC.
B2-T8-1 Why dose subacromial pain relief improve arm elevation in patients with symptomatic rotator cuff tears?

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Purpose: To clarify the effect of subacromial pain relief on shoulder kinematics and muscle activities in patients with rotator cuff tears with limited arm elevation.

Methods: Eleven patients (mean age: 61 years old) with rotator cuff tears and active elevation less than 140 degrees were enrolled. The mean motion pain in visual analogue scale was 74/100 and the mean active and passive elevation was 106 degrees and 123 degrees, respectively. Shoulder kinematics and surface electromyographic data during active arm elevation in the scapular plane were measured before and after subacromial injection of 5 mL of 1% lidocaine. Motion pain and elevation angle were also reassessed after the injection.

Results: After the injection, motion pain significantly decreased to 24/100. The injection significantly improve active and passive elevation angle up to 133 and 143 degrees, respectively. Also, the scapular upward rotation significantly decreased at 90 degrees of active elevation. The injection significantly reduced the activities of the middle and lower trapezius, serratus anterior, posterior deltoid, and infraspinatus in the range from 30 degrees to 45 degrees of elevation.

Discussion: While pain relief with subacromial injection improved the range of arm elevation in patients with rotator cuff tears, it decreased scapular upward rotation. Subacromial pain relief seemed to suppress the activities of both the antagonists for glenohumeral elevation and the compensatory muscles for excessive scapular motion and depression of the humeral head. Subacromial pain relief is likely to restore the shoulder motion and muscle activities in cuff-tear patients with limited arm elevation.

B2-T8-2 Proper Site Of Steroid Injection For The Treatment Of Idiopathic Frozen Shoulder: A Randomized Controlled Trial

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Introduction: The objective is to determine whether corticosteroid injection into the subacromial space was not inferior to intra-articular injection in patients with idiopathic frozen shoulder (FS), and whether combined injections had an additive effect.

Methods: Patients with idiopathic FS (n = 126) were randomly assigned to receive ultrasound-guided intra-articular (IA group), subacromial (SA group), or combined IA and subacromial injections (IA + SA group). All groups received a total dose of 40 mg triamcinolone acetonide. The outcome measures included the VAS pain score, ASES score, subjective shoulder value (SSV), and passive range of motion before and at 3, 6, and 12 weeks after treatment.

Results: There was significant effect of time on all measurements such that all measures improved in all groups during the 12 weeks after treatment. Group-by-time interactions were significant for ASES (P = 0.006), VAS (P < 0.001), SSV (P = 0.03), and internal rotation (P = 0.014). Between-group comparisons revealed a significant improvement in the IA (P < 0.001) and IA + SA (P < 0.001) groups as compared to the SA group. The IA + SA group demonstrated significant improvement in internal rotation as compared to the IA group (P = 0.049).

Discussion: The efficacy of corticosteroid injection into the SA space in idiopathic FS was inferior to IA injection up to 12 weeks; however, combination injections had an additive effect on increasing the internal rotation angle. These results indicate that although the GH joint is a major site in the pathogenesis of idiopathic FS, the SA space may be a contributing site.

B2-T8-3 Biomechanical investigation of the shoulder kinematics by using the fresh frozen cadaver

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Background: It has not been clarified about glenohumeral transitions. The purpose of this study was to evaluate the 3-dimensional relationship of the humeral head to the scapula and the function of the rotator cuff in passive shoulder motions for cadaveric upper extremity.

Materials and methods: 7 fresh-frozen upper extremities were used in this study. Three optical markers were fixed to the scapula, humerus, radius, ulna, and 3rd metacarpal bone. The scapula was fixed to the original jig. Static weights were set on the rotator cuff, respectively, via nylon threads that reproduced the action trajectories of each muscle. The shoulder moved passively for several directions. The motions of the markers were recorded using a motion capture system.

Results: When all muscles of rotator cuff were applied of weight, the diameter of translation was equal to the reminder of subduction of the diameter of gneoid from the humerus one. When the subscapularis muscle tear, diameter of the translation was increased. When the supraspinatus, infraspinatus, and teres minor tear, center of rotation of the humerus was move upward.

Discussion: There is the difference of the diameter between the gneoid and humerus. This study revealed that the difference was equal to the diameter of the gneoid of humeral translations. This study also revealed that subscapularis muscle serves a function of stabilizer for anterior/posterior direction, and posterior parts of rotator cuff serves a function for inferior/superior direction.
B2-T8-4  Comparison of Scapulohumeral Rhythm, External Rotation Angle of the Humerus, and EMG Activity of Cuff Muscles between Elevation and Raising

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(Purpose) Elevation is defined as arm elevation with extension of the elbow joint, while raising is as arm elevation starting from the condition of elbow flexion. Given that the 2 patterns of arm motion are different; examiners would not observe the actual pattern of arm motion. The purposes of the study were to compare scapulohumeral rhythm (SHR), the external rotation angle (ERA) of the humeral head (HH), and EMG activities of the 4 rotator cuff muscles during arm elevation between the 2 patterns. (Subjects and methods) 10 healthy subjects (10 males; mean age 22 yrs) were enrolled. The angles of scapular upward rotation and ERA of the HH were measured from scapular spine angle and rotation of the line between the medial and lateral epicondyles, respectively. Electromyographic (EMG) activities of the 4 rotator cuff muscles (RCM) during elevation and raising were recorded with Teflon-coated wires synchronized with 3-D computed motion analyzer. (Results) The mean humerothoracic angle (HTA) of 2 motions were 150 degrees; in both motions, SHR over 30 degrees; of HTA did not show significant difference between 2 motions. ERA of elevation increased linearly from 0 degrees; to 60 degrees; at 150 degrees; of HTA, whereas ERA of raising gained as curved line and significantly greater than that of elevation until 90 degrees; of HTA. EMG activities of RCM of raising were statistically lower than those of elevation. (Conclusion) Elevation and raising are identified different motions.

B2-T8-5  Histological evaluation of the layers in delaminated rotator cuff tear: is it purely tendon or capsule?

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Introduction: On the delaminated rotator cuff tear, there is debate on that the articular layer is composed of tendon or capsule. The purpose of this study is to distinguish whether articular layer is a part of the torn tendon or remaining capsule layer, by histologically.

Methods: Tendon and capsule tissues were acquired from articular-and-bursal layer of three patients with delaminated tear during surgical repair. Normal rotator cuff tendon and capsule tissues were acquired from one cadaver as a control. Histological morphology under H&E stain was observed and immunofluorescence stains were applied to the tissues on four different tissues in order to evaluate the expression of CD68+macrophage (shows high-expression in capsule), and Type-I-collagen and Tenascin-C (show high-expression in tendon).

Results: Histologically, collagen bundles were observed in normal tendon. These collagen bundles were also observed in both layers of delaminated tear. However, different from the tendon layer tissues of delaminated tear, outer layer of cadaveric capsule tissue (control) was surrounded by the proliferated synovial cells. The expression of CD68+ was higher in cadaveric capsule than normal tendon of a cadaver and both layers of delaminated tear. Meanwhile, expression of Type-I-collagen and Tenascin-C was higher in normal tendon of a cadaver and both layers of delaminated tear.

Discussion: In the biological results, articular layer of delaminated tear turned out to a part of the torn tendon, rather than remaining joint capsule. The results of the study has strong evidence why articular layer should also be repaired in the treatment of the delaminated tear.

B2-T8-6  The effect of gelatin hydrogel sheet with PRP after rotator cuff repair

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Background: The purpose of this study was to analyze the effect of platelet rich plasma (PRP) with gelatin hydrogel sheets (GHS) on rotator cuff repair.

Methods: Twelve-week-old Sprague-Dawley male rats were used. Bilateral supraspinatus tendons were transected and sutured by the Mason-Allen technique. 1. Phosphate buffered saline (PBS) or PRP was injected into subacromial bursa (PBS group, PRP group), GHS with PBS or PRP was set on the tendon-to-bone insertion (PBS+G group, PRP+G group). At 4 and 8 weeks after surgery, sections were stained with hematoxylin and eosin, safranin O. Tissue repair was evaluated by tendon-to-bone maturing score. In the 4 groups, breaking strength of the tendon-to-bone insertion was measured at 4 and 8 weeks after surgery.

Results: Tendon-to-bone maturing score and breaking strength was the highest in PRP+G group at 8 weeks after surgery. Conclusions: At 8 weeks, in PRP+GHS group, the tendon-to-bone insertion was most obviously matured. These findings suggest keeping PRP local concentration may promote the healing of tendon-to-bone insertion.
Histomorphometric and three dimensional ultrastructural analysis on the tendon-to-bone healing after rotator cuff repair in a rat model

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Introduction
In order to obtain a successful outcome after rotator cuff repair, the repaired tendon need to be biologically anchored to the bone. However, the histological structure of the repaired tendon-bone interface is completely different from that of the normal tendon insertion. In this study, we analyzed the difference between the normal tendon insertion and the repaired tendon-bone interface after surgery in terms of mechanical property, histomorphometric analysis, and 3D ultrastructure of the cells using rat rotator cuff repair model.

Materials and Methods
Development of normal tendon insertion
Sprague-Dawley rats were used for the study. One-, two-, three-, and four-week-old rats were sacrificed and both right and left shoulders were removed. At each time point, specimens were evaluated with fluorescent immunostaining for SOX9/SCX expression, and were evaluated with FIB-SEM tomography.

Tendon-to-bone healing after surgery
Sprague-Dawley rats underwent complete cuff tear and subsequent repair of the supraspinatus tendon. The repaired supraspinatus tendon-bone interface was evaluated at 4, 8 and 12 weeks after surgery. Specimens were used micro-CT and biomechanical testing, histomorphometric analysis, and FIB-SEM tomography.

Results and Discussion
These new information would be one of cues to accelerate the mechanical property, or regenerate the normal tendon insertion between the repaired tendon and bone.
B2-ST-01 A comparison of dominant and nondominant the pathway of rotator cuff intramuscular tendon for the glenoid plane in healthy subjects

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Objective: The aim of this study was to investigate the difference between dominant and nondominant shoulder the pathway of rotator cuff muscle intramuscular tendon with respect to the glenoid plane by a 3-dimensional bone and intramuscular tendon model reconstructed from magnetic resonance imaging (MRI) in a healthy male subject.

Methods: Thirty shoulders of fifteen volunteers without a history of shoulder pathology participated in this study. 3D models of bone and intramuscular tendon were constructed from MRI. Antero-posterior shear force angle (SFA-AP) of four rotator cuff muscles (supraspinatus ; SSP, infraspinatus; ISP, teres minor; Tmi, subscapularis; SSC) measured as the angle between each muscles intramuscular tendon and glenoid plane across the transverse scapular view. If the SFA-AP has a positive value it means the intramuscular tendon has a posterior shear force component. Independent T-tests were used to compare the difference between the dominant and nondominant sides for four rotator cuff muscles SFA-AP.

Results: As a result of analysis using an independent T-test, all four muscles SFA-AP was not significantly. (SSP, dominant=7.3 ± 3.4°/nondominant=6.7 ± 3.6°; ISP 29 ± 4.1°/15 ± 3.1°, Tmi 69 ± 40°/62 ± 39°, SSC 129 ± 27°/139 ± 28°)

Conclusions: These results imply that the pathway of rotator cuff muscle intramuscular tendon with respect to the glenoid plane wasn’t influenced by frequency of upper extremity use.

B2-ST-02 The glenoid inclination and glenoid version in healthy subjects

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Purpose: Although previous studies indicate that the glenoid inclination (GI) and the glenoid version (GV) influence the rotator cuff tear (RCT), it is not clear that the GI and the GV affect the RCT whether independently or mutually. The purpose of this study was to measure the GI and the GV and to understand the morphological character of the glenoid in healthy subjects.

Method: Thirty shoulders of fifteen healthy male volunteers participated in this study. Using a magnetic resonance imaging, we measured the GI and the GV. The GI was defined as the angle between (I) a line connecting the intersection of the scapular spine with the scapula’s medial border and to the center of the glenoid fossa and (2) a line connecting the superior and inferior margins of the glenoid. The GV was defined as the angle between (I) a perpendicular line of a line connecting the intersection of the scapular spine with the scapula’s medial border and to the center of the glenoid fossa and (2) a line connecting the anterior and posterior margins of the glenoid.

Result: The glenoid measured in this study had an average superior inclination of 7.1 degree and antversion of 1.2 degree, respectively.

Conclusion: The present study investigated the morphological character of the glenoid in healthy subjects by measuring the GI and the GV. The future study needs to measure the GI and GV in patients with the RCT and determine how the relationship between the GI and GV influences the RCT.

B2-ST-03 The effect of upper arm assisting on the shoulder girdle muscle activities during abduction

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The active-assistive motion has the important role for the achievement of active motion in rehabilitation. Recently there were no differences between active-assistive motion and passive motion. The purpose of this study is to analyse relationship between shoulder girdle muscle activity and upper arm assisting and to investigate the characteristic of active-assistive motion of shoulder. The subjects were 6 healthy volunteers (average age: 25.6) without shoulder disorders. Measuring muscles were serratus anterior, trapezius of the upper, middle and lower muscles, infraspinatus, deltoid, and rhomboid muscles. The subjects were instructed to be in the sitting position with 90 degree abduction and hold the grip of the cable-wire for the arm assisting by compass cable column system (COP-340W). The amount of arm assisting was set as 1.5kg. The each muscle integrated activities were statistically compared among the amounts with arm assisting from 1 to 5kg. There were no significant different with trapezius muscles. In middle fibers of deltoid muscle, the activities with 1kg were significantly larger than that with 3.4 kg. In infraspinatus and rhomboid muscle, the activities with 3kg were significantly larger than that with 2.3 kg. In this study, small amount of assisting lead to the assisting of deltoid and serratus anterior muscles. More assisting increased the muscle activities of infraspinatus and rhomboid instead of deltoid muscle. In active-assistive shoulder motion, the amount is considered to be important for training of several muscles.
B2-ST-04 The evaluation for shoulder girdle muscle activities of the patients with massive rotator cuff tear using R-muscle value in EMG

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Introduction: We investigated the shoulder girdle muscles activity in patients with a massive rotator cuff tear on electromyography (EMG). Witte et al. reported the quantitative method of muscle activation changes among the various tasks (Muscle Ratio: R-muscle) using EMG. shoulder girdle muscles concerning scapulothoracic joint activated during shoulder flexion. The purpose of this study is to investigate the characteristics of shoulder girdle muscles activity of the cases with a massive rotator cuff tear in shoulder flexion.

Materials and methods: The subjects in this study were 18 cases with shoulder massive rotator cuff tear and 11 healthy controls. The task was followed; shoulder 0°, 30°, 60°, and 90° degrees flexion, keeping with 5 seconds. Measuring muscle were serratus anterior muscle, trapezius of the upper, middle and lower muscles. R-muscle from the values of each muscle integral activities between 0-30 degrees, 30-60 degree, 60-90 degrees were measured and these data were compared statistically.

Results: In the serratus anterior muscle, the values of R-muscle during 0-30 degree was significantly different between healthy and cases. In trapezius middle muscle, the values of R-muscle during 30-60 degree in cases significantly increased than in healthy control. There was no significant differences with trapezius of the upper, middle and lower muscles.

Discussions: In the cases with massive rotator cuff tear, shoulder girdle muscles were compensatory activated instead of rotator cuff muscles. The quantitative differences of shoulder girdle muscles activities during shoulder flexion were clarified by R-muscle value in this study.

B2-ST-05 The tendency of the humeral head necrosis associated with idiopathic femoral head necrosis

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Humeral head necrosis is often complicated with idiopathic femoral head necrosis as multifocal osteonecrosis. In this study, we investigated the complication rate of the humeral head necrosis with the idiopathic femoral head necrosis, Crues classification, and checked the cause of the femoral head necrosis. The subjects include the patients with a diagnosis of idiopathic femoral head necrosis in our hospital from January 2008 to May 2014 and were able to undergo MRI scanning, which resulted in 63 patients and 124 shoulders. The complication rate of humeral head necrosis was 10 patients and 15 shoulders (15.9 %), and the classification of the Crues was as follows; 4 shoulders for stage 1, 5 shoulders for stage 2, one shoulder for stage 3, 4 shoulders for stage 4, one shoulder for stage 5. The causes of idiopathic femoral head necrosis were steroid for 8 patients, alcohol for 2 patients. The previously reported rate of multifocal osteonecrosis was 5-30 % and we need to take humeral head necrosis into account when treating idiopathic femoral head necrosis caused by steroid.

B2-ST-06 The actual condition of the shoulder pain by daily activities including snow shoveling and weeding

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Purpose: Because the age or the occupation are important for the treatment of rotator cuff tear, preservation treatment is easy to be chosen for retired aged patients. However, snow shoveling and weeding are carried out routinely in the farm village of the snowy district. We investigated the actual condition of the shoulder pain by the daily activities.

Methods: Daily activities which resulted in pain and the pain sites were investigated by the questionnaire in the farm village of the snowy district. Results: 136 of 409 people had shoulder pain by daily activities, and 171 people had the pain except the shoulder by daily activities. 70 people worked, but they did not have any pain and 32 people did not performed daily work. There was more snow shoveling among the daily activity that resulted in shoulder pain than the daily activities which became the factor of pain except the shoulder (P is less than 0.0001). The pain except the shoulder are low back pain, knee pain, and neck pain. The wrist pain or the elbow pain coexisted for shoulder pain.

Conclusion: 92% performed weeding and snow shoveling in the farm village of the snowy district, even if they were aged. 81% had pain by the daily activities, and 44% had shoulder pain due to daily activities. Because snow shoveling is easy to cause a shoulder pain, you should consider having need or not of the snow shoveling in the rotator cuff tear treatment.
B2-ST-07  Postoperative clinical result and image evaluation after distal clavicle resection for the treatment of acromioclavicular joint osteoarthritis

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PURPOSE: The purpose of this study was to evaluate middle term clinical results and image evaluation after distal clavicle resection for the treatment of acromioclavicular (AC) joint osteoarthritis.

METHODS: We retrospectively evaluated 34 shoulders in 31 patients who had undergone arthroscopic distal clavicle resection with a minimum 5 years follow up. The patients undergone ARCR were excluded. Average age at the time of surgery was 62 years old. We evaluated active ROM in flexion, active ROM in abduction, tenderness of the AC joint and horizontal abduction test at preoperation, 1 and 5 years follow up. We also evaluated new bone formation of distal clavicle by X-ray at 1 and 5 years follow up.

RESULTS: Preoperative average active ROM in flexion and preoperative average active ROM in abduction was significantly improved at 1 and 5 years follow up. Complete disappearance of AC joint tenderness was recognized in 20 shoulders at 1 year follow up and 27 shoulders at 5 years follow up. Mild AC joint tenderness remained in 12 shoulders at 1 year follow up and 7 shoulders at 5 years follow up. Complete disappearance of horizontal abduction test was recognized in 32 shoulders at 1 year follow up and 33 shoulders at 5 years follow up. New bone formation of distal clavicle was recognized in 2 shoulders at 1 year follow up and 4 shoulders at 5 year follow up.

CONCLUSION: Arthroscopic distal clavicle resection was an effective surgical procedure at middle term follow up.

B2-ST-08  Surgical treatment for a recurrent posterior shoulder dislocation occurring in a 10-year-old girl-a case report

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-Introduction-We experienced a recurrent posterior shoulder dislocation due to external trauma in a young patient.

-Case-The patient was 10 years old girl who don’t have past history but joint laxity. After being thrown off balance when attempting a handstand during a dance, the patient noticed a subluxation of her left shoulder joint, with the subluxation being repeated afterwards in flexion and internal rotation. The previous doctor performed an emergency examination when it became impossible for her to reduction herself in a flexed position when sleeping. After diagnosis of a posterior dislocation of her left shoulder, and reduction under anesthesia, she was referred to our hospital the following day.

-Diagnosis and treatment-Inspection resulted in the diagnosis of a recurrent posterior dislocation. In order to limit activities of daily living due to the ease of dislocation, the conservative therapy necessitated a cast immobilization as far as the bodily trunk, so an arthroscopic reverse Bankart repair + McLaughlin procedure was performed three months following the initial dislocation. After surgery, ROM began after the fitting of an abduction brace for three weeks, and it was worn at night for the subsequent two weeks. At one year following the surgery, she could return to competition at the same level as previously.

-Consideration-As traumatic recurrent shoulder dislocation in childhood is extremely rare and patient had joint laxity, it was difficult to determine treatment but the course of recovery following surgery has been good.

B2-ST-09  Arthroscopic Revers Remplissage for Posterior Shoulder Dislocation: A report of a case

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We report a case of 54-year-old women who underwent Arthroscopic Revers Remplissage for chronic posterior shoulder dislocation. She experienced acute left shoulder pain after she fell down. After primary clinical and radiologic examination at the local hospital, she was conservatively treated with the diagnosis of rotator cuff tear. At the initial visit to our clinic at 6 weeks, she presented with persistent pain and loss of motion. CT examination showed that the humeral head was fixed in the glenoid rim with the anteromedial humeral head defect encompassing approximately 25% of the articular surface. After closed arthroscopic reduction, #3 bioabsorbable suture anchors are used to tie the subscapularis tendon into the bony defect. The shoulder was immobilized for 6 weeks after surgery. At 3 months, she returned to work and demonstrated a significant improvement in ROM. The postoperative MRI examination showed integration of the subscapularis tendon into the defect area. The surgical option should be based on the general condition and demands of the patient, as well as the size of the humeral head defect and the duration of the dislocation. Although multiple surgical options can be available, Arthroscopic Revers Remplissage could afford satisfactory outcome for the present case.
B2-ST-10  Corrective osteotomy for chronic unreduced posterior fracture-dislocation of the shoulder : a case report
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BACKGROUND: Posterior dislocation of the shoulder is a rare incident, and missing at the first consultation leads to an old case. Since we experienced a case of chronic unreduced posterior fracture-dislocation of the shoulder in which corrective osteotomy was performed, we report on the case.
CASE: A 50-year-old man sustained right shoulder injury in a bicycle accident. The diagnosis at the first hospital visit was fracture of the proximal humerus, and he was immobilized with the arm at his side for six weeks. After two years of conservative therapy, limitation of range of motion had continued and he visited our hospital. Physical examination revealed limitation of active range of motion of his right shoulder, with elevation to 90 degree, external rotation to 20 degree, radiographic study revealed a deformed posterior dislocation. The JOA score was 48 points. Two years and two months after the injury, a corrective osteotomy was performed. The operation had difficulty of humeral head reduction because of adhesive fractured humeral head. One year after the surgery, less improvement of range of motion, posterior instability, deformity of the humeral head and shoulder pain were existd. So additional operation, plate removal and posterior-capsulectomy pllication, was performed. One year and three months after the first operation, the JOA score and range of motion had improved with 72 points, elevation to 120 degree, external rotation to 30 degree.
DISCUSSION: After the osteotomy active range of motion was improved, but osteotomy has a risk of avascular necrosis of the humeral head.

B2-ST-11  Anterior dislocation of the shoulder in Shprintzen-Goldberg syndrome
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Shprintzen-Goldberg syndrome (SGS) is a subtype of Marfan syndrome, and is a disorder of unknown cause characterized by craniosynostosis as well as skeletal and cardiovascular anomalies. Joint hypermobility is also one of its major characteristics. We present a case of recurrent anterior shoulder dislocation in a patient with SGS who has been treated arthroscopically. He was a 13-year-old boy before epiphysical closure. He was diagnosed with SGS at 4 years old, and the first episode of shoulder dislocation was while swimming at the age of 10. After that, he had experienced recurrent anterior dislocations following minor trauma. The Brighton score was quantified as 2 of 9; consequently, joint hypermobility was not obvious. However, at arthroscopic evaluation, we found complete absence of the middle glenohumeral ligament which left the subscapularis uncovered. We performed arthroscopic Bankart repair and reconstruction of the capsule through stitching both superior and inferior glenohumeral ligaments, thereby reducing capsul volume. He underwent 4 weeks of postoperative airplane shoulder sling and 6 months of subsequent active range of motion exercises. At 1-year follow up, he could participate in leisure sports painlessly with no new episodes of instability. While there was a case of recurrent anterior shoulder dislocation in a patient with adult Marfan syndrome in a previous report, this is the first such case during the growth period. Due to the patient's early age, there is a need for long-term follow-up.

B2-ST-12  Two cases report of the labrum repair for unstable painful shoulder of rugby players in top league
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Instability can often present in a purely painful form, without any apparent history of dislocations, but with anatomic lesions indicative of instability. Boleau termed this Unstable Painful Shoulder (UPS). We report two cases of the labrum repair for UPS. Case 1 was 33 years old man. He was a rugby player in top league. He suffered from the chronic shoulder pain without any apparent history of dislocations and did not respond to the conservative treatments. He had no anterior apprehension sign. However, labral injuries were recognized at MRI and arthroscopy. Therefore, we performed arthroscopic stabilization procedure. He was able to return to the regular games at postoperative 7 months. Case 2 was 25 years old man. He was also a rugby player in top league and suffered from the shoulder pain. He had no anterior apprehension sign, but instability was actually recognized in EAU. We performed arthroscopic stabilization procedure and he was able to return to the regular games at postoperative 6 months. However, he dislocated his shoulder in tackle at postoperative 10 months. In rugby players, labral injury is the most common injury of all shoulder injuries. However, they rarely dislocate their shoulders owing to their well-developed outer muscles. Boleau excluded SLAP lesion. Although our cases, to be precise, were different from UPS because they also had SLAP lesions, we thought they were very close to UPS. When we see a chronic shoulder pain in a young athlete, we must consider a potential instability with labrum injuries.
B2-ST-13 *Musculocutaneous nerve injury caused by arthroscopic Bankart-Bristow procedure.* A case report

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We report a case of musculocutaneous nerve injury caused by arthroscopic Bankart-Bristow procedure. A 20-year-old man underwent arthroscopic Bankart-Bristow procedure for recurrent dislocation of the right shoulder at a different hospital. He was permitted to play rugby 4 month after the operation, but he couldn’t play because of the weakness of his upper limb. 8 month after the operation, he presented in our hospital. Physical examination revealed the weakness of the elbow flexion muscle and hypesthesia of the lateral forearm. CT showed a resorption of the transplanted coracoid process and MRI showed lumineance change of the brachialica and the biceps. We diagnosed this as musculocutaneous nerve injury and performed reoperation. At the surgery, the nerve got caught in the screw and was revealed to be cut off after removal of the screw. The nerve was sutured by end to end neurorrhaphy and the conjoin tendon was fixed with a suture anchor into the bone hole of the Bristow procedure. 7 month after the reoperation, sensory recovered but muscle did not. Arthroscopic Bankart-Bristow procedure is useful, but it is important to take great care not to injure nerves including the musculocutaneous nerve.

B2-ST-14 *Axillary nerve palsy occurred with arthroscopic repair of humeral avulsion of the glenohumeral ligament lesion: A case report*

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A 16-year-old female handball player visited our institution for traumatic recurrent subluxation of the right shoulder at June 2014. The physical examination revealed anterior instability of the right shoulder. At August 2014 she was performed arthroscopic repair of Bankart lesion, SLAP lesion and humeral avulsion of the glenohumeral ligament lesion (HAGL lesion) of central type located in the area between inferior glenohumeral ligament anterior band and posterior band. Postoperatively incomplete sensory loss around lateral side of the right shoulder and shoulder pain on abduction was presented, and gradually progressive muscle atrophy of the right deltoid was detected. As the needle EMG of the right deltoid muscle showed the findings of denervation potential, she underwent neurolysis of axillary nerve at 3 months after the initial surgery. A branch of axillary nerve was tied by a suture belonging with HAGL repair, so the responsible suture was removed and adhesion around the nerve was released. Postoperatively her shoulder pain immediately disappeared. At 6 months after second surgery nearly full recovery of deltoid muscle power was obtained, so she could fully return to handball. The JSS-SI score improved from preoperatively 39 pts before initial operation to postoperatively 100 pts after 15 months from second surgery. When repair of HAGL lesion of central type is done, extreme care and prevention have to be taken not to injure axillary nerve that runs just behind the capsule.


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We present a case of traumatic shoulder dislocation which occurred in the patient with Charcot shoulder. Fifty-year-old male patient was diagnosed with spinal dural arteriovenous malformation 8 years ago, and was condemned to a wheelchair. Very recently he got traumatic right shoulder dislocation, accompanied by coracoid process fracture and bony Bankart lesion, and transferred to our hospital. Then we performed open Latarjet surgery; we did capsule release for posterior capsule tightness and cuff repair for subscapularis rupture. After the surgery, his affected shoulder was maintained with horizontal-flexion position; however, after 1 week anterior redislocation was found by X-ray without any symptoms. Although we removed the screw to avoid humeral head destruction and ROM limitation, we did not try repositioning, leaving the shoulder dislocated, and then the patient started rehabilitation to acquire the activity of daily life. Now coracoid process is fattenning, and acetabulization is proceeding which may enable wheelchair push-ups and transfer motion in the future.
B2-ST-16  two cases of traumatic instability of shoulder joint with large bone defect in Parkinson disease
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It is difficult in the therapy in the patient who has traumatic instability of shoulder joint with large bone defect. We report that the 2 cases of Parkinson disease had traumatic instability of shoulder joint with large bone defect. We performed Bony Bankart repair, Arthroscopic rotator cuff repair, and Gleno-Humeral temporary fixation for the first case, and Bony Bankart repair and Coracoid transfer for the second case. In postoperative course, reoccurrence of the instability of shoulder joint happened in both cases. The patient of Parkinson disease has rigidity, resting tremor, akinesia, bradykinesia, osteoporosis and muscle weakness. So, traumatic instability of shoulder joint in the patient of Parkinson disease could be inculable to be stronger. Parkinson disease should be one of factors of poor result in the therapy of instability of shoulder joint. We commonly perform Arthroscopic Bankart repair, Arthroscopic Rotator cuff repair, shoulder joint fixation and coracoid transfer for traumatic instability of shoulder joint with large bone defect in elderly adult who have no Parkinson disease. But, for traumatic instability of shoulder joint in the patient of Parkinson disease with large bone defect we should perform other surgical procedures, for example of total shoulder arthroplasty and reverse shoulder arthroplasty.

B2-ST-17  Arthroscopic Bankart repair for the patient with athetoid cerebral palsy
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Arthroscopic Bankart repair became the standard operation for recurrent dislocation of the shoulder. But operative indication of single dislocation and subluxation is unclear. We report the good case of Arthroscopic Bankart repair for the patient with athetoid cerebral palsy that had the persistent shoulder pain after single subluxation. A 49 year old woman with athetoid cerebral palsy did subluxation and reposition of her right shoulder when she got up. Then, the shoulder pain persisted. She came to our hospital three months later. Internal impingement of the shoulder was present. She underwent physical therapy for three months. But the symptom wasn’t improved, so arthroscopic debridement was done. In the operation, the partial tear of subscapularis and slightly anterior instability of the shoulder was found. The stabilized operation wasn’t done. The symptom was improved temporarily, but the shoulder pain recurred four months later. In unimpaired person, the minor instability of a shoulder is controlled by physical therapy. But we couldn’t control it in the patient of athetoid cerebral palsy with involuntary movement. So arthroscopic Bankart repair was performed seven months later of first operation. The persistent pain disappeared after the operation. Her satisfaction was high. The persistent shoulder pain of the collision athlete sometimes occur for instability of the shoulder with bony Bankart lesion. We should think that the shoulder pain of a patient with involuntary movement may occur for the minor instability of the shoulder.

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We reports recurrent shoulder dislocation with Hill Sachs Lesion and Teres Minor and lower part of infraspinatus muscle ruptures on it.Case67y. o. Male Lt.shoulder.His first shoulder anterior dislocation was At 17yo and then recurrent dislocation has continued. Big Hill Sachs lesion and posteroinferior rotator cuff ruptures. We repaired Bankart lesion arthroscopically and repaired those ruptures using two anchors by posterior open approach. Two years later, muscle strength were all MMT 5. Forward elevation;170, ER;60,ER;270.In this case, Engaged Hill Sachs lesion seems to lead teres minor and lower part of infraspinatus muscle ruptures on it based on cuff degeneration. We think that open surgery is better than arthroscopically operation on remplisage method.
**B2-ST-19  Experimental study of shoulder dislocations with rotator cuff tear**

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Hypothesis: We have experienced shoulder dislocation with rotator cuff tear.

Methods: We evaluated shoulder dislocations with rotator cuff tear, which were treated with rotator cuff and anterior labrum repair. Six patients (average age 47 years) were examined clinically using the JSS Shoulder Instability Score (JSS) score. Active range of motion were assessed. The average follow-up was 21 months.

Results: JSS scores improved from 24 to 70. The average flexion improved from 87 to 124, and the average external rotation improved from 30 to 57.

Conclusion: rotator cuff and anterior labrum repair were effective operation for the patients with shoulder dislocation with rotator cuff tear.

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**B2-ST-20  Short-term results of Arthroscopic Bankart Repair using Labral Tape and knotless suture anchor**

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Clinical results of Arthroscopic Bankart Repair (ABR) are generally satisfied. However, there were some knot-related problems such as failure of the sutures and cartilage disorder of humeral head. For avoiding knot-related problems, we developed a new ABR procedure with Labral Tape and knotless suture anchor. The purpose of this study is to clarify clinical results and usefulness of our surgical procedure. 6 months after surgery, 13 patients (11 men and 2 women, the average age at surgery was 33 years old) of new procedure with Labral Tape and knotless suture anchor were evaluated. Anterior apprehension test, range of motion (ROM) and Rowe score were performed for clinical evaluation. In all patients, anterior apprehension test were negative. In ROM (the average value ± the standard deviation), elevation was 169 ± 11°, abduction was 170 ± 11°, 2nd external rotation was 67 ± 8°. The average value of Rowe score was 93 points. Although our surgical procedure had a little bit limitation of external rotation, it could be get good results in another ROM and shoulder stability. We present a useful new surgical procedure for recurrent shoulder instability.

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**B2-ST-21  Examination of the shoulder dislocation to need attention.**

- To avoid further iatrogenic injuries-

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Background: Anterior dislocation of the shoulder is a common injury, which is often reduced in the emergency room. Previous studies described iatrogenic fracture while reducing the dislocation. We describe a case of a locked primary anterior shoulder dislocation with impaction of the humeral head onto the antero-inferior glenoid rim (Anterior shoulder dislocation impaction type). Mechanical obstacles may frequently impede closed reduction of an anterior shoulder dislocation impaction type. We take CT before the reduction procedure, when humeral head lying inferior to the glenoid at the AP radiographs. After review of the image, patient underwent a closed reduction under anesthetic. Thus, it avoids further iatrogenic injuries.

Material and Methods: The subjects were 8 shoulders in 7 patients (4 males and 4 females, average age 60.1 years) with anterior shoulder dislocation impaction type by X-ray at the time of the first medical examination. 3 shoulders were without fractures and 5 were with fractures. We undergo CT for all cases before reduction and evaluated the details of dislocation. After review of the image, patient underwent a closed reduction under anesthetic.

Results: Closed reduction was possible with all 3 shoulders without fracture. Closed reduction was possible in 4 shoulders with fracture. We needed arthroscopic reduction in remaining one shoulder. In all cases, we did not experience iatrogenic injuries.

Conclusion: Failure to reduce anterior shoulder dislocation impaction type should prompt CT to define injury and cause obstruction to reduction, prior to further manipulation or operative intervention.
B2-0-19 In-vivo glenohumeral translation during internal and external rotation in varying degrees of abduction

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Purpose: Some investigators evaluated the shoulder kinematics during the rotations at variously abducted positions, but in-vivo dynamic kinematics has been unknown in details. The purpose of this study is to investigate in-vivo glenohumeral translation during internal and external rotation in varying degrees of abduction.

Material and methods: Ten shoulders of 5 healthy subjects (all men, mean age 33.4 years old) were enrolled in this study. The single-plane fluoroscopic images were obtained during internal and external rotations (IR/ER) in 0, 90, 135 degrees and maximum abduction. 3D shoulder kinematics was analyzed using 2D/3D registration technique. The supero-inferior (SI) and antero-posterior (AP) translations of the glenohumeral joint were calculated and compared at internal and external rotations of each abducted position (a plus value means the superior and anterior translation).

Results: The SI translations were -2.8mm and -0.3mm at ER and IR of 0 degree of abduction with significant difference. They ranged from 0.6mm to 1.7mm at 90 and 135 degrees of abducted rotations, without any significant difference. They were 0.2mm and 2.0mm at IR and ER of maximum abduction, with significant difference. The AP translations ranged from 0mm to 2.3mm at 0, 90 and 135 degrees of abducted rotations, without any significant difference. They were 2.3mm and 3.3mm at ER and IR of maximum abduction, with significant difference.

Conclusion: This study revealed the humeral head center showed a small degree of translation at 90 and 135 degrees of abducted rotations, but it showed significant translation at 0 degree and maximum abducted rotations.

B2-0-20 In-vivo glenohumeral ligament length during internal and external rotation in varying degrees of abduction

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Purpose: The function of the glenohumeral ligaments has been reported in cadaveric studies, but in-vivo glenohumeral ligament length has been unknown in details. The purpose of this study is to investigate in-vivo glenohumeral ligament length patterns during axial rotations in varying degrees of abduction.

Material and methods: Ten shoulders of 5 healthy subjects (all men, mean age 33.4 years old) were enrolled in this study. The fluoroscopic images were obtained during internal and external rotations at 0, 90, 135 degrees and maximum abducted positions. 3D bone models were created from CT images and the contour of each model was matched to the fluoroscopic images (2D/3D registration technique). The origin and insertion of the glenohumeral ligaments (SGHL, MGHL, AIGHL and PIGHL) were set on the bony models and the shortest paths between the origin and insertion of each ligament were calculated.

Results: The SGHL reached maximum length at external rotation of 0 degree of abduction. The MGHL reached maximum length at external rotation of 0 and 90 degrees of abduction. The AIGHL reached maximum length at external rotation of 90 degrees of abduction. The PIGHL reached maximum length at internal rotation of 0 degree and maximum abduction.

Conclusion: This study showed that the SGHL and MGHL contribute to joint stability at external rotation of 0 degree of abduction, the MGHL and AIGHL at external rotation of 90 degree of abduction and PIGHL at internal rotation of maximum abduction, respectively.

B2-0-21 The onset style of Thoracic outlet syndrome

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Thoracic outlet syndrome (TOS) is a challenging condition to diagnose and treat. TOS describes a wide spectrum of clinical presentations with a variety of etiologies. As our understanding of this condition has improved, treatment has evolved but it remains controversial. Most cases of TOS are thought to be caused from an anatomic predisposition, either a single acute incident or repetitive stress. Symptoms may be delayed several weeks or longer after acute trauma, or they may develop insidiously because of chronic stress. Repetitive upper extremity use in high-performance athletes is associated with the development of neurogenic and vascular TOS. Athletes might be at even higher risk given the relative amount of musculature developed in training. We have impression that the onset of TOS is younger in athletes. We compared the non-athlete with the athlete about the condition of a patient including operative findings.
B2-O-22  Comparison between preoperative ultrasonography and operative findings in thoracic outlet syndrome

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Thoracic outlet syndrome (TOS) describes a wide spectrum of clinical presentations with a variety of etiologies, all with the common thread of neurovascular compression in the thoracic outlet region. Variation in scalene origin and insertion may cause compression within the interscalene triangle. Diagnosis of TOS is challenging because of the varied clinical presentation and the lack of objective data to support a diagnosis. Angiography may be used in conjunction with MRI or CT, but this technology’s role in diagnosis remains unclear. Therefore, we evaluated the thoracic outlet region using ultrasonography. In addition, we measured the base of the interscalene (ISB) triangle during operation and compared it with the ultrasonography. The ultrasonography were 5.4±3.4mm, operative findings were 3.9±3.5mm.

[Conclusion] The ISB measurement by the ultrasonography can become the supporting diagnosis of TOS in future.

B2-O-23  Clinical outcome of trans-axillary first rib resection for thoracic outlet syndrome

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The purpose of this study is to investigate clinical outcomes of trans-axillary first rib resection (TAFRR) for thoracic outlet syndrome (TOS). AFRR was performed on refractory cases resistant to conservative treatment more than 3 months. We studied 16 cases followed up over 1 year after surgery. There were 7 males and 9 females with a mean age of 21.5 years old. Twelve cases participated in sports activity. The mean follow up period was 1.8 years (range: 1.1-5.8). Fifteen cases had TOS alone and 1 case complicated with loose shoulder. Denervation potential of C8 or Th1 nerve was showed in all the 11 cases performed needle EMG. Apparent compression of the subclavian artery was observed in 7 of 16 cases on MRI or CT angiography. Three cases had bony abnormality. There existed fibrous band in costoclavicular interstice in all cases. We performed open TAFRR on 10 cases and arthroscopic-assisted TAFRR on 6 cases. Pneumothorax occurred in 2 cases, resulted full recovery with trocar suction. After surgery, all cases gained improvement of TOS symptom, and quick DASH score significantly reduced from preoperative 458 to postoperative 173. All sports participants except for a loose shoulder case could return to sports activity with the complete recovery rate of 57.1%. TAFRR was useful for refractory TOS.

B2-O-24  Evaluation of center of gravity during baseball pitching and its influence on pitching kinematics

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Background  Shift of weight during pitching motion is an important aspect in evaluating throwing mechanics; however, there are few correct criteria for objective evaluation of weight movement. Therefore, this study kinematically calculated the position of the center of gravity. Based on the analysis of movement of the center of gravity during the throwing motion, shift of weight was quantitatively evaluated. In addition, relationship between the center of gravity movement and pitching kinematics was examined.

Methods  Fifty-six baseball players with various skill levels were included in this study. Thirty-six reflective markers were attached and their throwing motions were investigated using the motion capture system in our hospital. A physical center of gravity position was calculated by the data derived from a surface markers. The calculation was made by combined gravity method using each segment mass.

Results  A correlation was demonstrated between too early trunk rotation at early cocking phase and the amount of movement of the center of gravity from late cocking phase to acceleration phase. In addition, a correlation was demonstrated between smaller downward movement of gravity center and reduction in shoulder abduction from early cocking phase to acceleration phase.

Discussion  The weight movement is an important factor in throwing activity. It was shown that evaluation of center of gravity movement using the motion capture system was effective for kinematic analysis of pitching motion providing helpful information in management and prevention of throwing injuries.
**B2-O-25**  Glenohumeral Joint Kinematic Evaluation of Baseball Players Using Four-Dimensional Computed Tomography

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Purpose: The objective of the current study was to assess differences in the tracking of micromotion of the glenohumeral joint capsule between the dominant and nondominant shoulders of baseball players.

Methods: We obtained 4DCT data from the dominant and nondominant shoulders of six baseball players during the cocking motion. We quantitatively tracked eight capsular ligament attachment sites, the center of the humerus, and two sites in the longitudinal axis of the humerus using a coordinate system on the glenoid and an original tracer program. The trajectory length at each point and angular velocity were calculated. Our device kept the total radiation exposure under 2.4 mSv.

Results: The obtained data showed that the dominant humeral head moved more anteroinferiorly at maximum external rotation compared to the nondominant. The mean total trajectory length was longer on the dominant side than the nondominant side (8.7mm, 5.4mm, respectively). Repeated-measures ANOVA and Tukey’s HSD test showed that the pitching motion had the greatest effect on the capsular ligaments from the anterosuperior to the anteroinferior portion. At maximum external rotation, the angular velocity was the highest of all frames.

Discussion: 4DCT scanning and the tracer program for bone surface modeling of the glenohumeral joint could visualize micromotion and be used for kinematic evaluation with a low radiation exposure. The current results showed that the repetitive pitching motion may create glenohumeral joint capsule laxity, especially at the anterosuperior to anteroinferior part.

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**B2-O-26**  Decreased Shoulder Abduction Angle Cause Forceful Internal Impingement and Decrease Anterior Stability in a Cadaveric Model of the Throwing Shoulder

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Objective: Internal impingement and excessive anterior laxity, which result from shoulder capsular loosening, are common shoulder pathologies in throwing athletes. Decreased glenohumeral abduction loosens the anterior band of the inferior glenohumeral ligament, which is the primary static restraint to anterior force in the glenohumeral joint during the throwing motion. The purpose of this study was to assess the effect of the glenohumeral abduction angle on shoulder internal impingement and anterior shoulder laxity during the simulated throwing motion.

Materials and Methods: Eight cadaveric shoulders were tested at the simulated late-cocking and acceleration phases of the throwing motion. The anterior translation, location of the rotator cuff insertion on the greater tuberosity with respect to the glenoid, length and site of internal impingement, and glenohumeral contact pressure were measured. All data were compared between shoulder abductions of 80, 90, and 100 degrees.

Results: In the simulated late-cocking phase, decreasing the glenohumeral abduction shifted the humeral head significantly posteriorly and superiorly resulting in impingement of the infraspinatus tendon, and increased the glenohumeral contact pressure. In the simulated acceleration phase, anterior glenohumeral translation significantly increased as the glenohumeral abduction angle decreased.

Conclusions: Decreased shoulder abduction during throwing motion may cause forceful internal impingement in the infraspinatus tendon during late-cocking phase of throwing motion, and decrease anterior shoulder stability in the acceleration phase.

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**B2-O-27**  Development of the pitching motion simulator aiming to achieve both performance improvement and injury prevention

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The purpose of this study is to derive the pitching motion to achieve both performance improvement and injury prevention using the computer simulation. The subjects were asymptomatic 11 adult baseball players who took part in both MRI and pitching motion analysis (Total 382 trials). We made the database composed of the data of joint angles, contact forces, control, ball-speed, rotational speed of the ball and findings of MRI. We analyzed the database with principal component analysis and classified the motion patterns into the principal component scores. Then we made the simulation system using principal component score and optimization theory. We can make the new pitching motion easily while we operate the parameters of principal component scores. In this simulation, we created a throwing motion to increase the rotational speed of the ball, to increase ball-speed and to decrease the contact forces without departing from strike-zone. The pitching motion that has been created was expressed in 3D animations.
B2-O-28  Characteristics of shoulder pain and scapula function in junior high baseball players selected by retired professional baseball player.
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Purpose The purpose of this study was to investigate the characteristics of the shoulder pain and scapula function in junior high baseball players selected by retired professional baseball players.

Methods One hundred three junior high school baseball players who participated in our medical checkup were included. We divided the players into two groups: 26 players selected by retired professional baseball players (selected group) and 77 players belonged to the baseball team of junior high school (control group). At first, we asked them to answer the questionnaire to investigate the shoulder pain at the time of medical checkup and the experienced episode of shoulder pain. Then we performed physical examination as scapular function: presence or absence of scapular malposition, restriction ability of scapular retraction, hyper external rotation test (HERT).

Results The rate of presence of shoulder pain at the time of medical checkup was 0% (selected group) and 9% (control group). The experienced episode of shoulder pain was 30% (selected group) and 21% (control group). Scapular malposition was 50% (selected group) and 83% (control group). Restriction of scapular retraction was 46% (selected group) and 74% (control group). HERT positive was 0% (selected group) and 16% (control group). Scapular malposition, restriction ability of scapular retraction, and HERT positive were significantly difference in two groups.

Discussion In selected group, the rate of scapular functional disability was less than control group. Players selected by retired professional baseball players might to be hard to decline scapular function.

B2-O-29  Can the shoulder injury in high school baseball players be prevented?
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Background The effectiveness of the functional exercises to prevent the occurrence of the disabled throwing shoulder in baseball players is not clarified.

Methods Total of 210 players from one high school baseball team participated in the medical checkup of 2013-6 were included. After the checkup in 2014, the exercises for preventing the disabled throwing shoulder were introduced as a part of daily training menu. Current shoulder pain, asymmetry of the scapula position, O’Brien test, hyper external rotation test (HERT), elbow push test (EPT), elbow extension test (EET), combined abduction test (CAT) as well as horizontal flexion test (HFT) of Hara test were annually checked in each player. Bilateral muscle strength of the lower trapezius was measured manually in 2013 and 2016.

Results: Positive ratio of each item in 2013-6 was as follows: current shoulder pain 30%, 31%, 16%, 13%, asymmetry of the scapula position 66%, 51%, 28%, 28%, O’Brien test 25%, 18%, 18%, 9%, HERT 30%, 18%, 11%, 12%, EPT or EET 36%, 16%, 25%, 25%, CAT or HFT 75%, 33%, 23%, 12%. The rate which the dominant muscle strength of lower trapezius was weaker than non-dominant were 30% in 2013 and 25% in 2016. As the result of the comparison between 2013-4 and 2015-6, current shoulder pain (p<0.05), asymmetry of the scapula position (p<0.0001), O’Brien test (p<0.05), HERT (p<0.05) and CAT or HFT (p<0.0001) significantly improved.

Conclusion: Shoulder injury in high school baseball players can be prevented through functional exercises intended for injury prevention.
【背景】挙上は肘伸展位で、挙手は肘屈曲位から肩関節を屈曲する。目的は挙手と挙上における肩甲上腕リズム（SHR）、上腕骨頭（骨頭）、外旋角度、外軸筋の筋活動を比較すること。
【方法】対象は男性10名（平均年齢22歳）である。肩甲骨運動を肩甲棘上方回旋角度から、骨頭外旋角度を内外側上頸の回旋角度から計測した。肩甲下筋（SSC）、棘上筋（SSP）、棘下筋（ISP）、小円筋（TM）の筋活動を比較した。
【結果】HTA30°までのSHRは両者で有意差があるが、それ以上では有意差はなかった。挙上上の骨頭外旋角度は直線的に増加しHTA150°で60°外旋した。一方挙手の外旋角度は曲線的に増加しHTA90°までは挙上より有意に大きかった。HTA75°までのSSP、ISP、TMの筋活動とHTA60°までのSSCの筋活動は挙手挙上より少なかった。
【結論】挙手と挙上とは異なる運動である。

V2-0-02 Relationship of shoulder joint range of motion and scapula-thoracic spine during shoulder flexion（※）
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【はじめに】肩関節挙上動作では上腕骨、肩甲骨、胸椎の一連の運動がみられる。本研究の目的は肩関節可動域と屈曲時の肩甲骨、胸椎の関係を明らかにすることである。
【方法】対象は健常男性8名。計測はデジタルカメラを使用し坐位で屈曲動作を実施。解析はImage Jを用い、肩関節屈曲は体幹と上腕骨外側上頸－肩峰、肩甲骨後頭は垂直軸と肩甲棘三角－下角、胸椎後方はC7－Th7とTh7－Th12の成す角とした。最大までの肩甲骨後傾、胸椎後傾変化量を算出し、肩関節屈曲、下垂外旋、外軸90°内外旋との関係をスパーキャンドルの順位相関係数にて検定した。
【結果】肩甲骨後傾、胸椎後傾と肩関節屈曲（r=−0.82,−0.66）、下垂外旋（r=−0.75,−0.74）で負の相関がみられた（p<0.05）。
【考察】肩関節可動域が減少すると、肩甲骨、胸椎の代償が増大した。肩関節可動域が減少し、リーチ動作などに支障をきたすと肩甲骨、胸椎の代償運動を試みると考えられた。

V2-0-03 The lateral characteristics of the rib cage shape and scapula movement in the shoulder joint flexion（※）
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【目的】胸郭形状が肩甲骨の左右運動特性に与える影響を明確にすること。
【方法】測定は男性10名で三次元動作解析装置と筋電図を用い、座位で肩関節屈曲を行った。マーカーは、体幹、肩甲骨、胸郭に計55点とした。統計的分析は安定位肩甲骨角度（STA）、STA変化量・筋力、胸郭前後傾左右差に対する検定スタ、STA変化量と胸郭前後傾左右差・筋力の関係にPearsonの相関係数で検討し、有意水準はそれぞれ5％未満とした。
【結果】安定位STAは左側で後傾位。STA変化量は左側で上方回旋、内旋、左側初期で後傾・右側後期で後傾角度が増加。胸郭前後傾は第3・5胸肋間関節レベルで左側が増加、第3胸肋関節レベルの胸郭前後傾と僧帽筋上部線維に正の相関を認めた。
【結論】胸郭前後傾が増加するほど肩甲骨可動性が増加し、僧帽筋上部線維も活動していた。これは、setting phaseにおける上腕骨頭心位が形成出来ず肩甲骨での代償運動が生じたためであると考える。
V2-O-04  Effect of thoracic shape on the scapula angle -Comparison between at rest and in rotation- (※)
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【目的】等尺性内外旋運動における胸郭形状と肩甲骨角度 (SA) を検証した。
【方法】対象は男性 19 名。測定は VICOM とした。前後径は胸郭骨 (ST), 第 5 胸肋 (SC), 前後突起 (XP) レベルとした。SA は胸郭に対する角度とした。課題は肩関節の等尺性内外旋運動とした。安静前後径, SA と課題時前後径, SA の変化は t 検定で比較し, ST, XP と矢状面角度は相関で検討した。
【結果】前後径は ST, SC が左側で大きく, XP は右側で大きい。各 SA は右側で大きい。ST および XP レベルと矢状面角度にはそれぞれ相関を認めた。外旋で ST, SC 前後径は増大し, XP は減少した。内旋で ST, SC 前後径は減少し, XP は増大した。各 SA は外旋で減少し, 内旋で増大した。
【考察】前後径と SA は左右非対称を呈した。外旋は棘下筋と菱形筋が活動し肋骨を回旋させる。内旋は肩甲下筋と前鋸筋が活動し肋骨を回旋させる。今回の検討で肋骨・肩甲骨・上腕骨に運動連鎖を有する可能性を見出した。

V2-O-05  Measurement of Shoulder Range of Motion and Arm Motion Smoothness using Kinect v2: A Validation Study
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Introduction: Measurement of range of motion (ROM) is a clinically important parameter in evaluating joint function. However, the quality of arm motion is often overlooked during clinical shoulder assessment. In comparison with the currently validated measurement systems, in this study, we evaluated the accuracy of Kinect v2 as a tool for measuring shoulder ROM and the quality of arm movement.
Methods: Ten male participants were included in two stages of the experiment. First, the shoulder joint ROM was measured in four firmly static poses (flexion, abduction, external, and internal rotation) with Kinect v2, three-dimensional (3D) motion analysis, and goniometry. Second, participants performed a point-to-point arm movement as naturally as possible and validated parameters related to movement smoothness were recorded. The results obtained with the different systems were compared.
Results: Regarding measurement of shoulder ROM, Kinect v2 showed very good correlation (r>0.9) for every shoulder position with 3D motion analysis (95% LOA < ± 8°) than goniometry (95% LOA < ± 10°). In terms of movement smoothness, Kinect v2 also showed a significantly good correlation and agreement with the measurement of motion quality parameters [PV/MV, AT/MT, and NOP (r = 0.769, discrepancy = ± 0.1; r = 0.922, discrepancy = ± 5%; and mean = 1 ± 0, respectively)] compared with 3D motion analysis.
Discussion: This study shows that Kinect v2 can be used as a clinically reliable tool to measure shoulder joint ROM and arm movement smoothness.

V2-O-06  Comparison of the glenohumeral rhythm in young and elderly (※)
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【目的】本研究は、三次元動作分析装置を用いて、肩関節の外転運動における若年者と高齢者の肩甲上腕リズムを比較し、加齢による影響を明らかにすることである。
【方法】若年男性 21 名と高齢男性 17 名を対象とした。課題動作は、肩関節外転運動とし、外転 0 ～ 80° までの角度で、10° ごとに測定した。課題肢は立位にて行った。三次元動作分析装置を用いて肩甲上腕リズムを分析した。
【結果】肩関節外転運動における上腕骨と肩甲骨の関係性である肩甲上腕リズムは、若年者では 3.5：1 の割合となった。次に高齢者における肩甲上腕リズムは 4.4：1 の割合となった。
【考察】本研究より、三次元動作分析装置を用いた計測において電磁ゴノメータと同程度の妥当性を有することが示された。さらに加齢に伴い肩甲骨の動きが低下するなど肩甲上腕リズムが異なることが明らかとなった。本研究で得られた結果は、肩関節を評価・治療する上で重要な知見となる。

(※: The title was translated by editor.)
V2-O-07 Study of the movement pattern of Y exercise in healthy individuals（※）

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【目的】Yエクササイズにおける背中筋下部の収縮が肩甲骨の静的アライメントに及ぼす影響を検討すること

【方法】対象は健常男性13名、腹臥位、両側肩関節外転150°から20回挙上動作を反復させた。筋動態の評
価は超音波検査装置を用い、第4胸椎レベルの背中筋下部、菱形筋を描出し、運動前後の筋厚測定。筋厚増
加率を比較検討した。運動前後の肩甲骨アライメントを肩甲骨脊椎間距離（SSD）で評価した。

【結果】筋厚増加率の比較で背中筋下部が優位であったのは9名で菱形筋が優位であったのは4名であった。
筋厚増加率とアライメント変化に有意な相関は認めなかった。

【考察】アライメント変化は個人間でのばらつきが大きく、SSDから優位に活動した筋の同定はできず、運
動パターンが個体間で異なることがわかった。促通させたい筋に対しては、超音波検査装置を用い視覚的に
フィードバックすることが必要と考えた。
P2-013 Differences in young and elderly acromial morphology

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Purpose: Rotator cuff tears are more common in middle and old age, with few cases reported in lower age groups. In this study we took subjects who received rotator cuff repair surgery and created two groups: a young group under 50 years old (Group Y) and an elderly group 75 years old (Group E). Here we report the investigation of acromial morphology in these subjects.

Method: From 2011 to 2016, 43 subjects (Group Y: n=15, Group E: n=28) who received surgery for rotator cuff tear were selected for retrospective analysis. The control group (Group C) comprised of 16 subjects (19.4+/−4.3years) for shoulder dislocation. Average age at the time of surgery was 44.3+/−3.3 years for Group Y and 77.7+/−2.4years for Group E. Pre-operative X-ray (AP, Y view) analysis of acromial morphology (the Bigliani classification), acromion angle of inclination and critical shoulder angle (CSA) was performed. Chi-square test analysis and Bonferroni correction was used in this study.

Conclusion: There have been reports of higher incidence of rotator cuff tears associated with the Bigliani type 3 acromion. There was no statistically significant difference between group Y and E in this study. However, the group Y was in had tendency than group E. This worsening of the group Y might have caused rotator cuff tear in the early stage.

P2-014 Study of patients-based assessment for rotator cuff tear using Shoulder 36 (Ver 1.3) evaluation form

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Purpose: Shoulder 36 is a self-administered questionnaire and some reported correlation with JOA score and the usefulness of postoperative evaluation method. The purpose of this study was to investigate the subjective evaluation of the rotator cuff tear.

Material and Methods: From April 2014 to March 2016, 77 patients (46 males, 21 females, mean 65.6 years) underwent arthroscopic rotator cuff repair were included. Sh36 was assessed by themselves at preoperation and 1 year after surgery. We divided patients into 3 groups. Group A was partial tear and 13 patients, group B was complete tear and 46 patients underwent primary repair, and group C was massive tear and 8 patients underwent partial repair. We compared the 3 groups respectively. We investigated cuff repair integrity by Sugaya’s classification and compared the Sh36 type 1-3 with type 4-5.

Results: In Group A and B, all domains were significantly improved. In Group C, ROM only significantly improved. At preoperation, there were no significant differences in all domains between the three groups. At postoperation, there were no significant differences in all domains between group A and B. At postoperation, there were significant differences in domains between group B and C with the exception of sense of well-being. Sugaya’s classification revealed 62 type 1-3 and 5 type 4-5. In this two groups, Sh36 domains shows significant differences with the exception of sense of well-being and sports.

Conclusion: Self-evaluation of the patient was not related to the cuff tear size at preoperation, but related to repaired cuff integrity postoperatively.

P2-015 Investigation of return to sports after arthroscopic rotator cuff repair in the middle-aged and elderly

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Purpose: The purpose of this study was to investigate the sports activity after arthroscopic rotator cuff repair (ARCR) in recreational activities. [Materials and Methods] Ten patients (Male:6 Female:4, Age: 42-70) who underwent ARCR because of pain with sports activity and wanted to continue the same sports were involved in this study. Clinical results were evaluated according to Japanese Orthopaedic Association Score (JOA score) and Japan Shoulder Society Shoulder Sports Score (JSS-SSS), and all patients were assessed if they could return to the same level of sports activity. [Results] JOA score and JSS-SSS were both significantly improved after surgery and all cases were able to return to the same sports. But in three cases, decreased in level of activity or frequency of sports were observed. [Discussion] Two cases which demonstrated lower JSS-SSS after ARCR were elder female. The weakness of abduction and external rotation were observed in three cases which decreased activity of sports after ARCR, and we think these results pointed out the important factor in post-operative rehabilitation of ARCR. The results of this study indicate that ARCR is one of the reasonable choices for patients who want to return to sports in the middle-aged and elderly. [Conclusion] Investigation of return to sports after ARCR showed good results.
P2-016  
*Postoperative outcomes of arthroscopic rotator cuff repair in patients with neuropathic pain.*

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(Purpose) There is neuropathic component that contribute to pain. We reported that 10.3% of patients with rotator cuff tears may have neuropathic pain (NeP). We studied to elucidate the postoperative results of arthroscopic rotator cuff repair for NeP in patients with rotator cuff tear.  
(Methods) From October 2013 to March 2015, 40 consecutive shoulders underwent arthroscopic rotator cuff repair for rotator cuff tear in our hospital. We classified the subjects into two groups according to painDETECT score: NeP+M group (13-36 points) and NeP- group (0-12 points). Age, sex, history of trauma, duration of symptoms, tear size of rotator cuff, VAS, painDETECT score, JOA score, range of motion of shoulder, isometric strength, and re-  
tear rate evaluated using MRI were evaluated and compared using Mann-Whitney U test, paired t-test, and Fisher’s exact test.  
(Results) There were 25 men and 15 women and average age was 63.5 years old. There were 3 cases in NeP+ group (7.5%), 27 cases in NeP- group (67.5%), and 10 cases in M group (25%). VAS, painDETECT score, JOA score, and range of motion of shoulder improved in both groups postoperatively. There were no intergroup differences before the operation or final follow up.  
(Discussion) Antidepressants and calcium channel alpha 2-delta ligands are recommended as first-line therapy for NeP. It was suggested that arthroscopic rotator cuff repair can become a therapeutic tool for NeP in patients with rotator cuff tears.  

P2-017  
*Clinical results of arthroscopic rotator cuff repair in Diabetic Patients*  
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We hypothesized that clinical results of the rotator cuff repair might be inferior in diabetics and examined the influence of the diabetes on the postoperative results of the arthroscopic rotator cuff repair. Arthroscopic rotator cuff repair was performed on 48 shoulders in 45 patients in our hospital. 20 patients were males, 25 patients were females. The mean age at the surgery was 60 years old, tear size was 2.7cm, disease period was 13.7 months. 12 were DM group (diabetic patients), 36 were non-DM group. The evaluation items of postoperative results were range of motion at 3 and 6 months after the operation, JOA score at 1 year after the operation, MRI at 1 year after the surgery. We compared pre- and postoperative JOA score, and compared pre- and postoperative data, in both groups, and analyzed them statistically. MRI were classified using Sugaya’s classification. In the both groups, JOA score were significantly improved after the operation. Age, tear size, disease period, postoperative range of motion, MRI, JOA score did not have a significant difference between two groups. In the MRI, type 4.5 were 9 shoulders, and in the non-DM group, there was no re-tear. There was no difference in the postoperative range of motion, and postoperative results in the DM and non-DM group.

P2-018  
*Short term operative outcome of Arthroscopic rotator cuff tear*

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1 The Duai Memorial Hospital

We weighed short operative outcome of ARCR according to tear size. The object is 204 cases of rotator cuff performed of ARCR from January 2012 to December 2014. The mean of follow-up period is 11.0 months. We evaluated by JOA score. Shoulder 36. Quick DASH and range of movement. We evaluated the presence of re-tear by SUGAYA classification. We accepted improvement in all tear size. More than SUGAYA type 4 is small tear 0%, middle tear 7.5%, great tear 25.5%, extensive tear 52.9%, entire 14.2%. We accepted relatively many re-tear cases in great and extensive tear, but obtained a good result in the clinical outcome.
P-019  Clinical results of Dual-row and DAFF rotator cuff repair

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We compared the clinical outcome of rotator cuff repair performed using either a Dual-row or a DAFF for rotator cuff tears. 77 patients underwent a Dual-row rotator cuff repair, and 63 patients underwent a DAFF rotator cuff repair. The mean follow-up period was 18 months. The JOA score used for postoperative evaluation showed a statistically significant improvement from the preoperative to the final score for both groups. No statistically significant difference in the total JOA scores was found when comparing the two repair techniques. This study suggests that there is no difference in terms of objective outcomes between the two surgical procedures studied if patients have rotator cuff tears.

P-020  The effect of protect anchor in arthroscopic rotator cuff repair using bone-tunnel method

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We have used bone-tunnel method in arthroscopic rotator cuff repair. The purpose of this study was to evaluate the type of bone-tunnel after the surgery and the difference of bone mineral density (BMD) of proximal humerus among that types. Forty patients (25 males and 15 females and mean age 68.9 years) with RCT patients were evaluated. We examined BMD using dual-energy X-ray absorptiometry before surgical repair. We decided with the modification of the report of Yamada et al, region1: 30 degrees above the medial surgical neck, 2: 60 degrees above the medial surgical neck, 3: greater tuberosity, 4: 1cm medial side from 1, 5: 1cm medial side from 2. 6: the medial surgical neck, 7: the lateral surgical neck, 8: humeral shaft under the surgical neck. We have evaluated bone tunnel type using MRI 3 month postoperatively. According to bone tunnel type, there were 11 straight type, 16 curved type, 19 L shaped type. When we used protect anchor at lateral tunnel, those bone tunnel type were all L shaped type. On the other hand, without protect anchor, those bone tunnel type was all straight or curved type. BMD at greater tuberosity was 0.33g/cm2 in straight type, 0.46/g/cm2 in curved type, 0.36/g/cm2 in L shaped type, which was significantly lower in straight type than curved type. Bone tunnel was changed from L shaped to straight or curved type postoperatively, especially female with lower BMD at greater tuberosity. When we used protect anchor at lateral tunnel, we could keep bone tunnel shape.

P-021  The trans-acromial approach with locking plate for the massive rotator cuff tear

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Background: Recently Reverse shoulder arthroplasty is a standard operation for irreparable massive cuff tear, however contra-indication cases of RSA are still controversial. We reported on the surgical results of patients with a massive rotator, which were repaired through the trans-acromial approach with locking plate. Methods: This series included contra-indication 19 cases of RSA which tendon of supraspinatus and infraspinatus were retracted to the medial side of glenoid joint line. There were 11males and 8females. The mean age at operation was 70.4 years old. The Hamada classification was type 1 in 9, type2 in 9, type4 in 1 cases. 15 cases were complicated with subscapulalis tear. The patient is placed in the lateral decubitus position. We confirm it impossible to repair by arthroscopy, and then exposure the acromion and cut the lateral part of the acromion. We can isolate each tendons due to good exposure, and pull them to anatomical insertion. After the primary cuff repair, the acromion is fixed with transosseous sutures and angular stable X plate (locking plate). Results: The JOA score improved from 59.7 to 86.3. Four cases were re-teared of rotator cuff and one case was displaced of acromion postoperatively. Conclusion: Locking plate was useful for acromion fixation because it enable us to fix without penetrating contralateral cortical bone with screw. The trans-acromial approach is a useful procedure, it was easier to repair than conventional approach due to wide exposure.
P2-022  Humeral head osteonecrosis following arthroscopic superior capsular reconstruction.
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[Background] There are some reports of humeral head osteonecrosis following arthroscopic rotator cuff repairs. However there is no report following arthroscopic superior capsular reconstructions (ASCPR).

[Purpose] The purpose of this study is to report one case regarding humeral head osteonecrosis after ASCR.

[Case presentation] A 65-year-old male suffered from left shoulder pain during farm work. Massive rotator cuff tear was diagnosed by MRI image. Since conservative treatment including physical therapy for 9 months, we performed ASCR.

[Results] After an interval period of mild improvement, the patient experienced progressive pain at 4 months post operation. Radiographic evidence showed humeral head osteonecrosis.

[Discussion and Conclusion] Patient claims to have no pain at the moment. Although another surgical treatment might be needed as follow up.

P2-023  Medical examination for baseball players in Miyazaki
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We performed medical examination and measured the shoulder range of motion for baseball players in Miyazaki during 2013-2015. Total 1601 baseball players were eligible in this study, and they were divided into normal group (group N; n = 1355) and abnormal group (group A; n = 246) following the result of medical examination for shoulder and elbow. The result showed that in all players, external rotation (ER) angle was increased (105.4deg), and internal rotation (IR) angle was decreased (56.9deg) at pitching side compared with those at non-pitching side (ER104.1deg, IR56.6deg). At pitching side, ER and IR angle were similar between group A and N; however, at non-pitching side, ER angle was decreased in group A (99.1deg), while IR angle was increased in group N (65.5deg). It has been reported that in the baseball players ER angle was increased and IR angle was decreased at pitching side compared to those at non-pitching side. Our data showed that at non-pitching side ER angle was decreased and IR angle was increased in group A compared with those in group N. These findings suggest that anatomical individual differences might be involved in shoulder and elbow disorder of baseball players.

P2-024  Chronological change of shoulder and elbow pain in juvenile baseball player
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Title Chronological change of shoulder and elbow pain in juvenile baseball player

Purpose The purpose of this study is to investigate the chronological change of shoulder and elbow pain in juvenile baseball players. Methods 3571 juvenile baseball players who participated in annual medical checkup were enrolled in this study. The experience of shoulder/ elbow pain during the season were investigated by age group using self-completed questionnaire. Results The prevalence of shoulder/ elbow pain was 14.7% and 12.7% in the lower grade of elementary school, 24.1% and 34.7% in the higher grade of elementary school, 26.4% and 40.3% in the junior high school, and 41.1% and 51.4%, respectively. Both pain was significantly increased after higher grade of elementary school age, and the prevalence of elbow pain was significantly higher than shoulder pain throughout the surveillance period. Conclusion Elbow pain would be more popular compared with shoulder pain in youth period.
P2-025  Approach of the sports disorders prevention for high school baseball player
-Associated factor with shoulder pain-
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[Purpose] To evaluate factors related to the pain, in particular shoulder pain, of the high school baseball player, compared to the junior high school athletes.

[Subject and Methods] 65 high school baseball players, members of the winning team of Akita prefectural tournament and 121 designated junior high school athletes of Akita prefecture who were undergone the medical check-ups in 2013-2015 were enrolled. We compared the presence of pain with check-up factors and examined approach of the sports disorders prevention for the first-class high school baseball player.

[Results] Finger Floor Distance (FFD) and Heel Buttock Distance (HBD) in high school baseball player were significantly higher than in junior high school athletes (P=0.001, P=0.0239). Players with higher FFD or HBD tended to have a pain. In contrast, abnormal findings on elbow joint ultrasonography which mean past disorder were more observed in players with lower FFD or HBD. On the other hand, Straight Leg Raising angle (SLR) in high school baseball player were significantly higher than in junior high school athletes (P=0.0439). Players with lower SLR tended to have a shoulder pain.

[Conclusion] It was suggested that FFD or HBD were effective indices of approach of the sports disorders prevention for the first-class high school baseball player. In terms of a shoulder pain, SLR might be effective index of approach.

P2-026  The relationship between shoulder pain and dynamic balance ability
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Introduction: In the pitching motion, pitchers have to stand with dominant side leg in early phase, and then, they have to stand with nondominant side leg in late phase. Thus, dynamic balance ability is thought to be an important factor for the stability of the pitching motion. The aim of this study was to examine the relation between the dynamic balance ability and shoulder pain.

Methods: 128 high school baseball pitchers were included in this study. We interviewed all participants about the presence of recent or past shoulder pain. All participants performed Y balance test which examine reaching distance of their legs toward anterior, postero-medial, and postero-lateral. Results of the test were normalized with their leg length, and these ratios were used as indicator of the dynamic balance ability. Participants were divided into two groups according to the presence of shoulder pain, and we compared results of Y balance test between two groups.

Results: Anterior balance ability when standing with dominant leg was significantly lower in the group with recent shoulder pain (n=4) than those in group without recent shoulder pain (n=124). Postero-lateral balance ability when standing with nondominant leg was also significantly lower in the group with recent shoulder pain.

Discussion: Previous reports have revealed that the instability of the ankle joint or tightness of lower leg may decrease anterior balance ability. The results of this study suggest that instability of the ankle joint or tightness of lower leg may be related to recent shoulder pain.

P2-027  Relationship between cool-down time and the pain in the body and disability of performance in high school baseball players
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Purpose: The purpose of this study is to investigate the relationship between cool-down time, and the shoulder, elbow pain or the performance of playing baseball. Materials and Methods: 123 high school baseball players were recommended to do cool-down more than ten minutes through the season, and then questionnaires a season about the cool-down time that they actually did in the season. Also we asked the body pain or disability of performance, such as The Disabilities of the Arm, Shoulder and Hand Score (DASH sports) or The Performance Score of Throwing. 1,222 cases were investigated, and statistical analysis was performed with Mann-Whitney U analysis.

Results: 563 cases did the cool-down for more than ten minutes (mean of 86 points, the mean DASH sports was 15 points, and the mean Performance Score of Throwing was 73.7). In more than ten minutes group, the body pain, especially shoulder and elbow pain, was significant better than less than 10 minutes group. Similarly DASH sports and The Performance Score of Throwing in more than ten minutes group were significant better than less than 10 minutes group.

Conclusion: Doing cool-down more than ten minutes related to less shoulder and elbow pain and better performance.
P2-028  Two cases of stress fracture of the first rib in baseball players
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Stress fractures of the first rib are uncommon. We report the two cases of this fracture in high school baseball players. CASE1. An 18-year-old high school student presented to our hospital with pain in his right scapular region after throwing in baseball. Radiographs of the shoulder and CT scan revealed a fracture of the first rib on the right side. Throwing was forbidden him for 2 months, and he healed with conservative therapy. CASE2. An 16-years-old high school student presented to our hospital with pain in his right scapular region after throwing in baseball. Radiographs of the shoulder revealed a fracture of the first rib on the right side. Playing baseball was forbidden him for some time, and he healed with conservative therapy. The pathogenetic mechanism for stress fracture of the first rib is traction force exerted by the anterior and middle scalene muscles and by the serratus anterior and internal intercostal muscles. In addition, stress fracture of the first rib also occur as a result of repeated direct external force and indirect external force transmitted by the clavicle. Sometimes the initial examination does not lead to a diagnosis of stress fracture of first rib. Because the fracture location is unclear due to overlapping by the second rib and clavicle. We think the medical practice that bears stress fractures of the first rib in mind is necessary whenever an athlete complains of pain around the shoulder joint.

P2-029  Clinical characteristics of first rib stress fractures
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We analyzed clinical characteristics of first rib stress fractures which is a rare condition. There are 12 cases (7 cases in baseball, 3 cases in weightlifting, 1 case in classical ballet, 1 case in cheerleading) with a mean age of 17.8 years. The pain is located around the scapula in 10 cases (83.3%) and all cases had sloping shoulders and kyphosis. Radiograph showed transverse fracture in the middle of the first rib in all cases. All cases had conservative treatment involving the rest of the affected upper extremity. Sports return period had an average 18 months. As patients of first rib stress fractures have pain around the scapular, this presentation usually misleads the physician to believe that this is a cervical spine or shoulder problem. Therefore, stress fractures of the first rib should be kept in mind whenever an athlete complains of pain around the scapula.

P2-030  Characteristics of painful shoulder without recognized instability in the rugby players
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Background: Traumatic shoulder dislocation is common in rugby. Despite the injury, the players sometimes have a long lasting shoulder pain without awareness of instability. Objective: To investigate MRI findings and surgical outcomes of the rugby players having these complaints. Materials and Methods: MRI findings of Consecutive 40 shoulders from 40 rugby players without awareness of dislocation were retrospectively assessed. Their chief complaints were shoulder pain at the time of contact which lasts more than one month. The player who has a subjective recognition of shoulder instability were excluded. Two raters, experienced radiologist and orthopaedic surgeon, evaluated the MRI double-blindly. Intraoperative findings and functional score before and after surgery were also investigated from the subjects who undertook surgical treatment. Results: 35 out of 40 shoulders revealed labral tear in the affected shoulder. Whereas the direction was anterior in most cases, the superior and the posterior tears also existed. Osseous lesions on both the glenoid and postero-superior part of the humeral head were observed in two cases. All players who undertook surgical treatment could return to play rugby in pre-injury level (n=10). Conclusions: Painful shoulders without any apparent history of dislocation or subluxation are not rare in rugby. Our findings revealed that labral tear is the most cause of these symptoms. The direction of the tear was mainly in anterior, but superior or posterior in some cases. These findings may indicate the mechanism of injury was not uniform. Surgical treatment demonstrated good outcome for return to play in pre-injury level.
P2-031  Malposition of rugby tackling; focus on neck orientation and scapular tilt
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In rugby, incidence of traumatic anterior shoulder dislocation is much higher than that of other sports. Previous epidemiologic study demonstrated that more than 60 % of these mechanism was tackling. We demonstrated that neck rotation and shoulder external rotation was correlated during tackling, and this finding might be one of the possible causes of shoulder dislocation by using 3 dimensional motion capture system in the last meeting. The aim of present study was to investigate the scapular tilting under different neck orientations. We investigated correlation between neck orientation and scapular tilting during rugby tackling position by using 3 dimensional magnetic position sensor system. All subjects of four mature rugby players repeated active motion of maximum shoulder external and internal rotation in 90 deg: abduction of the shoulder with 7 different neck orientation. Scapular tilting angle were compared among seven neck orientations during total of 84 trials. As a result of motion analyzes, scapular tilting angle in the maximum shoulder external rotation was highest in extension with ipsilateral rotation of the neck, and lowest in flexion with contralateral rotation of the neck. These results suggest that neck orientation affects scapular tilting, resulting in decrease in range of shoulder external rotation. This finding may be a key of shoulder malposition during rugby tackling.

P2-032  Overhead throw sports decrease the internal rotation of shoulder joint
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Purpose: It is known that Glenohumeral Internal Rotation Deficit (GIRD) arises in baseball players, especially the repetition of pitching. However, there are few reports related to the risk factor or physical feature of the players who has occurred GIRD. We investigated the risk factor of GIRD including Overhead Throw Sports (OTS) other than baseball.

Methods: We evaluated 130 junior high school students. Among them, 73 people were classified into OTS groups (tennis, handball, badminton and softball) and 57 people were classified into non-OTS groups (Kendo, fencing, basketball and table tennis). The people were classified as positive GIRD (p-GIRD) if their dominant arm displayed shoulder internal rotation (IR) deficit more than 15 degree compared with their non-dominant arm. We investigated the age, competition years, height growth, affiliation sports, general laxity and the flexibility of lower body between p-GIRD people and negative GIRD (n-GIRD) people.

Results: p-GIRD were present 26% (19 of 73 people) in OTS groups while 5% (3 of 57 people) in non-OTS groups. The ratio of p-GIRD was significantly higher in OTS groups than in non-OTS groups (p<0.002). On the other hand, there was no significant difference between p-GIRD and n-GIRD people regarding other evaluation items.

Conclusion: There was no significant difference between p-GIRD and n-GIRD person in relation to physical feature or background factor. Playing OTS was only the risk factor of GIRD.

P2-038  Latissimus dorsi transition after surgery, reverse type shoulder joint replacement surgery the elevation failure remained
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limitation of latissimus dorsi transfer for pseudoparalysis due to massive rotator cuff tear. Latissimus dorsi transfer (LDT) is reported to be one of the treatment option for irreparable massive rotator cuff repair. However, several limitations have been reported which indicate the poor outcome. We demonstrated the patient who complained persistent shoulder pseudoparalysis after LDT for massive rotator cuff tear with partial defect of acromion. Case report 75 year-old man who complained shoulder pseudoparalysis after open acromioplasty for massive rotator cuff tear visited to our hospital. LDT with subcapsularis tendon repair was performed to achieve the ability of shoulder elevation, however, pseudoparalysis was not improved after surgery in spite of intensive rehabilitation intended to facilitation of transferred latissimus dorsi muscle and scapulothoracic function. Shoulder active elevation was improved immediately after reverse shoulder arthroplasty. Severe cuff tear arthropathy with subcapsularis tendon tear might be good indication for reverse shoulder arthroplasty even if the coraco-acromial arch is disrupted.
P2-039 The Cause and Patient Selection to Protect the Infection after Reverse Shoulder Replacement
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We reported three cases of the infection of the shoulder. About two cases of them, we suspected the preoperative infection and find out the bacteria arthroscopically, so we stopped RSR. At the other case, we did RSR and post operative infection. We think that there are some preoperative infections and we must take care of it to prevent from infection after RSR.

P2-040 Radiographic evaluation of incidences of DVT and PE in total shoulder arthroplasty and associate surgeries using DVT-CT
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(Background) The incidences of deep venous thrombosis (DVT) and pulmonary embolism (PE) are supposed to be low in upper extremity surgeries. However, ultrasonography after total shoulder arthroplasty (TSA) revealed that there were 13 cases of DVT and additionally 3 cases of symptomatic PE in 100 cases (Willis et al., JSES 2009). So there is a possibility that the incidence of PE in TSA including asymptomatic case is higher than supposed. The purpose of this study is to elucidate the incidences of DVT and PE after TSA and associate surgeries using DVT-CT.

(Method) 31 shoulders of 31 patients who were treated with TSA and associate surgeries performed in our university hospital and affiliated hospital from April 2014 to April 2016 were enrolled in this study. There were 3 cases of TSA, 26 cases of reverse shoulder arthroplasty (RSA) and 2 cases of humeral head replacement (IHR). There were 11 shoulders of 11 male patients and 20 shoulders of 20 females patients. Enhanced 16-row multi detector computed tomography (MDCT) was performed on the fourth day after surgery.

(Results) MDCT revealed that there were no cases of PE including asymptomatic one nor proximal DVT but 3 cases of peripheral DVT located at distal from popliteal vein.

(Discussion) MDCT revealed that the incidence of DVT was 9.7% (3 out of 31 cases) and there were no PE cases including asymptomatic case. The result of MDCT was almost as same as past report.

P2-041 A case report: periprosthetic humeral fractures with loosening of the component after total shoulder arthroplasty
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One of the late complication after shoulder arthroplasty is periprosthetic humeral fractures. However, there have been a few case report. We encountered a patient with periprosthetic humeral fractures with loosening of the component after total shoulder arthroplasty. The patient had total shoulder arthroplasty twelve years ago. He had a fall and had a symptom of right arm pain. He visited our hospital and detailed examinations revealed these fractures. He hoped conservative therapy. However, the degree of dislocation of the humeral fracture became worse. We treated the fracture with revision arthroplasty and osteosynthesis and autogeneous bone graft. One weeks later from the operation, he started passive range of motion exercise. Four weeks later from the operation, he started active range of motion exercise. He have restored almost preoperative range of the motion. On the other hand, the bone union have not occurred yet. We report on this patient with periprosthetic humeral fractures with loosening of the component after total shoulder arthroplasty, with reference to the relevant literature.
P2-042  Glenoid baseplate failure of reverse shoulder arthroplasty: A case report

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Purpose: Glenoid failure following reverse shoulder arthroplasty (RSA) is rare. We report a patient who had the glenoid component failure after RSA.

Case report: A 65-year-old man. He had RSA for irreparable rotator cuff tear and rotator cuff arthropathy. On postoperative weeks (POW) 4, active range of motion was started. On POW 8, the glenoid component was fallen out. On POW 10, revision was performed. Glenoid fracture hadn’t occurred. Action of pressing with affected arm was prohibited.

Discussion: Multiple factors can contribute including patient related issues and technical issues. Patient factors contributing to glenoid component failure involve action of pressing on the floor with affected arm to raise up. Technical factors involve errors in initial component placement which is inserted in a superiorly oriented direction and screw length. We report a patient who had the glenoid component failure after RSA.

P2-087  The clinical outcome of arthroscopic surgery for the glenoid fossa fracture of the scapula

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[Purpose] The purpose of this study was to evaluate the arthroscopic surgical results of the glenoid fossa fracture of the scapula.

[Materials and Methods] We studied 18 patients who had 18 shoulders underwent minimum invasive surgery for intra-articular fracture of the shoulder and were followed-up more than 5 months from January 2006 to December 2015. Nine were male and nine were female. We had Idecberg’s Type Ia fracture 12 cases, Type Ib fracture 1 case, TypeII 1 case, and TypeIII were 4 cases. The average age was 57.4 years old (22-83 years old) and the average follow up period was 20.5 months (6-30 months). We used suture anchor and cannulated screw. We investigated the surgical results using the Japanese Orthopaedic Association score (JOA score).

[Results] The average post operative JOA score is 85.3 points. We could obtain the bone union for all cases.

[Conclusion] The clinical outcome of arthroscopic surgery for the glenoid fossa fracture of the scapula was satisfactory.

P2-088  Clinical results of osteosynthesis for the distal clavicle fracture with the cable wiring and locking screw plate system

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Purpose: The purpose of this study was to investigate the clinical results of osteosynthesis with the cable wiring and locking screw plate system (CWP) for distal clavicle fractures with small distal bone fragment.

Methods: 6 patients (5 males, 1 female) were treated with CWP from January to December 2015. The mean age of patients was 43.1 +/- 5.0 years old and the mean follow-up period was 9.7 +/- 2.7 months. These cases were classified according to Craig classification (type2B: 5 cases, type5: 1 case). We assessed the range of the shoulder motion, bone union and complications.

Results: All of 6 clavicle fractures had united, and all patients had no complications. At the final check-up, the mean range of the shoulder flexion, abduction, external rotation and internal rotation was 171.7 +/- 7.5, 176.3 +/- 10.8, 62.5 +/- 11.7 and Th108 +/- 20.0 respectively.

Discussion: We performed osteosynthesis with CWP for distal clavicle fractures and got satisfactory outcomes in all cases. Osteosynthesis with CWP was useful procedure for distal clavicle fractures with small distal bone fragment or comminuted fractures.
P2-089  Treatment of Comminuted Distal clavicle fracture with locking plate and coracoclavicular ligament reconstruction

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The treatment of the comminuted distal clavicle fracture is still a challenging task. Previous report showed the clavicle hook plate is one of the best treatment option for this fracture, however, the terrible complication such as the superior migration of the hook into the acromion was reported. To address this issue, we established the surgery to the comminuted distal clavicle fracture using the locking plate combined with the coracoclavicular ligament reconstruction. Patient is a 51-year-old male and the plain X-ray showed the distal clavicle was fragmented. The distal fragments of the clavicle were too small to fix by the locking plate, hence, the coracoclavicular ligament reconstruction was required. The coracoclavicular ligament was created in a single-bundle of the artificial ligament and the ligament was fixed by using the end-buttons. The bone tunnel of the clavicular side was created in the antero-posterior direction to avoid interfering with the locking plate positioning. The clinical short-term result was good and the clavicle fracture was healed in three month. When the coracoclavicular ligament is reconstructed concomitantly with the plate fixation, the end-button or the knot on the clavicle is a major impediment to the plate positioning. The coracoid tubercle places at the postero-inferior aspect of the clavicle, then the coroid ligament could not be created anatomically in the cranio-caudal bone tunnel. Our method is the best treatment option for the combination of the distal clavicle fracture fixation and the coracoclavicular ligament reconstruction, moreover, the coracoclavicular ligament re-create can be sustainable after the plate removal.

P2-090  Treatment of distal clavicle fracture by anatomical locking plate, NOW-J.

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Background: The purpose of this study is to retrospectively review the clinical outcomes of anatomical locking plate (NOW-J) in the treatment of distal clavicle fractures. Material and Methods: 25 patients, 21 men and 4 women, who underwent open reduction and internal fixation with NOW-J between July 2011 and October 2015 were evaluated. An average age was 52.4 years. There was 1 Craig type I, 4 type IIa, 9 Type IIb and 11 type V fractures. We have evaluated the size of distal fragment, union rate and range of motion in each patient. Results: The mean size of distal fragment was 23.3mm (9.6-41.6mm). At least 3 locking screws were inserted in the distal fragment in all cases. All patients achieved union. The mean flexion angle at final follow-up was 151 degrees. Discussion: According to the plate design, distal fragment must be more than 7mm to insert more than 3 locking screws. In our series, the smallest distal fragment was 9.6mm in length.

P2-091  The results of treatment for lateral clavicle fractures

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(Introduction) Recently, various types of fixation for lateral clavicle fractures have been reported, but decision which type of fixation to perform could be tough. In this report, we investigated the results of treatment for this fracture in our institution and discuss the treatment strategy.

(Materials and methods) Twenty-five cases treated in our institution were reviewed retrospectively. Twenty-two cases underwent surgical treatments and residual three were treated conservatively. There were 6 patients treated with tension band wiring fixations, 6 hook plates, 6 locking distal clavicle plates, and 4 other treatments in the patients received surgical treatments. The results of the treatments for these patients were investigated in view of bone union, complications, and clinical assessment.

(Results) Bone union was achieved in all patients. There were some complications. One malunion occurred in a patient treated by tension band wiring fixations, 2 shoulder joint contractures and a fracture of the shaft of the clavicle medial to the plate were seen in the patients treated using the hook plates, but no complication was seen in the patients treated with locking distal clavicle plates.

(Discussion) The outcome of patients treated with locking distal clavicle plates showed the most favorable results, but the indication of this plate must be careful. In case of the small distal fragments or acromioclavicular ligament injuries, subluxation or dislocation of acromioclavicular joint might occur after using this plate. In the surgical treatment for this fracture, fixation methods could be changed according to the fracture type.