Preoperative findings anticipate poor grade subarachnoid hemorrhage and prognostic factors; Retrospective study

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Objective
To reveal factors which can anticipate the poor grade subarachnoid hemorrhage (SAH) and analyze the preoperative prognostic factor.

Methods
186 patients were included. Physiological, radiographic and blood examination data were collected retrospectively. Factors related to poor WFNS grade and poor outcome were analyzed. Poor outcome was defined as modified Rankin scale scores 3-6. All surgical intervention were performed by clipping immediately after diagnosis of SAH. 10 cases were treated conservatively because of no bilateral light reflex.

Results
Mean age was 61.6 years. Female sex was in 134(72%). Poor WFNS were observed in 70(38.2%). Poor WFNS were significantly (P=0.005) correlated to Age≧70 (p=0.007; adjusted odds ratio(OR): 3.732), midline shift (p=0.003; OR: 4.894), no CSF in high convexity cortical sulcus (p=0.001; OR: 5.471), and ambient cistern (p=0.003; OR: 4.830). Poor outcome were significantly correlated to Age≧70 (p<0.001; OR: 8.363), WFNS grade5 (p<0.001; OR: 15.350), ICH (p=0.014; OR: 3.323), Evans index(EI)≧0.3 (p=0.008; OR: 4.398). EI≧0.3 were significantly correlated to body mass index (p=0.046; OR: 0.865), intraventricular hemorrhage (p=0.008; OR: 3.859), HbA1c (p=0.008; OR: 2.781) and Age≧70 (p=0.003; OR: 4.115).

Conclusion
Present study shows that the radiographic signs of poor grade SAH were not correlated to poor outcome. The results suggest that early decompressive surgery may improve outcome. Poor outcome were correlated to high-age, brain-destructive hemorrhage and EI≧0.3. And EI reflects not only hydrocephalus but also patient’s frailty. Surgical indication for the patients with those aging related status may be controversial.
SYII-2

Delayed intracranial parenchymal changes after aneurysmal coil embolization procedure.

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[Background] With recent advancement of endovascular techniques and devices, coil embolization for unruptured cerebral aneurysms has been mundanely performed, however, delayed complications caused by several devices for endovascular procedures has been described. In the present study, we investigated the characteristics, pathology and treatment of the delayed intracranial parenchymal changes after aneurysmal coil embolization procedures.

[Methods] From 2015 to 2017, 305 patients who underwent coil embolization for cerebral unruptured aneurysms at our related institutes were included. Delayed intracranial parenchymal changes were defined as late-onset symptomatic inflammatory changes which showed multiple cerebral white matter lesions that coincided with the target vessel perfusion territories and resolved by steroid administration.

[Results] Seven cases (2.3%) showed late-onset symptomatic inflammatory changes after the procedures, and six out of seven cases underwent stent-assisted coil embolization. In 2 cases, nickel allergy was proved by the skin patch test.

[Discussion] As causes of delayed inflammatory parenchymal changes after endovascular coil embolization, contrast agent encephalopathy, coil compression, PRES, metal allergy, foreign body allergy may be considered. In our series, 2 cases which proved nickel allergy, suggesting the possibility of nickel allergy. With respect to the other 5 cases, it was also possible that inflammatory changes such as metal allergy or coating polymer peeled off from the catheter during procedures.

[Conclusion] In performing aneurysmal coil embolization procedures, it is necessary to fully recognize that there are possibilities of delayed inflammatory changes due to the use of various devices.
Altered trend in background and treatment modality in the patients with ruptured cerebral aneurysm during the last decade

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With the aging of society and progress of intravascular treatment, we reconsidered the roles of craniotomy for the patients with subarachnoid hemorrhage (SAH) due to ruptured cerebral aneurysm.

Materials and methods: We experienced 512 patients with SAH in last 10 years; age 29-96 year-old, 151 male 361 female. We examined their severity, treatment, outcome, complications, etc. in all cases and radical treatment cases (467). The patients was divided into the first (2007-11; 245) and the second period (2012-16; 267). Craniotomy was the first line in the first period, but indication of endovascular treatment has been expanded in the second period.

Results: In 10 years, significant progress of aging has been observed. Although the distribution of disease severity does not change, the proportion of patients with existing disabilities and general complications increased significantly. In multivariate analysis, age, cerebral infarction due to cerebral vasospasm, disease severity, existing disability and general complication were predictors of poor outcome (modified Rankin scale 3-6). Patients treated with endovascular treatment increased from 6.5% to 20%. The frequency of surgical complications was around 25%, being not significantly different between each modality. Overall ratio of poor outcome have not changed at all. The outcome is well maintained regardless of aging, because patients with accompanied complications are mainly treated by endovascular manner.

Conclusions: The role of endovascular treatment for SAH is increasing. Safety as well as robustness should be taking into account when we consider which treatment should be selected for the particular aneurysm.
The real world outcome of surgical clipping or endovascular coiling with aneurysmal subarachnoid hemorrhage in Japan

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According to the guideline of AHA, for patients with ruptured aneurysms judged to be technically amenable to both endovascular coiling (EC) and neurosurgical clipping (SC), EC should be considered. However, there have been some papers reported with different results. Now, we compared the outcome after SC with after EC for the patients with aneurysmal subarachnoid hemorrhage (aSAH) using the big database in Japan. The stroke data bank in Japan with 3593 cases of aSAH showed that no significant differences in modified Rankin scale (mRS) at discharge were found between SC and EC (p=0.22) and that the cutoff age of ROC analysis for poor mRS > 2 was 3 to 9 years older by EC than SC. The Diagnosis Procedure Combination (DPC) database in Japan showed that the propensity score-matched analysis of 3,561 non-elderly patients (< 65 years) showed no significant difference for poor outcome between SC and EC (34.3% vs 32.9%, p=0.19; risk difference -1.5%), however 3,559 elderly patients (≥ 65 years) undergoing SC showed significantly higher rates of poor outcome (65.5% vs 61.34%, p=0.002; risk difference 4.3%) compared to EC. In-hospital mortality was significantly higher after EC than SC in both groups. ROC analysis for poor outcome of the total group showed the cut-off ages of 67.5 years for SC (AUC 0.70) and 71.5 years for EC (AUC 0.69). The treatment indication should be carefully considered based on the characteristics of the aneurysm and the patients with aSAH, especially in non-elderly individuals.
SYII-5

Outcomes of open procedures for unruptured intracranial aneurysms and prediction model - implications from the UCAS Japan cohort

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Background: Management strategy of the unruptured intracranial aneurysms (UIA) should be made by balancing rupture risk and management risk of aneurysms as well as patient’s physical and mental conditions. Rupture risks and its prediction models of UCA have been recently reported, but management risks need to be further clarified. We now report the treatment data from a Japanese cohort and created risk prediction model in conjunction with rupture risks in this cohort.

Method: In the cohort of UCAS Japan, 2,316 underwent open craniotomy. Morbidity was defined as decline of modified Rankin scale to the level of two or below at one month after treatment. Factors with p value less than 0.10 by multivariate cox regression model were considered important and included in the prediction model for management morbidity. Prediction scores were derived from multivariate hazard ratio.

Results: Overall morbidity was recorded in 65 cases (2.8%). Important risk factors were as follows; Size $\geq$ 10mm, Basilar Location, not associated with daughter sac, Age $\geq$ 70, Hypertension, Diabetes Mellitus, initial modified Rankin scale and multiple aneurysm treatment at one cession. Neither hospital treatment volume nor method of treatment affected treatment morbidity. We created risk prediction model for morbidity to be balanced with rupture prediction score.

Conclusions: Risks associated with management of UIA can be stratified with several factors. Risk prediction model of management as shown here should support decision making on UIA management in conjoined with rupture risk prediction model.
The great pioneers of aneurysm surgery in the mid and late 20th century had made a lot of effort to lay foundation for basic concept and technique for aneurysm microsurgery. The advancement of microsurgical techniques by many great vascular neurosurgeons, such as Dr. Drake and Dr. Yasargil, and development of neuroradiology and surgical equipment allowed the tremendous improvement of treatment results of aneurysm microsurgery. In addition to direct neck clipping, coil embolization introduced by Dr. Guglielmi in 1991, has represented as effective solution for most saccular aneurysms especially in posterior circulation, and number of coil embolization has increased in relation to neck clipping as years passed. Since the years 2006-2007, a new generation of neurovascular stent, flow diverter device, such as Pipeline Embolization Device (PED), can exclude the sac from circulation in fusiform, dissecting, large, giant and wide necked aneurysm.

Subarachnoid hemorrhage (SAH) due to ruptured aneurysm is still very hazardous and dangerous disease, because of its high mortality and morbidity rates even in 21st century with marked improvement of management of SAH. Prevalence of saccular intracranial aneurysm is around 1% in population and incidence of SAH gives figures around 10/100,000 people/year. Therefore, unruptured aneurysm has a risk of bleeding of 1%/year, approximately. There has been a lot of report about natural history of unruptured aneurysm, and some controversies still remained which aneurysm will be ruptured, especially in small sized aneurysm. The one of the best ways to prevent SAH is disturbing aneurysm formation and its growth by reducing the risk factors such as hypertension and cigarette smoking, and another way is to find the unruptured aneurysm by CTA and MRA and treat it before rupturing in good condition by neck clipping or endovascular coiling. According to our database of treatment for cerebral aneurysms during last 10 years, we found about 15% of ruptured aneurysms were very small aneurysms (VSAs) with size of under 3mm in diameter which had poor grade clinical condition on admission and outcome. Therefore, we treated VSAs actively even in unruptured cases by direct neck clipping or endovascular coiling with acceptable complication rate.