Dural AVFs have been recognized as common type of vascular malformation at the cervical region. However, recent studies reveal frequent coexistence of dural and pial AVFs, which would require more accurate diagnosis. In this study, we studied the efficacy of intra-arterial injection (IA) fluorescence videoangiography to detect detailed anatomy of this lesion during surgery. This study included 9 cases (cranio-cervical junction (CCJ) 7, C5/6 1, C6 1). Preoperative diagnosis was dural AVF and pial AVF in 7 and 2 cases, and both AVFs were in 2 cases. We analyzed the intraoperative finding of IA-FV, and investigated its effectiveness on the final diagnosis. IA-FV depicted early reflux of fluorescence into drainers in all dural AVF cases, and confirmed all vascular structures in all pial AVF cases. In 2 cases, the lesions were located at the ventral side of the spinal cord, which required endoscopic FV to observe the shunts. In the colocalization cases, IA-FV, especially frame-by-frame playback, could distinguish each vascular component. Namely, feeders of pial AVFs were depicted earlier than drainers of dural AVFs. From these findings, 3 of 7 dural AVF cases turned out as the concurrence cases during surgery, and were treated based on the findings. Shunts were completely disappeared in all the cases, and outcomes were excellent in all but one with severe SAH. IA-FV is effective to distinguish dural, pial and concurrent AVFs and would improve the durability of surgery.
To safely and completely clip the intracranial aneurysms, there are three key issues. First, complete epidural hemostasis of surgical field. Second, wide, sharp, and bloodless fissure dissection. Third, skull base and bypass technique usage. In fissure dissection, bilateral meticulous brain retractors usage, irrigation suction, and sharp “Kamiyama scissor” usage under highest magnification is essential. In skull base drilling, for anterior clinoidectomy dura propria elevation with meticulous epidural hemostasis is important. For high flow bypass in cavernous giant AN, meticulous bypass technique under bloodless Sylvian field is mandatory. To demonstrate those issues, multiple surgical videos would be provided including anterior interhemispheric approach for AcomA aneurysm, distal transSylvian approach in conjunction with anterior clinoidectomy and dural ring opening for C2 aneurysm, Far lateral approach for difficult VA aneurysm, and high flow bypass for giant ICA aneurysm.
Blood blister-like aneurysms (BBA) are uncommon but challenging lesions. Currently, the treatment of BBA utilizes many therapeutic methods, including direct clipping, suturing, wrapping clipping, trapping with bypass, and endovascular approaches. In the present report, the author describes the patients with ruptured BBA of the internal carotid artery (ICA) who underwent multiple direct surgical clipping.

Twelve patients were treated with clip placement and 9 with endovascular treatment. The choice of surgical or endovascular treatment was decided by age, aneurysm direction, and their morphological features. A large tear during first clipping can destroy the vessel's tubular structure, and repair cannot be sufficient using a clip alone. While clipping the aneurysm, the arterial wall at the root of the aneurysm was also clipped to improve stability. Multiple clips (straight, encircling, curved clip) were applied parallel or perpendicular to ICA.

Patients exhibited no stenosis of the parent artery after clipping. One patient died due to major infarction after operation, the remaining 11 patients achieved satisfactory outcomes.

Management planning for patients presenting with a BBA must be tailored to the clinical and surgical conditions, and each available procedure has benefits and drawbacks. Multiple clipping technique could be chosen as the optimal surgical modality for prevention of rebleeding from these lesions.
Purpose: Currently, direct clipping has been pressed to carry out less and less invasively by technical innovation of endovascular surgery. We will introduce and examine our initial experience of clipping with keyhole craniotomy named keyhole clipping (KHC). Materials and methods: We defined keyhole as craniotomy less than 30mm in diameter. After experience of around 300 aneurysm clippings by conventional method before 2017, we’ve started KHC since June 2017 for the treatment for unruptured and relatively small aneurysms (ANs). MCA ANs with too short or too long M1, and dorsally projecting Acom ANs were excluded from the indication. Ten ANs (Acom 2, IC-Pcom 2, MCA 6) in ten patients (M:F=7:3, mean age 65+9 y.o.) were treated by KHC in University of Fukui Hospital. All surgery underwent under monitoring of MEP and ICG videoangiography (ICG-VA). Preoperative simulation by using computer workstation (ZAIO station) underwent in some cases. Results: Two Acom ANs and two IC-Pcom ANs were successfully clipped by supraorbital KHC and six MCA ANs were successfully clipped by pterional KHC. Although all aneurysms were clipped completely, postoperative minor occurred in one case and transient facial palsy occurred in 5cases. One of five needed additional plastic surgery. Conclusions: Though KHC was reported to give a shorter operation time, less frequent chewing discomfort, and better cosmetic outcome than conventional pterional approach, there remain some problems to be overcome such as facial nerve palsy and postoperative stroke.
Minimal invasive craniotomy is one alternative option for aneurysmal neck clipping. It has some advantages like simple preparation, short approaching time, minimal scarring and patient satisfaction. The corridor is so small, so instrument collisions are another problem. In order to obtain a wider field of view than corridor, cerebrospinal fluid (CSF) drain and sufficient arachnoid dissection are necessary. As a candidate for keyhole surgery, we need to select patients with minimal brain swelling. The first step to getting a relaxed brain is CSF drain. There are two ways. One is cerebrospinal fluid (CSF) drain through lumbar puncture. But it is not enough for brain relaxation when subarachnoid hemorrhage is abundant. Another alternative is in-situ ventriculostomy. You can access the ventricle from the cortex and drain CSF 40-70 cc. For the easy access to the ventricle you should aim the center of brain anywhere in anterior surface. The trans-eyebrow supraorbital approach is one of the well-known keyhole surgery for anterior circulation aneurysms. I present a typical case of ruptured aneurysm treated via supraorbital keyhole approach. The minipterional approach is another keyhole surgery. It is definitely trans-sylvian approach and we, neurosurgeons, familiar with this approach. Anterior circulation aneurysms can be treated through the 2.5cm size craniotomy on pterion area. The patient satisfaction is high because the length of skin incision is 4cm and there is no temporal muscle atrophy after the surgery. I present the surgical techniques from skin incision to muscle repair.
Clipping tactics of large to giant aneurysms

Jong Soo Kim

Sungkyunkwan Univ.

After wide use of endovascular tools for the treatment of intracranial aneurysm, especially flow diverter is making neurosurgeon have little chance to operate the large to giant aneurysms. But still now there are many aneurysms to be treated by only surgical methods. During last 10 years, the author operated 30 cases of large to giant intracranial aneurysm. (>20mm) directly. Among them 18 direct clippings were performed. The author will present the surgical tactics of clipping of giant aneurysms and result of direct surgery.