

## Chapter 32

# Contemporary Management of Anterior Circulation Aneurysms

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A subarachnoid hemorrhage (SAH) caused by the rupture of an intracranial aneurysm is one of the most common neurosurgical emergencies. Despite major advances in the understanding and treatment of this condition, the prognosis remains unsatisfactory. Over the past 10 years, clipping surgery has been increasingly replaced by endovascular methods of obliteration of the aneurysm sac (coil embolization). The patient not determined by the surgical procedure alone. Pre- and postoperative management of the patients is also crucial.

located in the anterior circulation and discuss our future goals for the treatment of these patients.

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### DIAGNOSIS AND PREOPERATIVE MANAGEMENT

Although neurological grading sometimes fails to predict outcomes for patients with SAH, we still use Hunt and Hess grades. We perform surgical intervention, including clipping or coil embolization, within 72 hours for Grade I, II, and III patients. For Grades IV or V (poor grade) patients with a space-occupying hematoma, emergent surgery involving clipping of the aneurysm and the removal of the hematoma, as well as a decompression craniotomy, is selected to prevent vasospasm. Poor grade patients without a hematoma who are admitted within 6 hours after onset and who are younger than 75 years old are introduced to hypothermia and receive coil embolization.

In cases with a negative study at the initial stage, repeated examinations (computed tomographic angiography, magnetic resonance angiography, and digital subtraction angiography) are required to avoid unexpected rebleeding because a thrombosed aneurysm, especially one located in the distal part of the vessels, or blister-like aneurysms on the internal carotid artery, are seldom discovered in the initial examination.

### SURGICAL PLANNING

Recently published results of the International Subarachnoid Aneurysm Trial (ISAT) may accelerate the number of cases receiving coil embolization instead of clipping surgery.

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modalities. Coil embolization cannot be selected for patients with large- to giant-sized aneurysms because of coil compaction. Aneurysms with a wide neck are also not suitable for coil embolization without an additional procedure, such as balloon-assisted neck-plasty. However, clipping surgery does not lessen the risk of tissue damage along the surgical corridor to the aneurysms. It is also difficult to preserve the vessels that firmly stick to the aneurysm neck or dome by using clipping surgery. However, open surgery enables the application of an optional treatment such as extracranial-intercranial (EC-IC) bypass and monitoring as motor evoked potentials (MEP) or cortical cerebrospinal fluid (CSF). To date, both modalities should be mutually supplemented by each other. Therefore, it is highly recommended that clip surgeons and endovascular surgeons evaluate each case together.

### PREVENTION OF VASOSPASM

Vasospasm is known to occur after SAH and has a negative impact on patient outcome. Our policy is prevention first.

Because cerebral ischemia frequently occurs when symptoms emerge, angioplasty for the spastic artery is often performed too late. We have used the following three treatments to prevent vasospasm: (1) intercranial pressure (ICP) control using CSF drainage and decompression surgery, (2) meticulous management of fluid and salt balance, and (3) Ca channel blocker (nicardipine) intrathecal injection/eicosapentaenoic acid p.o., resulting in the reduction of permanent symptomatic vasospasm up to 3%.

#### EVALUATION OF POSTOPERATIVE OUTCOME

Neuropsychological examinations have been performed in several neurosurgical fields on brain tumors, head injuries, and cerebrovascular diseases (bypass, carotid endarterectomy, and unruptured aneurysm) to evaluate the efficacy of treatment and the patient

recovery. We used the Wechsler Adult Intelligence Scale

Memory Scale to evaluate patients neuropsychologically at 2 months and 6 months after onset. At discharge, we also diagnosed how well the patients were recovering using the Glasgow Outcome Scale. We confirmed that the neuropsychological condition and CBF of most of the patients, who had been diagnosed as good recovery at discharge, returned to a normal level at 6 months after onset.

#### GOAL FOR PATIENTS WITH SAH

The outcome of patients with poor neurological grades remains unsatisfactory despite enormous efforts by neurosurgeons, neurologists, anesthesiologists, and emergency room doctors. Regardless of the economic and ethical problems, saving lives and increasing the number of patients who can resume leading independent lives may be a reasonable goal to aim for. However, not enough light has been shed on the outcome of patients with mild- to moderate-grade aneurysms. This patient group has various problems other than major neurological deficits, such as memory disturbances, intellectual impairment, and inadequate emotional responses, all of which cause these patients to experience difficulty returning to their communities and leading an independent life. The goal for these patients should not only be to enable them to return home alone, but also to resume their social life. Much improvement in the treatment of these patients still needs to occur for a better outcome in patients with mild- to moderate-grade aneurysms.