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Case Report

MICROSURGICAL CLIPPING IN THE RUPTURED AN ANEURYSM OF ANTERIOR COMMUNICATING ARTERY: A CASE REPORT

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ABSTRACT

Objective: Ruptured saccular aneurysms are a common and serious medical problem. The prevalence of aneurysms is low during the first two decades of life and increases steadily after the third decade. Anterior communicating artery (AComA) aneurysms are regarded as the most complex of all intracranial aneurysms.

Methods: Here, we report a case of an aneurysm of AComA patient with the development of microsurgical technique and intraoperative monitoring technique.

Results: Permanent clipping was successfully performed in the neck of an aneurysm of AComA.

Conclusion: Microsurgical clipping still remains a definitive treatment of ruptured cerebral aneurysms.

Keywords: Ruptured cerebral aneurysm, Microsurgical clipping, Intracranial hemorrhage.

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INTRODUCTION

Anterior communicating artery (AComA) aneurysms are most commonly found at the A1-A2 junction on the dominant side. The angle of the arteries at the bifurcation and the direction of blood flow are factors of hemodynamic stress in the apical region where these aneurysms often develop. They exist at the bifurcation of dominant A1, A2, and AComA and usually point in the direction away from the dominant A1. They are more prone to rupture and demonstrate the highest incidence of post-operative morbidity among anterior circulation aneurysms [1].

At present, the treatment of AComA aneurysms includes endovascular interventional surgery and microsurgery clipping surgery. Microscopic surgery is still a very important treatment. There are two approaches in the treatment of AComA aneurysms, pterion approach, and the approach between the hemispheres [2]. There are several changes in pterion approach, including additional lateral supraorbital approach and frontotemporal orbital zygomatic approach [3].

These surgical procedures often end up with complications. In this case we managed to precisely clip the blood vessel aneurysmal neck using the only single clip, thus avoiding unnecessary complications and reducing the cost.

CASE REPORT

Informed consent was taken from the patient. A male, 56-year-old patient, was consulted to the Neurosurgery Department from Neurology Department with the hemorrhagic stroke that contains intracerebral hemorrhage (ICH), subarachnoid hemorrhage (SAH) (Hunt and Hess Grade III), and intraventricular hemorrhage. The patient was brought to emergency room (ER) unconscious after had an episode of a severe headache 2 weeks ago and have been admitted to stroke unit after then. The patients have been complaining progressive chronic headache for 2 months, and the most severe headache was felt 2 weeks ago before he fell unconscious. The patient was describing his headache as pulsating and getting more frequent and worse over time. His left body was weakened after that. There is no history of hypertension before, and no history of the similar disease in his family.

The patients' blood pressure was 160/100 mmHg, pulse rate was 84 times per minute, respiratory rate was 18 times per minute, and his axilla temperature was 36.4°C. From the neurological examination, we found his Glasgow coma scale was E3V4M5, his pupils was isochoric with both round 3 mm wide in diameter and the light reflexes was positive. The motoric strength of his right extremity is 5, but he has decreased motoric strength in his left extremity, both 3 in his left upper extremity and in his right lower extremity, assuming there are left hemiparesis without the sensory deficit.

The head computed tomography scan examination at the time he arrived in the ER revealed ICH in the right frontal lobe, at cerebral falx areas, intraventricular hemorrhage, and brain edema (Fig. 1).

From digital subtraction angiography examination, we found an aneurysm in the AComA with 2.3 mm neck size and 7.1 mm and 5.6 mm in diameter (Fig. 2).

For further treatment, it was decided to perform microsurgical clipping aneurysm procedure for this patient. The surgery was performed 2 weeks after the onset of the stroke. The patient's head position was tilted for 45° to the right and head up, then fixated with the head pin (Fig. 3).

The operation area was sterilized with povidone iodine, surgical drape around surgery area. The left pterional incision was made, then the skin flap was fixated to the outside skin. Three boreholes were performed in the craniotomy area, followed by dural tenting; the sphenoid ridge was removed until the anterior clinoid. The dura mater was opened with C shape, sylvian fissure was opened to the proximal side microscopically, brain cistern was exposed, cerebrospinal fluid fluid was evacuated. Frontal and temporal lobes were separated, followed by carotid artery identification (Fig. 4).

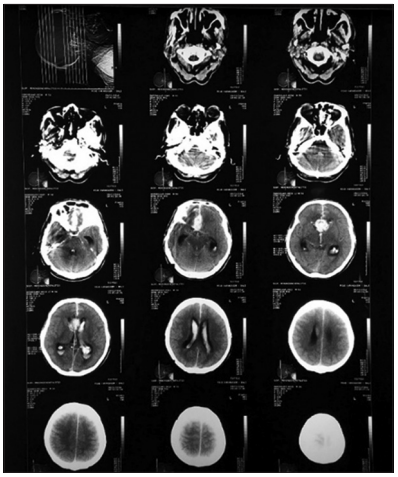

Fig. 1: Head computed tomography scan revealed ICH in the right frontal lobe, at cerebral falx areas, intraventricular hemorrhage, and brain edema

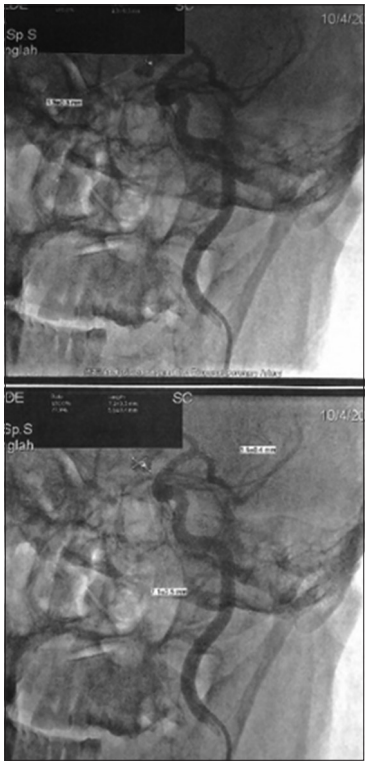

Fig. 2: digital subtraction angiography showing an aneurysm in the AComA with 2.3 mm neck size and 7.1 mm and 5.6 mm in diameter

Blunt dissection was performed to an identification of left A1 segment, followed until dome was exposed. Gyrus rectus was dissected, the aneurysm neck was seen, temporary clipping in the A2 segment, identification of the neck of an aneurysm, then permanent clipping was performed in the neck of an aneurysm and AComA (Fig. 5).

Evaluation for the bleeding, temporary clipping was removed (Fig. 6). The dura mater was closed with primary suture and the subdural drain was inserted. The cranial bone was placed back and fixated with three mini plates and mini screws. Then primary suture to close the surgery incision layer by layer. The patients were discharged 7 days after the operation. No complication was found after.

Fig. 3: patient's head position was tilted for 45° to the right and head up, then fixated with the head pin

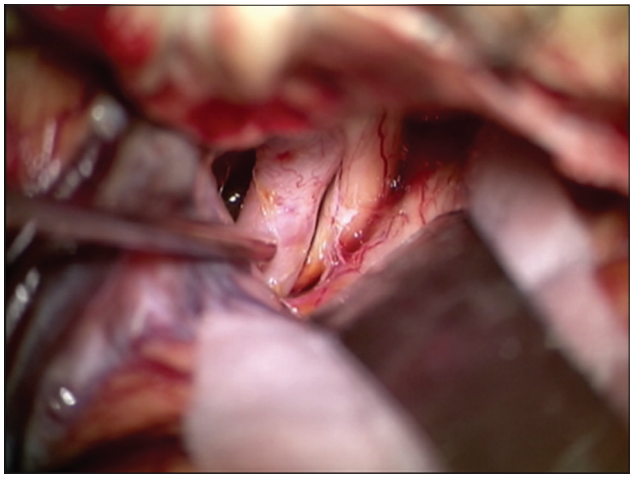

Fig. 4: Carotid artery identification

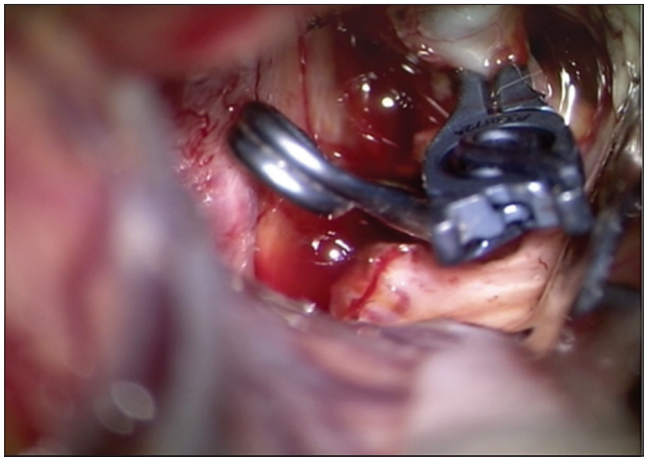

Fig. 5: Temporary clip on left A1 and permanent clipping was performed in the neck of an aneurysm and anterior communicating artery

DISCUSSION

According to the World Health Organization, "stroke is a clinical syndrome characterized by rapidly developing clinical symptoms and/or signs of focal, and at times global (applied to patients in deep coma

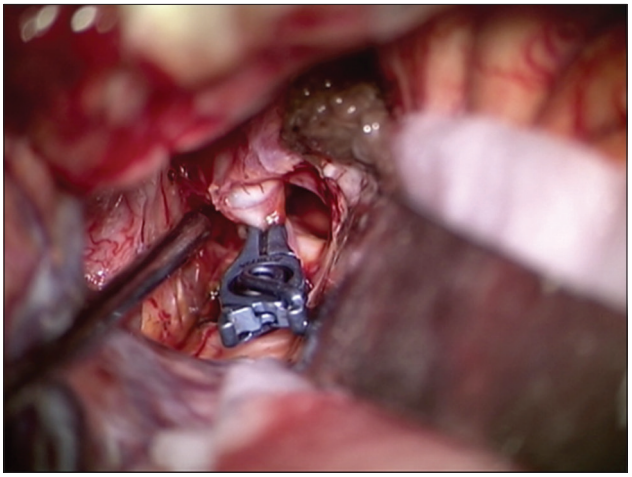

Fig. 6: The temporary clip was removed, and permanent clipping was left inside

and those with SAH), loss of cerebral function, with symptoms lasting more than 24 hrs or leading to death, with no apparent cause other than that of vascular origin [4]. Spontaneous ICH is one of the diseases when intracranial blood vessels ruptured, and the neurologic deficits will appear due to the neuron cells dead [5].

ICHs involve the brain parenchyma or subarachnoid space, or both. Approximately, 20% of all strokes are hemorrhagic, with SAH and ICH accounting for about 10%. SAH occurs when a blood vessel near the brain surface leaks, causing extravasation of blood into the subarachnoid space. SAH is most often caused by rupture of a saccular aneurysm or hemorrhage from an arteriovenous malformation. Less common causes include head injury, use of illicit drugs, especially amphetamines and cocaine, amyloid angiopathy, rupture of an artery near the pial surface due to hypertension, dural venous sinus thrombosis, and bleeding disorders [6].

The prevalence of aneurysms is low during the first two decades of life and increases steadily after the third decade. The frequency of SAH from ruptured saccular aneurysms is relatively low, estimated at between 6 to 11 per 100,000 persons per year, or about 1 per 10,000. The average age at rupture is approximately 50 years. Once an aneurysm rupture, death or severe long-term disability often results [6].

Amnesic syndromes are common after surgery for AComA aneurysms, particularly if the aneurysms are trapped rather than ligated at their neck. Trapping leads to disruption of the perforators that originate from the ACA and AComA, with resultant ischemia in the area of the anterior wall of the third ventricle and the orbital frontal lobes and basal forebrain nuclei. Similar clinical deficits are often caused by vasoconstriction in patients with ruptured AComA aneurysms [7].

Surgical clipping or endovascular coiling techniques can be used in the treatment of ruptured aneurysms. Most studies on the clipping and coiling of cerebral aneurysms were either small-scale studies or were retrospective studies until the multicenter prospective randomized clinical trial has been reported [8].

Clipping approach and techniques were introduced by Prof. Yaşargil and have been widely used since the 1970s. The current principle of clipping requires microsurgical dissection and clipping of the ruptured aneurysm neck whenever possible. The most patients with anterior or posterior circulation aneurysms, patients in the grades Hunt and Hess IV or V can be treated by clipping [9].

CONCLUSION

Treatment for a ruptured aneurysm includes microsurgical clipping and endovascular coiling. With the development of microsurgical technique and intraoperative monitoring technique, microsurgical clipping still remains a definitive treatment of ruptured cerebral aneurysms.

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