Journal of Clinical Neuroscience xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Journal of Clinical Neuroscience

journal homepage: www.elsevier.com/locate/jocn

Technical note

Bilateral suboccipital approach for a giant vertebral artery aneurysm

Yasuo Murai *, Toshimasa Yamada, Eitaro Ishisaka, Shun Sato, Fumihiro Matano, Akio Morita

Department of Neurological Surgery, Nippon Medical School, Tokyo, Japan

A R T I C L E I N F O

Article history:
Received 14 May 2017
Accepted 10 August 2017
Available online xxxx

Keywords:
Cerebral aneurysm
Complication
Suboccipital approach
Vertebral artery

A B S T R A C T

Giant thrombosed aneurysms of the vertebral artery (VA) are difficult to treat. Moreover, marked tortuosity of the parent VA complicates determination of the surgical approach. We report the case of a 71-year-old male patient who presented with gait disturbance. Magnetic resonance imaging revealed a giant thrombosed aneurysm of approximately 4 cm in diameter located in the ventral region and to the right of the medulla oblongata. Computed tomography angiography showed that the right VA had extreme tortuosity, and that the VA union was in contact with the left 7th and 8th cranial nerves. Given that the aneurysm was thrombosed and causing a mass effect, we sought to trap it. In this case, because of the tortuous VA, intravascular team considered intravascular therapy to be too difficult. We made a question mark-shaped skin incision and used a wide bilateral suboccipital approach. The VA proximal to the aneurysm was occluded with an aneurysm clip using an approach from the right of the brainstem, while the VA distal to the aneurysm was occluded using a lateral suboccipital approach. When the VA and basilar artery are atherosclerotic and extremely tortuous, the distal and proximal aspects of the aneurysm can exist on both sides of the midline. In difficult cases such as that reported here, in which a giant VA aneurysm exceeded the midline of the anterior surface of the medulla, we believe that it is useful to employ a bilateral approach from both sides of the brainstem.

1. Introduction

Vertebral artery (VA) aneurysms are mainly treated using a lateral suboccipital approach [1]. In cases of markedly tortuous aneurysms due to arteriosclerosis of the VA, surgical occlusion of the distal end of the aneurysm is difficult, and an endovascular approach also is challenging [2].

We treated a patient with a giant thrombosed aneurysm of the right VA, in which the course from the VA was extremely tortuous, and the distal end of the aneurysm were on the contralateral side. We used a bilateral suboccipital approach in order to trap the aneurysm proximally from the right side of the medulla and distally from the left side of the medulla. Here, we describe this case and present the bilateral suboccipital approach.

2. Case presentation

The patient was a 71-year-old man who developed a gait disturbance 2 months before. He had a history of hypertension and hyperlipidemia. A giant thrombosed vertebral aneurysm, approximately 4.2 cm in diameter, was observed (Fig. 1) on magnetic resonanse imaging (MRI). On digital subtraction angiography, the vertebral and basilar arteries were tortuous toward the midline (Fig. 2). However, the right anterior spinal artery bifurcation was unclear. The aneurysm was located distal to the right side of the medulla, crossed the midline, and was present on the left side, while the basilar artery was medial to the 7th and 8th cranial nerves. The right PICA bifurcated from the basilar artery. The right VA balloon occlusion test was conducted and neurologic findings were observed for 30 min, but no changes were noted.

In this case, because of the tortuous VA, intravascular team considered intravascular therapy to be too difficult. In order to effectively reduce compression, we found it absolutely essential to trap the aneurysm. However, when using an approach from one side, it is difficult to trap the aneurysm. Therefore, we decided to use an approach from both sides of the posterior fossa. After distal clipping, if abnormal signs appeared in motor evoked potential (MEP) or auditory brainstem response, we intended to perform proximal clipping only.

The patient was placed in the prone position (Video and Fig. 3). The surgeon was positioned on the patient's right side. In order to perform a C1 laminectomy and extensive bone removal in the posterior fossa, a question mark-shaped skin incision was made, extending bilaterally from the height of C2, with the superior pole

* Corresponding author at: Department of Neurological Surgery, Nippon Medical School, 1-1-5 Sendagi, Bunkyo-ku, Tokyo 113-86, Japan.
E-mail address: ymurai@nms.ac.jp (Y. Murai).

http://dx.doi.org/10.1016/j.jocn.2017.08.019
0967-5868/

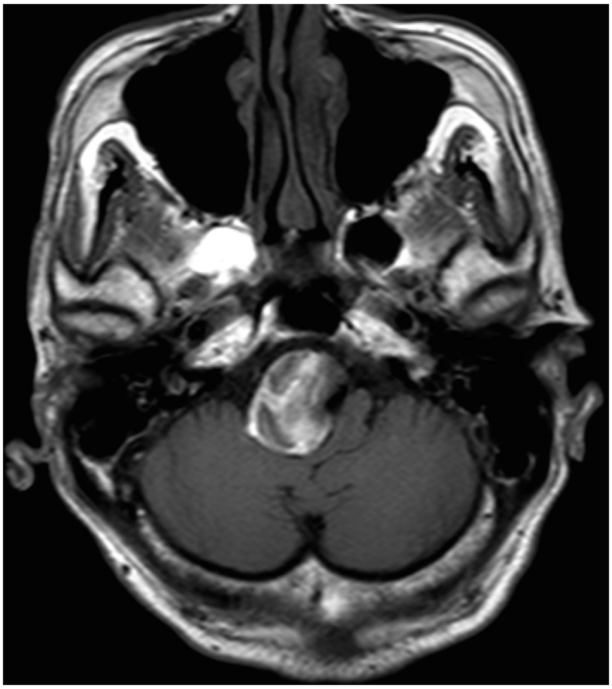

Fig. 1. Noncontrast-enhanced T1-weighted magnetic resonance image, showing a giant thrombosed aneurysm located on the ventral medulla.

at the superior nuchal line. The occipital muscles were separated from the skin flap on the right side and midline, moving toward the right side, in order to preserve blood flow of the skin flap. In addition, the lateral skin flap and muscle layers on the left side were removed en bloc. At the height of the superior nuchal line, a T-shaped incision was made, and the muscle layers were dissected bilaterally.

Video. This short video was made to introduce the technique of the bilateral suboccipital approach for trapping a vertebral artery aneurysm.

After the bilateral occipital bone removal, a C1 laminectomy was performed. After a Y-shaped incision was made in the dura, the proximal VA was confirmed between the right cerebellar tonsil and medulla. There was no change in MEP amplitude after proxi-

Fig. 2. Angiographic image of the right vertebral artery (VA), showing a giant thrombosed aneurysm and tourtuous right VA.

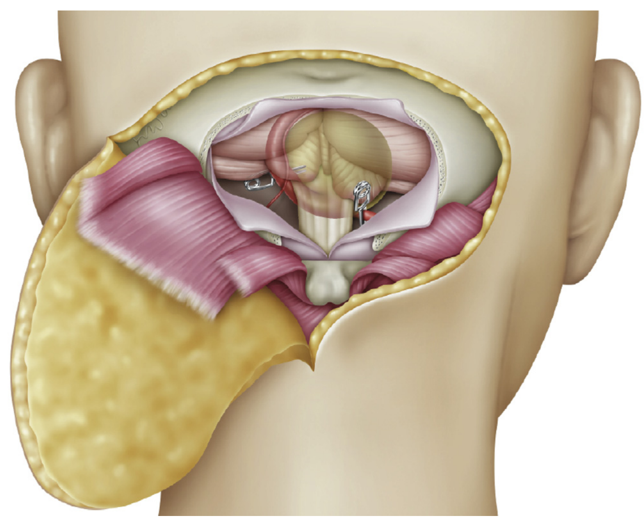

Fig. 3. Schematic drawing of intraoperative findings using a bilateral suboccipital approach.

mal occlusion with Yasargil FT 740T clip. Next, we rotated the surgical bed by 15° and moved the patient so that his left side was facing upwards. Then, the cerebellum was retracted, and the VA union was confirmed medial to the 7th and 8th cranial nerves. The distal end of the aneurysm in the right VA was occluded with a Yasargil FT 750 T clip. There was no change in MEP amplitude after this subsequent occlusion.

CT showed a small high-density area within the aneurysm, which was thought to be due to thrombosis. Fiv days after surgery, left hemiplegia was noted, which was probably due to mild dehydration after surgery associated with heart failure. The following day, diffusion-weighted MRI showed a small cerebral infarction in the medulla (Fig. 4), and the patient was transferred to another hospital for rehabilitation. His hemiparesis, although improved, remained at 12 months after rehabilitation.

Please cite this article in press as: Murai Y et al. Bilateral suboccipital approach for a giant vertebral artery aneurysm. J Clin Neurosci (2017), http://dx.doi.org/10.1016/j.jocn.2017.08.019