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Case Report

Aneurysm trapping by both direct and endovascular surgery for vertebral artery dissection: A case report

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Abstract

Background: Although vertebral artery (VA) dissecting aneurysms are treated by direct or endovascular surgery, some disadvantages are associated with each surgery. Therefore, the type of surgery should be selected based on the condition of the aneurysm. We performed aneurysm trapping by endovascular surgery via the contralateral VA after proximal direct ligation with bypass to prevent complications as well as achieve complete treatment.

Case Description: We attempted to insert a distal clip to achieve complete trapping of the ruptured VA dissecting aneurysm after proximal ligation with occipital artery-posterior inferior cerebellar artery (PICA) anastomosis; however, the operative field was limited by the existence of lower cranial nerves, brain swelling, and tortuosity of VA. Therefore, we performed the aneurysmal trapping by endovascular surgery via contralateral VA just after the direct surgery.

Conclusions: This technique can provide complete resolution without any complications, particular in the case of bleeding VA dissecting aneurysms that have a PICA origin and are located in the high or contralateral position.

Key Words: Dissecting aneurysm, direct surgery, endovascular surgery, vertebral artery

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INTRODUCTION

In recent years, the preferred surgery for vertebral artery (VA) dissecting aneurysm has been modified from a direct to an endovascular approach due to the development of endovascular instruments. However, endovascular surgery is not currently regarded to be sufficient or safe for cases that involve the posterior inferior cerebellar artery (PICA) or are associated with bleeding. Herein, we present a therapeutic technique using both direct and endovascular surgery.

CASE REPORT

A 58-year-old man suddenly suffered from disturbance of consciousness. He was subsequently diagnosed with subarachnoid hemorrhage due to a ruptured right VA dissecting aneurysm [Figure 1a]. Although the range of dissection was limited at the right VA because angiography demonstrated normal shape of the contralateral VA and basilar artery [Figure 1b], the aneurysm originated from the PICA [Figure 2a]

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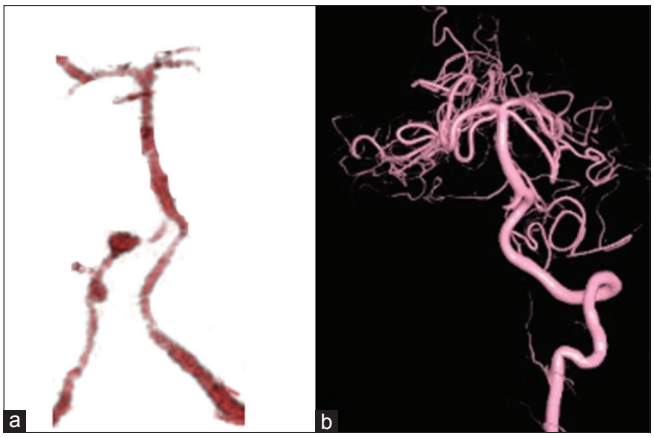

Figure 1: Initial three-dimensional enhancement computed tomography demonstrates a right vertebral artery dissection (a). Angiography shows normal appearance of the left vertebral artery and basilar artery, indicating that the dissection was limited at the right vertebral artery (b)

and extended from the jugular foramen [Figure 2b] to the internal acoustic canal [Figure 2c]. Moreover, the distal edge of the dissection extended contralaterally because of the tortuosity of the right VA [Figure 2c]. We selected direct surgery for the reconstruction of the PICA territory using the occipital artery (OA). The VA ligation was performed at the proximal dissection after OA PICA anastomosis and ligation of the PICA origin. Although distal ligation was attempted for complete trapping of the aneurysm, it could not be performed due to the lack of a sufficient operative field caused by the existence of lower cranial nerves, brain swelling, and VA tortuosity. The patient was moved to an angiography room under continual anesthesia. The distal part of the aneurysm was observed on angiography [Figure 3a]; therefore, retrograde placement of a coil was continuously performed up to the proximal origin of the anterior spinal artery via the contralateral VA [Figure 3b]. The postoperative three-dimensional computed tomography demonstrated OA to PICA bypass and the disappearance of the dissecting aneurysm via clip and coil [Figure 3c]. The postoperative period was uneventful.

DISCUSSION

Aneurysm trapping is considered to be the best treatment for VA dissecting aneurysm rather than proximal ligation, which prevents the worsening of the dissection.[6,8] Although internal trapping by endovascular surgery for VA dissection is regarded as the preferred initial treatment method, it has some limitations such as occlusion of the PICA and perforators from the VA.[1] Stenting has recently been observed to prevent PICA and parent artery occlusion;[4] however, it is necessary to administer sufficient antiplatelet medication prior to the placement of the stent to prevent stent occlusion. In case of a bleeding dissection, it is impossible to administer sufficient antiplatelet

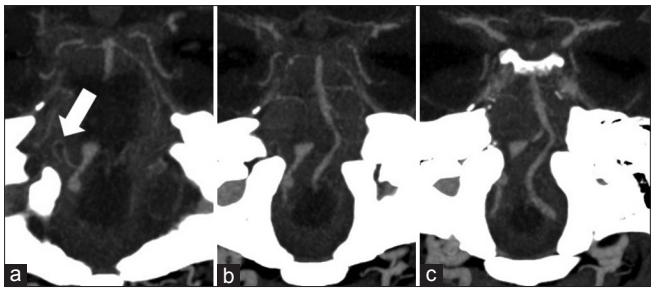

Figure 2: Enhancement computed tomography demonstrates a right vertebral artery dissection, which involves the posterior inferior cerebellar artery origin (arrow) (a). The level of the aneurysm extends from the jugular foramen (b) to above the internal acoustic canal (c); the distal edge of the dissection extends contralaterally because of the tortuosity of the right verterbral artery (c)

treatment because rebleeding from the dissecting aneurysm occurs almost immediately after the initial bleeding.[2,5] Therefore, the usefulness of internal trapping with the reconstruction of the PICA by direct surgery has been reported.[3,7] However, VA aneurysm trapping by both direct and endovascular surgery is associated with the risks of medullar infarction due to occlusion of VA perforators. The incidence of medulla infarctions after VA trapping is reportedly higher with longer lengths of trapping.[3] From the viewpoint of preventing medulla infarction, VA trapping should be performed by direct surgery because it allows for the placement of the clip at the proximal end of dissection and enables short segment trapping unlike endovascular surgery. However, compared with endovascular surgery, direct surgery also has disadvantages with respect to the ligation of the distal edge of the dissection and can result in the damage of lower cranial nerves and anterior spinal artery. These risks are especially increased in cases of high or contralateral position aneurysms, such as in the present case. Endovascular surgery, however, enables the placement of a minimum length coil without damaging the lower cranial nerves or anterior spinal artery.

In conclusion, the aim of the treatment for bleeding VA dissecting aneurysm is complete trapping without any complications that cause occlusion of the PICA, perforators or the anterior spinal artery without damaging the lower cranial nerve. Although several combined surgeries for VA dissecting aneurysms have been reported,[3,7] these techniques could not completely prevent the complications from occurring. The technique described in the present case utilized the benefits of both direct and endovascular surgery to avoid complications. We suggest that this combined surgery technique can be a viable option for bleeding VA dissecting aneurysms that are located in a high or contralateral position and involve a PICA origin.

Disclosure

All authors certify that there is no conflict of interest (any financial or non-financial interest) in the subject matter or materials discussed in this manuscript.

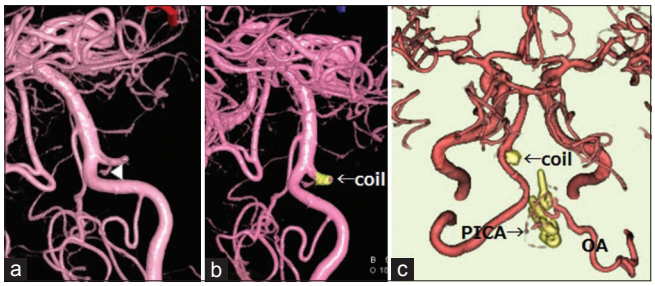

Figure 3: The distal section of the aneurysm and anterior spinal artery (arrowhead) observed at the contralateral vertebral artery (VA) during post direct surgery angiography (a). Retrograde placement of the coil performed at the proximal origin of the anterior spinal artery via the contralateral VA (b). The postoperative three-dimensional computed tomography demonstrates occipital artery to posterior inferior cerebellar artery bypass and the disappearance of the dissecting aneurysm via clip and coil (c). OA, occipital artery; PICA, posterior inferior cerebellar artery

Informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this article.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form tha patient(s) has /have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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