

## CASE REPORTS

# Endovascular coil occlusion of ruptured vertebral artery dissecting aneurysm: A case report

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### Abstract

Ruptured vertebral artery dissecting aneurysm is more prone to re-bleeding and thus needs immediate surgical management. We present a case of 47 years old male with ruptured vertebral artery dissecting aneurysm which was immediately treated by endovascular surgery. Coil occlusion of the vertebral artery at the aneurysm site was performed. As emergency open surgery is often not possible, this case shows that endovascular surgery is an effective and helpful alternative.

### INTRODUCTION

Though vertebral artery dissecting aneurysm has been increasingly diagnosed recently due to advanced neuroimaging techniques, it is still one of the mysterious causes of death in developing countries. Ruptured dissecting aneurysms tend to have higher risk of re-rupture than saccular aneurysms resulting in higher morbidity and mortality. Therefore novel surgical treatment is necessary to prevent it from re-rupture.

The surgical treatment can be carried out by either open surgery or endovascular surgery.<sup>1</sup> Endovascular technique is gaining more popularity due to its effectiveness and less invasiveness. We present a case of vertebral artery dissecting aneurysm and discuss the technical aspects of endovascular treatment of such aneurysms. The main objective of this article is to emphasize the role of endovascular surgery which is still not a common practice in developing world.

### CASE REPORT

A 47 years old male presented to the Emergency Department of Hiroshima University Hospital, Japan with sudden loss of consciousness. On arrival, his Glasgow coma scale (GCS) was about 4/15. Computerized tomogram (CT) scan showed subarachnoid hemorrhage (SAH)

(Figure 1 a), which was of Hunt and Hess grade 5 and World Federation of Neurological Surgeons (WFNS) grade 5. CT angiogram (Figure 1 b) showed dilatation and proximal stenosis in left vertebral artery. Digital subtraction angiogram (DSA) was performed by the neurovascular team of the Department of Neurosurgery which showed typical pearl and string and double lumen sign in left vertebral artery distal to the origin of posterior inferior cerebellar artery (PICA) suggesting vertebral artery dissecting aneurysm (Figure 2 a, b). Endovascular coil occlusion of the vertebral artery at the dissecting aneurysm site was planned immediately to prevent re-rupture. Systemic anticoagulation with argatroban, bolus of 5mg intravenous injection and maintenance of 5mg/hour, was started. A 5 Fr guiding catheter was placed in the V2 portion of left vertebral artery via femoral artery. Since both vertebral arteries were clearly seen in the CT angiogram, balloon occlusion test of left vertebral artery was not needed. A microcatheter was advanced through the guiding catheter into the true lumen of aneurysmal dilatation. Coil occlusion of the vertebral artery dissecting aneurysm was performed by completely occluding aneurysmal dilatation and parent artery using six Guglielmi detachable coils. Post-occlusion angiogram showed complete occlusion of aneurysmal dilatation and parent artery and no

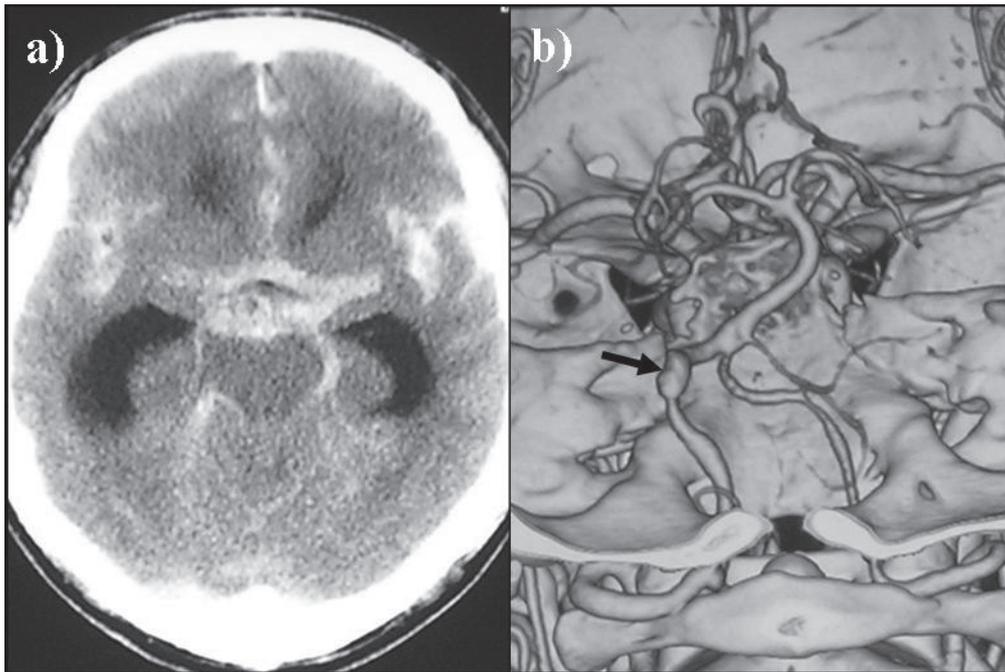


Figure 1: (a) CT scan showing extensive SAH, (b) CT angiogram showing aneurysmal dilatation (arrow)

retrograde filling from contralateral side (Figure 3 a, b). Post-operative CT showed no signs of cerebellar infarction (Figure 4 a, b) from blockage of PICA but mild hydrocephalus.

Though his general condition gradually improved and eventually became fully conscious, there was persistent moderate quadriplegia from the primary brain injury.

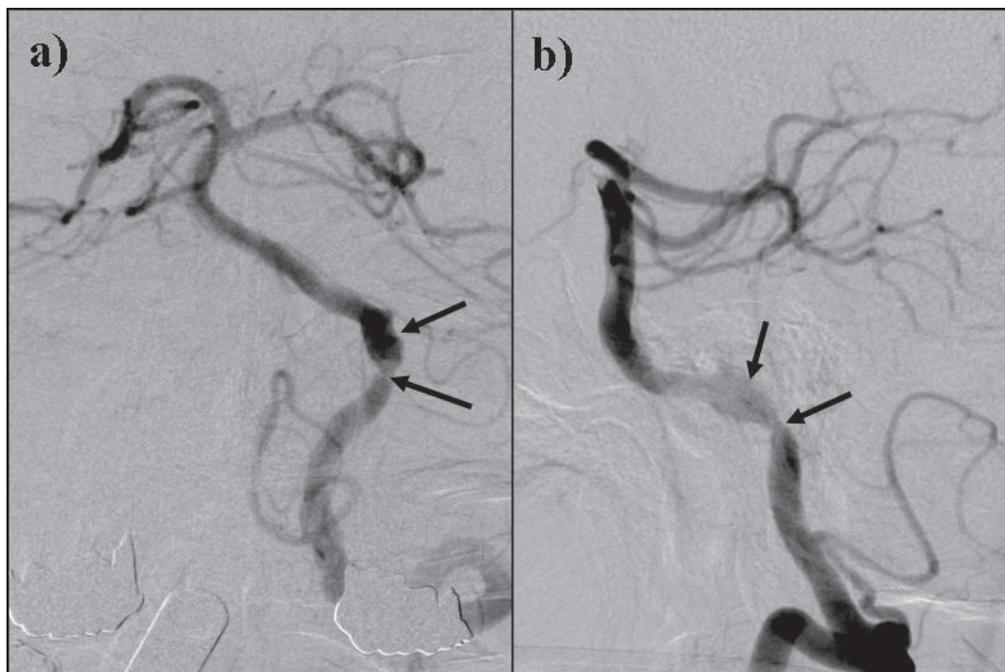


Figure 2: DSA showing dissecting aneurysm in left vertebral artery with pearl and string sign indicated by thick arrows; (a) AP view, (b) lateral view

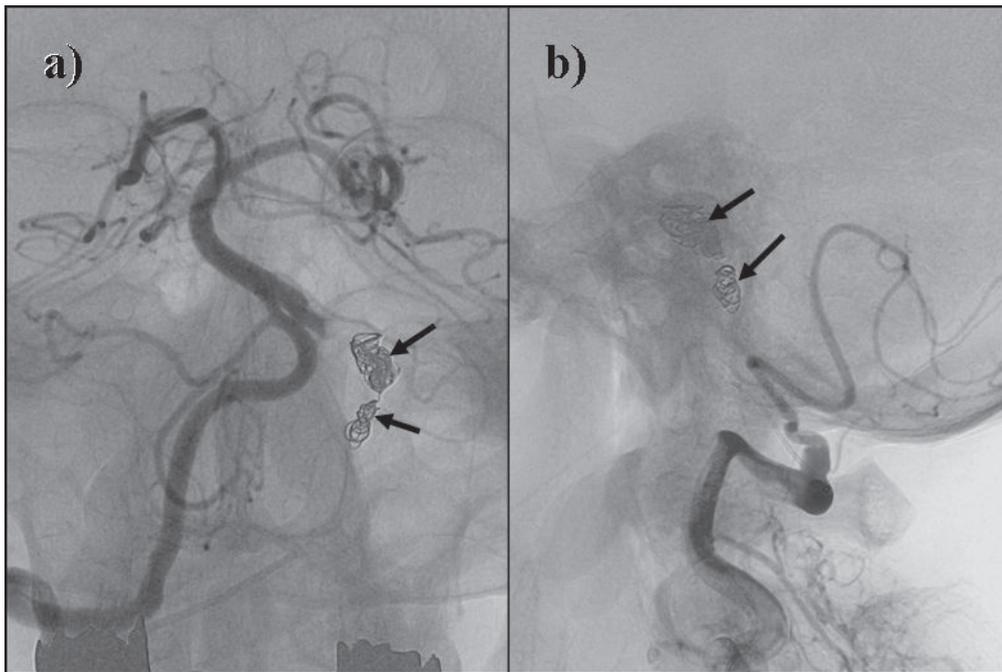


Figure 3: Post-operative images, arrows indicating mass of coils; a) right vertebral artery angiogram showing no retrograde blood flow to aneurysm from contralateral side, b) left vertebral artery angiogram showing no blood flow to aneurysm site but an intact PICA

## DISCUSSION

Surgical intervention is mandatory once vertebral artery dissecting aneurysm ruptures to prevent re-rupture. Proximal parent artery clipping, dissection segment trapping, dome clipping, circumferential wrapping are examples of open surgical techniques. However, critical condition of patient due to severe SAH often delays or makes the surgery more risky. Endovascular intervention is another technique of treating vertebral artery

dissecting aneurysm.

Endovascular treatment for vertebral artery dissecting aneurysm was initially by occluding the vertebral artery proximal to affected segment using detachable balloon or coils. This procedure was limited by recurrence of aneurysm formation and repeated hemorrhage. Then, the policy of endovascular treatment changed from proximal occlusion to trapping, in which the site of arterial dissection was completely occluded with

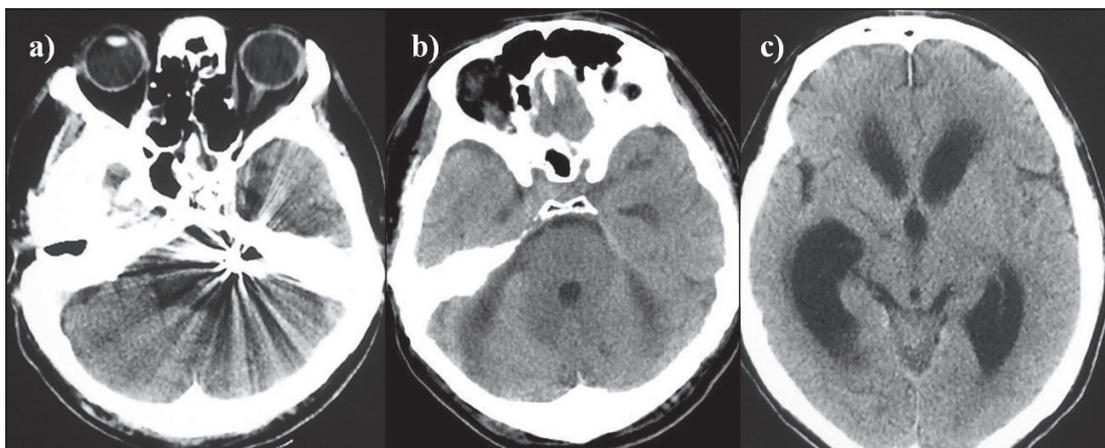


Figure 4: Post-operative CT scan images; a) immediately after coiling showing artifact, b) one month after coiling showing no intracranial complications, c) two months after coiling showing mild hydrocephalus

detachable coils.<sup>2-5</sup> This procedure was based on the same concept as that of surgical trapping. The efficacy of endovascular treatment for ruptured vertebral artery dissecting aneurysm has been reported in a number of reports.<sup>3-6</sup> Endovascular treatment seems to be the best for treating ruptured vertebral artery dissecting aneurysm during the acute stage of SAH. Furthermore, endovascular trapping is the best procedure for prevention of re-rupture when the aneurysm location is far from the origin of the PICA and the spinal artery. On the other hand, endovascular trapping of the dissecting aneurysm involving the origin of the PICA and the spinal artery has significant morbidity as occlusion of these vessels might cause cerebellar and spinal infarction. Stent-supported coil embolization is recently performed for the dissecting aneurysm involving of the PICA or spinal artery.<sup>6</sup>

Combination of endovascular surgery and open microsurgery as a multimodal approach has also been reported.<sup>7</sup> Addition of anastomotic revascularization surgery has been found to be helpful and effective. Stent angioplasty with endovascular surgery and subsequent circumferential wrapping of aneurysm with Teflon is an example of multimode treatment.<sup>8</sup>

Nevertheless, endovascular intervention is not always completely safe and effective. Vertebral artery recanalization in an antegrade fashion, coil compaction, coil migration, distal thromboembolism have been observed.<sup>9</sup> Therefore, complete internal trapping and regular angiographic follow up have been emphasized. New onset of transient headache following unilateral occlusion of vertebral artery has also been reported which has been attributed to the increase in diameter of contralateral vertebral artery due to hemodynamic stress.<sup>10</sup> Technical difficulties can also lead to intra-operative complications.

In conclusion, endovascular intervention is a well established mode of treatment in critical condition. However, it also have limitations and drawbacks.

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