Ruptured Dissecting Aneurysm of the Vertebral Artery Associated With Occlusive Internal Carotid Artery Dissection
—Case Report—

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Abstract

A 64-year-old male presented with subarachnoid hemorrhage. Angiography showed a dissecting aneurysm of the right vertebral artery (VA), and severe stenosis of the right internal carotid artery (ICA). He was treated conservatively in the early stage. Repeat angiography showed enlargement of the dissecting aneurysm of the VA and partial resolution of the stenosis of the right ICA. Intraaneurysmal coil embolization with proximal coil occlusion was performed following a balloon occlusion test. The postoperative course was uneventful. Based on the neuroradiological findings, the stenotic lesion of the right ICA was considered to be due to dissection. Analysis of serial changes in dissecting lesions in the craniocervical arteries is important for the correct choice of treatment, especially in patients with multi-vessel dissections. The surgical options should be determined on an individual basis.

Key words: aneurysm, dissection, internal carotid artery, vertebral artery

Introduction

Rebleeding frequently occurs in ruptured dissecting aneurysms of the vertebral artery (VA), so early surgical obliteration of the parent artery is recommended. The timing and methods of treatment depend on the shape, size, and location of the lesion, and the condition of the other craniocervical arteries. However, the treatment plan becomes complex in patients with lesions in multiple vessels, that is those with multiple dissections.

We treated a patient with a ruptured dissecting aneurysm of the VA associated with a spontaneously resolved internal carotid artery (ICA) stenosis, which was also considered to be due to dissection, and describe the serial changes of both lesions.

Case Report

A 64-year-old male presented with a history of loss of consciousness following headache. On admission, computed tomography demonstrated subarachnoid hemorrhage (SAH). He was hypertensive, but had no history of other diseases, such as cardiac disease or trauma. Laboratory evaluation found no abnormalities. He gradually regained consciousness. Right vertebral angiography on same day as the onset showed an aneurysmal dilatation of the right VA proximal to the origin of the right posterior inferior cerebellar artery (PICA). The angiographical diagnosis was ruptured dissecting aneurysm. The right cerebral hemisphere was supplied via the right posterior communicating artery (Fig. 1A). The left and right VAs were equal in size. Right carotid angiography showed severe stenosis of the cervical portion of the right ICA (Fig. 1B). There was no cross-flow via the anterior communicating artery from the left to the right cerebral hemisphere. The other craniocervical arteries were normal, and there were no findings suggesting fibromuscular dysplasia.

The patient was treated conservatively, and repeat angiography 3 weeks later showed enlargement of the right VA dissecting aneurysm and partial im-
Fig. 1  A: Right vertebral angiogram on admission showing aneurysmal dilatation of the right vertebral artery (arrow) and filling of the right middle cerebral artery via the right posterior communicating artery.  B: Right carotid angiograms showing severe stenosis of the right internal carotid artery.

Fig. 2  A: Right vertebral angiogram 3 weeks later showing enlargement of the aneurysm.  B: Right carotid angiogram showing partial resolution of the stenosis of the right internal carotid artery.

Fig. 3  T₁-weighted magnetic resonance image 1 month after the onset showing a hyperintense area in the right cervical internal carotid artery (arrow), suggestive of an intramural hematoma.

Improvement of the right ICA stenosis (Fig. 2). A balloon occlusion test of the third segment of the VA was negative, so intraaneurysmal embolization and additional proximal embolization using Guglielmi detachable coils were performed. Left vertebral angiography after the endovascular treatment showed the right PICA was filled via the right VA distal to its origin. The postoperative course was uneventful. The patient was discharged from the hospital, and he returned to his previous normal lifestyle.

Magnetic resonance imaging one month after the onset revealed a hyperintense area in the right cervical ICA on the T₁-weighted images, suggestive of an intramural hematoma (Fig. 3). This hyperintense area was observed at the same part as the stenotic lesion of the ICA, and had disappeared 6 months later. The stenosis of the right ICA was considered to be due to dissection. Follow-up examinations showed resolution of the right ICA stenosis and ob-
literation of the right VA.

**Discussion**

Craniocervical artery dissection is now a well-known clinical entity, which causes brain ischemia or SAH. Multiple dissections occur predominantly in patients with fibromuscular dysplasia, trauma, or some other underlying disorders, and can be successfully treated. However, multiple dissections can also occur in patients without such predisposing factors. The treatment of multiple dissections is complicated because of the hemodynamic changes in the cerebral circulation that may occur due to therapeutic intervention. The difficulties in treating bilateral VA dissecting aneurysms are already known. This case illustrates the problems in treating ruptured VA dissecting aneurysms associated with occlusive ICA dissection.

In general, early surgical treatment of ruptured VA dissecting aneurysm should be performed to prevent recurrent bleeding. In our case, proximal occlusion of the VA would have been the most appropriate treatment, but this could have led to ischemic complications, especially during the stage of vasospasm following the SAH. Therefore, the patient was treated conservatively in the early stage. An alternative treatment strategy would have been considered, if rebleeding from the VA dissecting aneurysm or development of ischemic symptoms due to progression of stenosis of the ICA had occurred, or if proximal occlusion of the VA was not well tolerated. Primary stenting or bypass surgery can be used to treat occlusive ICA lesion, and stent-supported coil embolization or direct surgery, such as reinforcement or trapping with vascular reconstruction, can be used to treat VA dissecting aneurysms.

The risk of rebleeding is reduced in the chronic stage of rupture of VA dissecting aneurysm because the lesions of the dissected artery tend to heal, although rebleeding frequently occurs in the early stage. The reopening rate is satisfactory in occlusive cervical carotid artery dissections, and recanalization can occur within 1 month. In our case, the ICA stenosis resolved spontaneously, but enlargement of the right VA dissecting aneurysm indicated surgery. This lesion was effectively managed by endovascular VA proximal occlusion.

Analysis of serial changes in dissecting lesions of the craniocervical arteries is important for the correct choice of treatment, especially in patients with multiple dissections. The timing and methods of treatment should be determined on an individual basis.

**References**


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