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Case Report

Gradual Growth of Spontaneous Dissecting Aneurysm of the Extracranial Internal Carotid Artery After Aneurysmal Subarachnoid Hemorrhage

Anevrizmal Subaraknoid Kanama Sonrasında Ekstrakraniyal İnternal Karotid Arter Spontan Disekan Anevrizmasının Giderek Büyümesi

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ABSTRACT

Spontaneous dissecting aneurysm of the extracranial internal carotid artery is uncommon, and simultaneous onset of multiple dissecting aneurysms is rare in patients without congenital or traumatic risk factors. A few reports suggest that extracranial internal carotid artery dissecting aneurysms can grow after SAH due to another intracranial dissecting aneurysm. The present report describes two cases in which gradual growth of unruptured dissecting aneurysm of extracranial internal carotid artery occurred after SAH due to ruptured dissecting aneurysm of the vertebral artery and in which carotid artery stenting was subsequently performed. A 42-year-old man was admitted to our hospital with SAH due to ruptured left vertebral artery dissecting aneurysm and was managed surgically. Dissecting aneurysm of the right extracranial internal carotid artery was found and showed gradual growth. The aneurysm was treated with a stent at 7 weeks after onset. In another case, a 47-year-old woman presented with SAH due to ruptured right vertebral artery dissecting aneurysm and was managed surgically. Concomitant left extracranial internal carotid artery dissecting aneurysm was found and showed gradual growth. The aneurysm was treated with stent and coils. These are rare cases of multiple dissecting aneurysms that originated from different arteries simultaneously and that showed growth after SAH.

KEYWORDS: Extracranial internal carotid artery, Dissecting aneurysm, Subarachnoid hemorrhage

ÖZ

Ekstrakraniyal internal karotid arterin spontan disekan anevrizması nadirdir ve konjenital veya travmatik risk faktörleri olmayan hastalarda çok sayıda disekan anevrizmanın aynı anda başlaması nadiren görülür. Birkaç rapor ekstrakraniyal internal karotid arter disekan anevrizmalarının SAK sonrasında başka bir intrakraniyal disekan anevrizma nedeniyle büyüyebildiğini düşündürmüştür. Mevcut rapor ekstrakraniyal internal karotid arterin rüptüre olmamış bir disekan anevrizmasının daha sonra karotid arter stentlemesi yapılan, vertebral arterde rüptüre disekan anevrizma nedeniyle SAK sonrasında giderek gelişen iki olgu tanımlamaktadır. 42 yaşında bir erkek sol vertebral arter disekan anevrizması nedeniyle SAK ile hastaneye yatırıldı ve cerrahi tedavi yapıldı. Sağ ekstrakraniyal internal karotid arterde disekan anevrizma bulundu ve giderek büyüdü. Anevrizma, başlangıçtan 7 hafta sonra stentle tedavi edildi. Başka bir olguda, 47 yaşında bir kadın rüptüre sağ vertebral arter disekan anevrizması nedeniyle SAK ile geldi ve cerrahi tedavi yapıldı. Eş zamanlı bir sol ekstrakraniyal internal karotid arter disekan anevrizması bulundu ve giderek büyüdü. Anevrizma stent ve sarmallarla tedavi edildi. Bunlar aynı anda farklı arterlerden köken alan çok sayıda disekan anevrizmanın bulunduğu ve SAK sonrasında büyüyen nadir olgulardır.

ANAHTAR SÖZCÜKLER: Ekstrakraniyal internal karotid arter, Disekan anevrizma, Subaraknoid kanama

INTRODUCTION

Spontaneous dissecting aneurysm of the extracranial internal carotid artery (EICA) is rare (1, 5, 9, 13). A few reports suggest that EICA dissecting aneurysms can grow after subarachnoid hemorrhage (SAH) due to another intracranial dissecting aneurysm. The present report describes two patients with gradual growth of unruptured dissecting aneurysm of the EICA after SAH due to concomitant ruptured dissecting aneurysm of the vertebral artery (VA).

CASE 1

A 42-year-old man presented with SAH due to right VA dissecting aneurysm, and a concomitant left EICA unruptured dissecting aneurysm was detected. No direct manipulation of the EICA had been performed since no guide-wire was inserted to the EICA during angiography. Emergent VA trapping was performed uneventfully, but the unruptured dissecting EICA aneurysm gradually grew from 6.0 mm to 16.0 mm in diameter over a period of 6 weeks. Endovascular carotid

artery stenting was performed using a Carotid Wallstent 10 × 24 mm without coils. The aneurysm disappeared and did not recur according to angiographic evaluation performed 7 months after the treatment (Figure 1A-D).

CASE 2

A 47-year-old woman with a history of chronic rheumatoid arthritis presented with severe headache. Head computed tomography (CT) showed SAH due to ruptured dissecting aneurysm of the left VA, and concomitant dissecting aneurysm of the left EICA was found. Emergent trapping for the left VA dissecting aneurysm was performed without complication. However, the left EICA dissecting aneurysm gradually grew from 4.0 mm to 9.4 mm in diameter over a 3-week period. Endovascular carotid artery stenting was performed using a Carotid Wallstent 6 × 22 mm, and additional coils were delivered through mesh of the stent into the aneurysm. The aneurysm disappeared and did not recur according to angiographic evaluation performed 7 months after the treatment (Figure 2A-D).

DISCUSSION

The annual incidence of spontaneous carotid artery dissection is 2.6 per 100.000 (10). These lesions typically arise from a tear in the intimal layer of the artery. The tear allows blood under arterial pressure to enter the wall of the artery and form an intramural hematoma and may result in stenosis or occlusion. However, dissections through the subadventitial layer may result in aneurysmal dilatation (13) that can lead to late embolic complications, nerve compression, or rupture. The etiology of dissecting aneurysm can be classified into spontaneous (47%), traumatic (48%) and iatrogenic (16%) causes (13). Congenital factors, systematic collagen diseases, and angiitis may sometimes be associated with a dissecting aneurysm (5, 9). However, there is no obvious pathological difference between dissections occurring spontaneously,

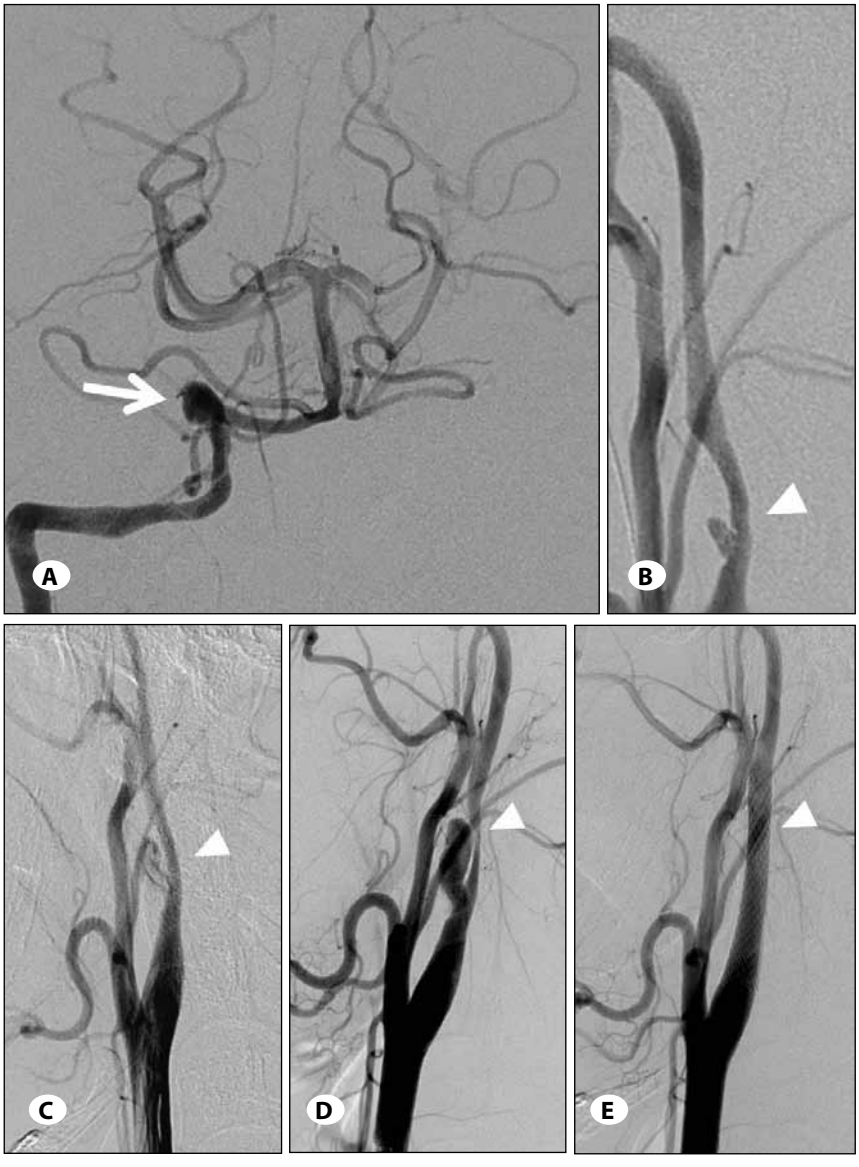

Figure 1: Right vertebral angiogram on admission reveals ruptured aneurysmal dilatation of the vertebral artery (VA) **(A, arrow)** and the left carotid angiogram depicts aneurysmal dilatation (arrowhead) of the external internal carotid artery (EICA) **(B)**. The left carotid angiogram was performed 3 weeks **(C)** and 6 weeks **(D)** after onset and shows growth of the EICA dissecting aneurysm (arrowhead) and resolution of the aneurysm (arrowhead) after treatment **(E)**.

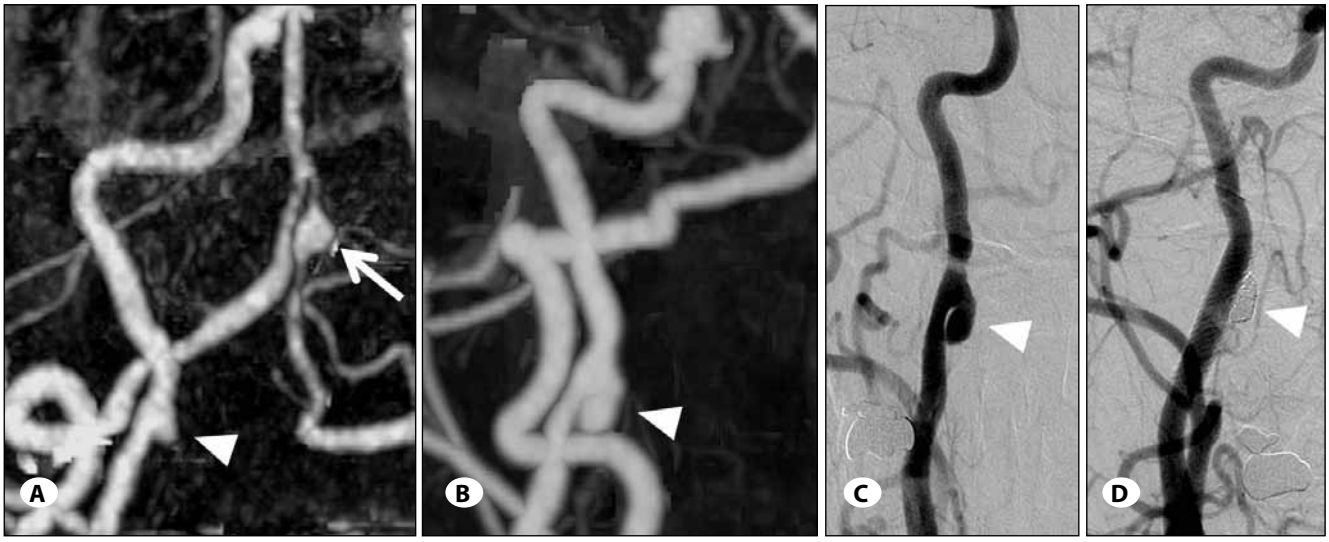

Figure 2: CT angiography on admission depicts the vertebral artery aneurysm (arrowhead) and the EICA aneurysm (arrow) **(A)**. CT angiography 2 weeks after onset shows growth of the EICA dissecting aneurysm **(B,** arrowhead**)**. The right carotid angiogram performed 3 weeks after onset demonstrates growth of the EICA dissecting aneurysm **(C,** arrowhead**)** and resolution of the aneurysm after treatment **(D,** arrowhead**)**.

after minor trauma, or after severe blunt injury (11). In practice, spontaneous dissections may include minor trauma such as hyperextension or rotation of the neck, practicing yoga, and coughing as the EICA is anchored to the petrous bone that could render it vulnerable to mechanical stresses. These movements may injure the artery as a result of mechanical stretching of the mobile segments of the EICA. A recent history of a respiratory tract infection is another risk factor for spontaneous cervical artery dissections. It could reflect endothelial damage, prothrombotic state, and protease activation, which are thought to underlie the association between infection and cervical artery dissections (2). A large multicenter study demonstrated the higher prevalence of recent infection in patients with EICA dissection compared to patients with vertebral artery dissection (4). There was no recent history of respiratory infection in the present cases, but anatomical proximity between the EICA and the upper respiratory tract may influence the prevalence. Most multiple dissecting aneurysms occur in patients with traumatic or congenital factors (8) but neither patient in the present report had congenital factors or a history of blunt injury. The architecture of the vessel wall of the EICA may make it susceptible to dissection as EICA is a muscular artery and the tunica media consists mainly of smooth muscle tissue, unlike the common carotid artery which is an elastic artery where tunica media consists mostly of elastic fibers. (7). Furthermore, patients with EICA dissection have an aneurysmal dilatation more frequently than patients with cervical vertebral artery dissection (4). The reason could be that pericytes and smooth muscle cells in the carotid arteries are derived from the neural crest, whereas the vertebral arteries emerge exclusively from the mesoderm (6). These different embryological origins could indicate that distinct genetic and developmental factors may be involved in the occurrence of EICA dissecting aneurysm.

Several reports have described extracranial carotid artery dissecting aneurysms that developed after SAH due to concomitant ruptured VA aneurysm. The mechanism of gradual growth of the EICA aneurysm remains to be elucidated. Additional hemodynamic stress can lead to irreversible damage of the intimal and the medial layer and can cause pathological changes that contribute to growth of the dissecting aneurysm (1,9,12). In the present case, hemodynamic stress on the internal carotid artery may have occurred due to alternative collateral flow through the posterior communicating artery induced by a decrease in cerebral blood flow in the territory of the posterior circulation due to vasospasm after SAH or VA surgical trapping.

Endovascular methods using self-expanding stents to occlude the dissecting aneurysm are associated with lower complication rates compared with direct surgery and allow reconstitution of the vessel lumen with immediate reestablishment of blood flow (8,10). This approach enables the simultaneous embolization of residual aneurysmal dilatation using coils through the stent mesh technique, which was employed in the present case (case 2). Use of a covered stent is another option that allows for immediate closure of the dissecting aneurysm (3).

CONCLUSIONS

There are rare cases of multiple dissecting aneurysms originating simultaneously from different arteries and showing gradual growth. The EICA small dissecting aneurysm may be overlooked and careful attention is required to assess for development of EICA dissecting aneurysm after SAH due to a ruptured dissecting posterior fossa aneurysm.

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