Patient with Recurrent Anterior Cerebral Artery Dissecting Aneurysm After Stent-Assisted Coil Embolization Successfully Treated with A3-A3 Anastomosis

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Key words
- Anterior cerebral artery
- A3-A3 bypass
- Coil embolization
- Dissecting aneurysm
- Stent

Abbreviations and Acronyms
ACA: Anterior cerebral artery
DSA: Digital subtraction angiography
EC: External carotid
IC: Internal carotid
SAH: Subarachnoid hemorrhage

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BACKGROUND: **With recent advances in endovascular devices and techniques, the use of endovascular treatment has been reported for intracranial dissecting aneurysms. However, the efficacy of this endovascular approach for intracranial dissection is still unknown. We report the case of a patient with a recurrent anterior cerebral artery (ACA) dissecting aneurysm after endovascular treatment.**

CASE DESCRIPTION: **A 67-year-old woman underwent stent-assisted coil embolization for a ruptured ACA dissecting aneurysm of the left A2 segment. Aneurysmal dilatation was completely occluded after embolization. However, follow-up angiography 40 days after treatment showed compaction of the coil mass and reenlargement of the aneurysm. Open surgery was performed, considering the risk of rebleeding from the recurrent dissecting aneurysm. A3-A3 anastomosis followed by trapping of the coiled aneurysm along with the stent was successfully performed through the interhemispheric approach. The postoperative course was uneventful, and angiography 6 months after surgery revealed disappearance of the aneurysm and patency of the A3-A3 anastomosis.**

CONCLUSIONS: **Stent-assisted coil embolization for an ACA dissecting aneurysm may not be curative, and the coiled aneurysm may recur within a short time period. Microsurgical bypass trapping can be considered as the alterative or salvage treatment because of curability. Revascularization surgery, such as A3-A3 anastomosis, should be performed before trapping to avoid ischemic complications.**

INTRODUCTION

Anterior cerebral artery (ACA) dissecting aneurysms are rarely diagnosed as the cause of cerebral infarction or subarachnoid hemorrhage (SAH).[1,2] When they are associated with intracranial hemorrhage, surgical treatment should be considered.[1,3,4] There is no uniform surgical treatment because of the rarity of ACA dissecting aneurysms. Trapping with various bypass surgeries has been previously reported in the literature.[5,6] In addition, with recent advances in endovascular devices and techniques, the use of endovascular treatment for intracranial dissecting aneurysms has been reported in the literature.[7,8] In this study, we present the case of a patient with a recurrent ACA dissecting aneurysm after stent-assisted coil embolization successfully treated by trapping with A3-A3 anastomosis.

CASE REPORT

History

A 67-year-old woman presented with sudden headache and disturbance of consciousness. Computed tomography showed SAH predominantly in the interhemispheric fissure (Figure 1A). Digital subtraction angiography (DSA) revealed a 1.5-mm small aneurysm at the nonbranching site of the left proximal A2 segment (Figure 1B). These radiologic findings led to a possible diagnosis of a left ACA dissecting aneurysm. She was initially treated conservatively; however, DSA performed 15 days after the onset showed apparent growth of the aneurysm to up to 3 mm, suggesting an increased risk of rebleeding (Figure 1C).

Stent-Assisted Coil Embolization (First Treatment)

Transfemoral stent-assisted coil embolization was performed under general anesthesia and heparinization. A microcatheter (Excelsior SL-10; Stryker, Michigan, USA) with a 0.012-inch microguidewire (GT wire, MicroVention, Terumo, Tokyo, Japan) was navigated into the aneurysm. Another microcatheter (Prowler Select Plus, Codman, Miami, Florida, USA) was navigated distally to the aneurysm, and a stent (Enterprise 2, Codman) was placed at the true lumen to cover the aneurysmal neck. Next, 3 coils (Target 360 Ultrasoft 2.5 mm × 4 cm, Target 360 Nano 1.5 mm × 2 cm, Stryker Neurovascular, Fremont, California, USA) were placed and the aneurysmal dilatation outside the stent was completely occluded

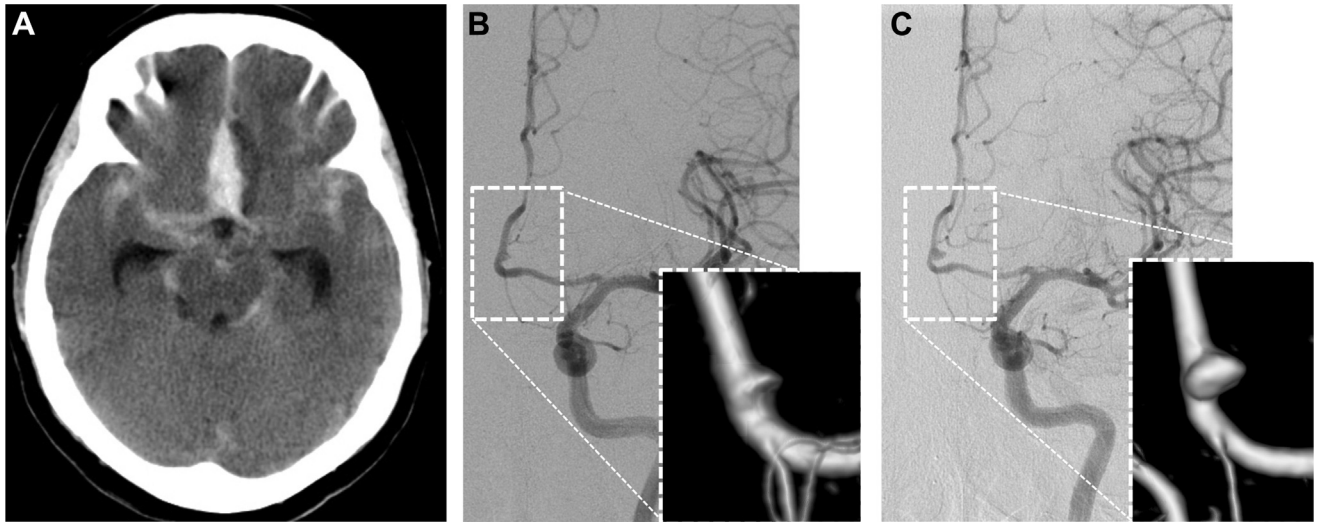

Figure 1. (**A**) Computed tomography image of a subarachnoid hemorrhage predominantly in the interhemispheric fissure. (**B**) Left internal carotid angiography on day 0 revealing a 1.5-mm small dissecting aneurysm at the nonbranching site of the left proximal A2 segment. (**C**) Left internal carotid angiography on day 15 revealing growth of the aneurysm.

(Figure 2A–C). The postoperative course was uneventful. However, follow-up DSA 40 days after endovascular treatment revealed compaction of the coil mass and reenlargement of the aneurysm (Figure 2D and E).

Bypass Trapping (Second Treatment)

Open surgery was performed, considering the risk of rebleeding from the recurrent dissecting aneurysm. A curved bicoronal skin incision was made, and bifrontal craniotomy was then performed. After sharp dissection of the interhemispheric fissure, the A3 segment of the bilateral ACAs was exposed. Before approaching the aneurysm, A3-A3 anastomosis was performed in a side-to-side manner using 10–0 nylon suture (BEAR Medic Corporation, Ibaraki, Japan) (Figure 3A). We decided to make the anastomosis at the A2-A3 junction, which was the shallowest part in the operative field. We made 3 mm of arteriotomy at the superior wall of the bilateral ACAs and then used continuous suture technique for the back side and intermittent suture technique for the front side. The occluding time for anastomosis was 30 minutes. Indocyanine green video angiography revealed patency of the A3-A3 anastomosis (Figure 3B). After completion of the anastomosis, the coiled aneurysm was exposed (Figure 3C). The aneurysm was trapped along with the stent, which had been placed in the left A2 segment to cover the aneurysmal neck (Figure 3D). Second indocyanine green video angiography showed occlusion of the aneurysm (not shown).

Postoperative Course

Postoperative magnetic resonance imaging 1 day after surgery revealed no ischemic or hemorrhagic complications (not shown). Angiography 6 months after surgery revealed disappearance of the aneurysm and patency of the A3-A3 anastomosis (Figure 3E). The postoperative course was uneventful, and the patient was discharged without any neurologic deterioration.

DISCUSSION

ACA dissecting aneurysms are rare compared with vertebrobasilar system aneurysms.[2] In a single-center series of 206 patients with intracranial arterial dissection, dissections in the vertebrobasilar system were seen in 80% of the patients, whereas dissections in the ACA were seen in 5.3%.[2] Ohkuma et al[1] reported 12 patients with ACA dissections collected from 46 stroke centers during a 5-year period, which share common features including a tendency to affect middle-aged patients, appearance of serial lesion changes on repeat angiograms, and a mostly good prognosis. Five patients presented with SAH, 9 with cerebral infarction, and 4 with both ischemic symptoms and SAH.[1] In their series, the A2 segment was the most frequent site for ischemic events, whereas hemorrhagic events may occur at any site in the ACA.[1] Uozumi et al[3] reviewed 82 patients' ACA dissections and reported a similar tendency of the lesion site.

Treatment of the ACA dissection remains controversial. Most lesions with cerebral infarctions have a good prognosis.[1,9] Therefore such patients with ACA dissection are generally treated conservatively. However, hemorrhagic onset can be fatal and surgical treatment should be considered.[1,3,4] Clipping of the aneurysmal dilatation can preserve blood flow of the parent artery. However, simple neck clipping can result in postoperative bleeding from the aneurysmal neck with a fragile structure.[1,3] Thus trapping of the entire segment of the dissection is a more effective strategy to prevent rebleeding. Revascularization surgery is necessary to prevent ischemic complications of the peripheral ACA territory after trapping.