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Endovascular treatment of a giant aneurysm arising from a basilar trunk fenestration using the enterprise stent

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Abstract

Objective: We present a case of a giant, broad-based aneurysm arising from the left limb of the Basilar Artery (BA) fenestration treated with Enterprise stent-assisted coiling. Technical nuances and indications for this treatment option are reviewed.

Clinical presentation: A 28-year-old man presented with headache, gait instability and swallowing difficulty. MR image showed a 27 × 25-mm partially thrombosed mass in front of the medulla and angiography demonstrated a 19 × 14-mm BA aneurysm associated with the left branch of a BA fenestration.

Technique: A 4.5 × 28-mm Enterprise stent was placed from the right vertebral artery into the BA via the right limb of the BA fenestration. The aneurysm was then coiled with a series of Microplex coils through the distal and proximal parts of the BA fenestration respectively.

Conclusion: Use of the Enterprise stent-assisting technique resulted in complete embolization of the aneurysm, and preservation of flow through one limb of the fenestration.

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Keywords: Basilar artery aneurysm; Basilar artery fenestration; Intracranial stent; Stent-coiling

Introduction

Saccular aneurysm is known to originate from Basilar Artery (BA) fenestration. [1-4] This lesion can be technically challenging to deal with from a surgical or endovascular standpoint, given the deep location in front of the brainstem, complex relationship of the parent vessel, fenestration arms, and its intimate relationship to perforating arteries. We describe a patient who presented with a giant aneurysm located at the left limb of a BA fenestration. To successfully treat the lesion, we placed an Enterprise stent in the right limb of the fenestration with subsequent coiling of the aneurysm and left limb completely.

Case description

A 28-year-old man presented with presented with 2-week history of headache, gait instability and swallowing difficulty. MR imaging examination showed a partially thrombosed mass in front of the medulla and its size was 27 × 25-mm (Figure 1A).

He was treated with Mannitol (250ml, Q12h) after admission. After several days, his symptoms caused by massive effect recovered completely. Conventional catheter-based cerebral angiography showed a 19 × 14-mm aneurysm involving the left limb of a BA fenestration (Figure 1B). The lesion was wide-based and incorporated the left limb of the fenestration and the left vertebral artery only irrigated the left posterior inferior cerebellar artery. The vascular channels of the fenestration had fairly significant areas of tortuosity proximal and distal to the origin of the aneurysm. Thorough consideration was given to this lesion and the patient's presentation. We believed that this lesion would regrowth, and, therefore, conservative radiographic observation, although an option, was not optimal. We also considered and presented to the patient surgical options that, until recently, had been the mainstay for treatment of all intracranial aneurysms. This aneurysm would have required a



far lateral transcondylar or a transpetrosal approach with a risk of lower cranial neuropathies, cerebrospinal fluid leak, stroke, and even death. We also considered a simple stent-assisted coil-embolization procedure; however, as seen in Figure 1B, the aneurysm neck was so broad-based and enveloped the left limb of the fenestration. We believed that with a single stent, the risk of early or late thromboembolic complications would be lower. We did discuss with the patient the higher risks of recanalization with endovascular therapies and certainly the possible need for additional treatments. An informed consent was obtained from the patient. He was given a dose of aspirin (100 mg) and clopidogrel (75mg) 3 days before the procedure. After conscious sedation was established with intravenous fentanyl and midazolam, the right femoral artery was accessed with a 6-French sheath. A 6-French Envoy catheter (Cordis, Warren, New Jersey) was advanced to the distal right vertebral artery. We proceeded to advance a Prowler Select Plus microcatheter (Cordman) with a Silverspeed-14 microwire (ev3) into the BA through the right limb of the fenestration. Once the catheter was in position, we deployed a 4.5×28-mm Enterprise stent (Codman, Inc., Raynham, Massachusetts). With the stent in position, we advanced an Echelon-10 microcatheter over the Silverspeed-14 microwire into the aneurysm dome through the distal portion of the fenestration. Microplex coils (Microplex, Microvention) were deployed into the aneurysm. The proximal portion of the fenestration was also completely packed with the same technique following complete distal portion packing (Figure 1C). The final angiogram showed complete obliteration of the aneurysm with preservation of the right limb of the BA fenestration (Figure 1D & 1E). Follow-up angiography 3 months later demonstrated a complete obliteration of the aneurysm and preserved flow through the right limb of the fenestration (not shown). The patient tolerated the procedures well with no untoward neurological events caused by massive effect. He was maintained on daily aspirin therapy.

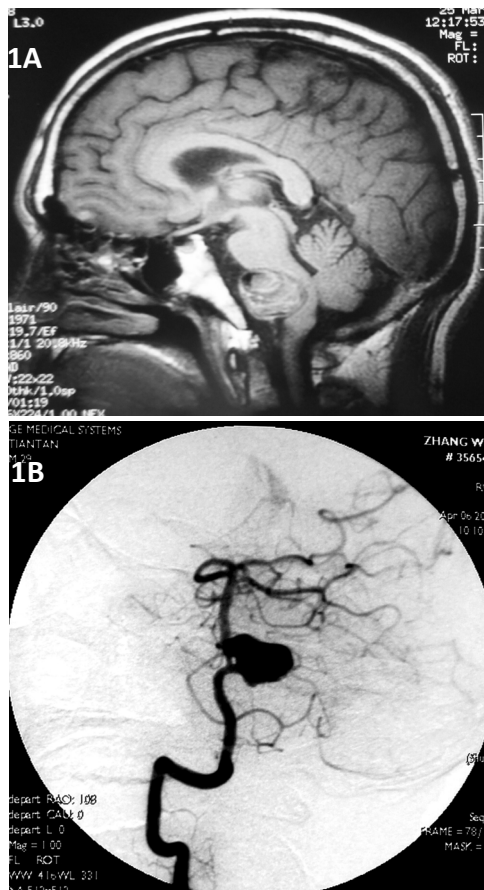


Figure 1: (A) Sagittal T1-weighted Magnetic Resonance Imaging (MRI) scan showing a partially thrombosed mass in front of the medulla. (B) Cerebral angiogram, right vertebral artery injection. Oblique view demonstrating the aneurysm in relation to the basilar artery fenestration. (C) Fluoroscopic image showing the coil mesh. Cerebral angiogram, right vertebral artery injection, antero-posterior view (D) and oblique view (E) showing complete embolization of the basilar artery aneurysm with coils.

Discussion

In this paper, we described a case of a giant basilar artery fenestration aneurysm treated by stent-assisted coiling. Although rare, cases of giant basilar artery fenestration aneurysms treated by stent-assisted coiling have been well described [5-7]. In general, the goal of treatment is complete aneurysm occlusion and preservation of both fenestration limbs and parent vertebral arteries because important brainstem perforators can arise from these structures. In this case, the left fenestration limb

was occluded but fortunately without clinical sequelae. Similar to the current case, Tasker et al. [7] reported the use of a single stent that extended from the distal left vertebral artery to the left limb of the fenestration. However, a single stent construct in that case was insufficient to maintain coils in the dome of the wide-necked aneurysm. The coils herniated into the right vertebral artery, leading to occlusion of both the right vertebral artery and the right limb of the fenestration. On the basis of these cases, we feel that a single stent is insufficient to prevent coil herniation and preserve both limbs of the fenestration and both parent vertebral arteries in these wide-necked basilar artery fenestration aneurysms. Perhaps, a double-stent assisted technique, as described by Menedez et al. [6], is more appropriate in the treatment of these difficult lesions.

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