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Technical note

X-microstenting and transmesh coiling in the management of wide-necked tent-like anterior communicating artery aneurysms

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ABSTRACT

Anterior communicating artery (AcomA) aneurysms frequently have wide necks and an irregular shape, incorporate parent vessels, and are associated with significant variations in vascular anatomy. Safe and complete endovascular occlusion of these aneurysms usually requires the assistance of combined approaches using balloons and stents in an individually tailored strategy. We describe a technique for X-configured stent-assisted coiling in the management of a small tricuspid tent-like wide-necked AcomA aneurysm by means of two crossed nitinol self-expandable Leo+ Baby stents (Balt Therapeutics, Montmorency, France) followed by "in stent" transmesh coiling. The addition of a low-profile stent into the neurointerventional armamentarium will substantially enhance our capability to treat previously uncoilable tent-like AcomA aneurysms.

1. Introduction

Anterior communicating artery (AcomA) aneurysms are among the most challenging aneurysms for both microsurgical clipping and endovascular techniques [1,2]. AcomA aneurysms frequently have wide necks and an irregular shape, incorporate parent vessels, and are associated with significant variations in vascular anatomy. Safe and complete endovascular occlusion of these aneurysms usually requires the assistance of combined approaches using balloons and stents in an individually tailored strategy.

X-configured stent-assisted coiling for the treatment of wide-neck and complex AcomA aneurysms has recently been described [3]. This technique requires double crossing from A1 to the contralateral A2, through the AcomA, with relatively large (0.021) microcatheters in order to navigate stents that are usually indicated for vessels over 2 mm in diameter; it was thus originally described as appropriate only for specific AcomA complex anatomy and diameter.

A recently introduced low-profile nitinol self-expandable stent (Leo+ Baby, Balt Therapeutics, Montmorency, France) that can be navigated through a regular coiling microcatheter is promising to expand the use of stents for neurovascular indications. We report the use of this microstent in X-stenting for the treatment of a symptomatic AcomA aneurysm in a patient with small anterior cerebral arteries.

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2. Case report

A 54-year-old woman presented to our Neurosurgery Department with a history of sudden onset severe headaches that began 3 days before admission. The patient had an unremarkable medical history and her neurological examination was normal.

Noncontrast head CT scan was negative for subarachnoid hemorrhage; however, CT angiogram showed a small wide-necked AcomA aneurysm and subarachnoid hemorrhage was then confirmed by lumbar puncture. Cerebral angiogram followed by bilateral internal carotid artery (ICA) rotational angiography with tridimensional reconstruction (Allura, Phillips, Eindhoven, The Netherlands) confirmed a small tricuspid tent-like wide-necked AcomA aneurysm (Fig. 1). The aneurysm, parent vessels, and angles of the AcomA complex were measured. The right A1 and A2 presented an acute angle and measured 1.5 and 1.1 mm in diameter, respectively. The left A1 and A2 also presented an acute angle and measured 0.75 and 2.1 mm in diameter, respectively. The aneurysm neck was 5 mm with a maximal height of 3 mm.

The patient was premedicated with clopidogrel (600 mg loading dose) and aspirin (300 mg loading dose) 6 hours before the endovascular intervention. Clopidogrel sensitivity was tested by using the VerifyNow P12Y12 assay (Accumetrics, San Diego, CA, USA). Under general anesthesia, bilateral femoral access was obtained, and 90 cm introducer sheaths (Arrow International, Reading, PA, USA) were placed in both common carotid arteries. We then advanced 6F guiding catheters (Envoy; Cordis Neurovascular, Miami Lakes, FL, USA) to the bilateral ICA, and performed bilateral

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Fig. 1. CT angiogram showed a small wide-necked anterior communicating artery (AcomA) aneurysm. Simultaneous selective internal carotid subtracted angiograms were obtained on magnified anteroposterior view. The wide-necked tent-like small AcomA aneurysm is shown. Note the sharp A1–A2 angles.

microcatheterization of the proximal A2 through their contralateral A1. Leo+ Baby stents were then implanted in an X-fashion extending from A2 to the contralateral A1 crossing through the AcomA, 2.5 × 18 from the left A2 to right A1 and 2.0 × 12 mm from the right A2 to left A1 (Fig. 2). Immediately afterwards, we attempted to cross the first (and larger) stent with the microcatheter tip in order to proceed with coiling. Although the guidewire easily crossed the stent struts, we had several failed attempts to cross with the microcatheter. We decided to anchor the preshaped microcatheter at the struts in front of the aneurysm neck and to coil through the stent mesh (Fig. 3). A single standard coil was implanted and the aneurysm was completely occluded. Follow-up angiogram obtained at 4 months confirmed complete aneurysm obliteration with preservation of the parent vessels of the AcomA complex, and no sign of in-stent stenosis (Fig. 4). Following the control angiogram, clopidogrel was discontinued and lifelong use of aspirin was prescribed.

3. Discussion

Endovascular coil embolization for the treatment of wide-necked cerebral aneurysms has progressed substantially after the introduction of specially designed self-expanding stents for neuro-interventional use. Stents are used not only as a scaffold for safe coiling (stent-assisted coiling), but have proven to allow better initial occlusion rates while sparing the parent artery lumen. Moreover, stents have been shown to stabilize aneurysm occlusion and decrease recanalization due to their effects on intra-aneurysmal hemodynamics [3–5].

The recently introduced Leo+ Baby stent is a braided stent made of 16 nitinol wires, two of which are radio-opaque to facilitate more precisely controlled stent positioning and deployment. The stent's braided constitution allows a better adaptation to vessel anatomy in comparison to laser-cut stents. The flared extremities are designed to anchor the stent and open appropriately in curves. However, the most appealing feature of this device in the management of AcomA aneurysms or other aneurysms in small vessels or distal locations is that can be delivered through a standard 0.017

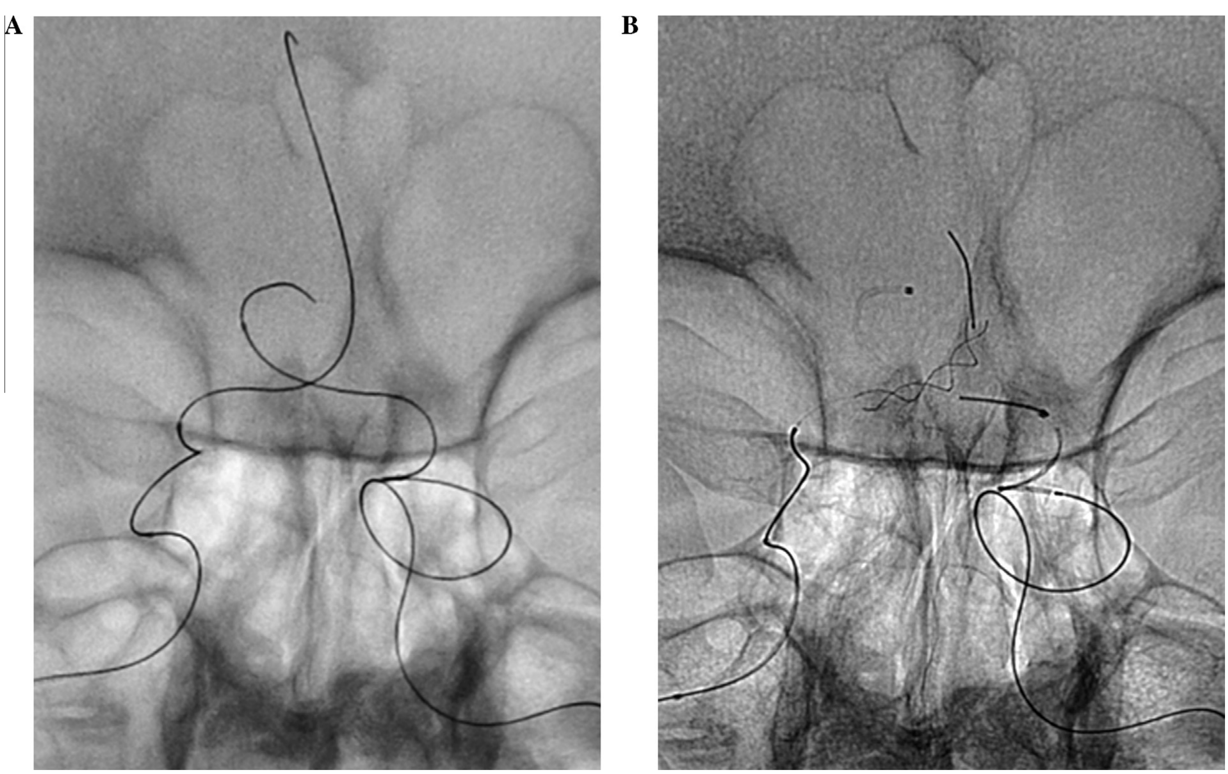

Fig. 2. Radioscopic image of serial steps required for X-stenting. (A) A microcatheter was navigated from the left A1 to right A2; the second catheter is seen being navigated from the right A1 through the anterior communicating artery to the left A1. Note that the A1 and contralateral A2 angles are widely open. (B) One stent has been deployed and is readily visible while the other is being navigated.