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CASE REPORT

Successful treatment of a basilar artery fenestration aneurysm using a kissing flow diverter stent

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Introduction

Basilar artery fenestration is a rare congenital condition associated with the development of aneurysms, specifically basilar artery fenestration aneurysms. These aneurysms have potentially severe consequences, but treatment is complex because of the rarity and intricate anatomy. This article presents the case of a 76-year-old female patient with a basilar artery fenestration aneurysm treated successfully using flow diverter stents via the 'kissing' technique. It discusses the evolution of treatment of basilar artery fenestration aneurysms, the challenges of their anatomical features, and the role of flow diverters and the kissing technique in their management.

Discussion

Basilar artery fenestration is a congenital vascular anomaly that occurs during the embryonic development of the brainstem. This anomaly results from the incomplete fusion of the neural crest cells that form the basilar artery (Gupta et al, 2013). Basilar artery fenestration is characterised by the basilar artery splitting into two or more smaller vessels before they rejoin. It is the second most common site of fenestration, after the anterior communicating region. The frequency of basilar artery fenestration is reported to range from 0.6% to 2.33% (Campos et al, 1987; Trivelato et al, 2016; Korkmaz et al, 2021; Essibayi et al, 2022).

Case report

A 76-year-old female patient presented to the authors' clinic with a subarachnoid haemorrhage. Computed tomography angiography and digital subtraction angiography showed that she had a basilar artery fenestration aneurysm that was too small for coiling (Figure 1). The patient was loaded with clopidogrel 600 mg and aspirin 300 mg via orogastric tubing on the angiography table. A slow infusion of tirofiban 0.75 mg was administered intravenously just before endovascular navigation to start the antiaggregant effect immediately. The aneurysm was located at the midline, equidistant to both fenestration arms, so the decision was taken to embolise it using two flow-diverting stents in the kissing technique (Figure 2a). The treatment was completed without complications, and the patient was discharged 8 days later taking 75 mg/d clopidogrel and 300 mg/d aspirin. The 6-month follow-up computed tomography angiogram clearly demonstrated the efficacy of the treatment (Figure 2b).

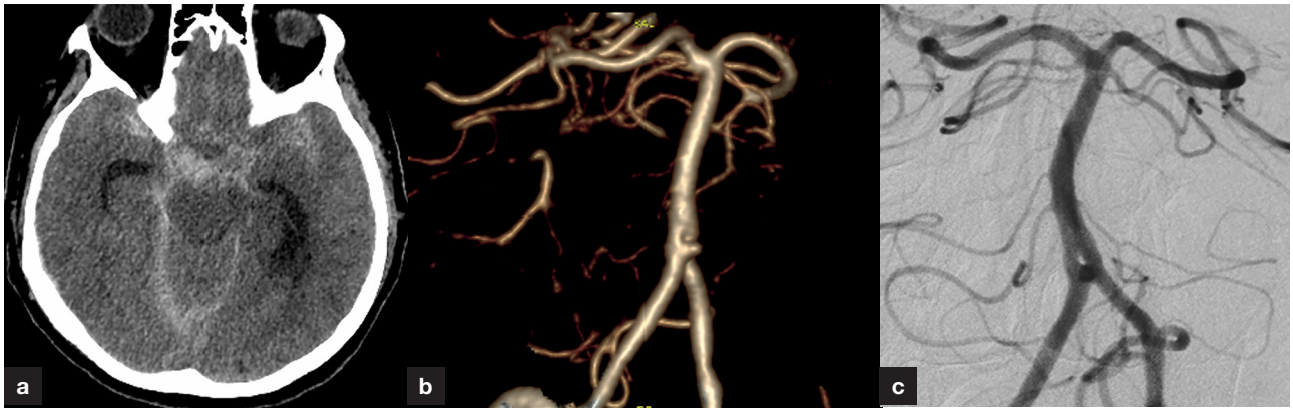

Figure 1. Diagnosis of basilar artery fenestration and accompanying small saccular aneurysm. a. Widespread subarachnoid haemorrhage observed in basal cisterns, (b) visualisation of basilar artery fenestration on computed tomography angiography, and (c) confirmed diagnosis of fenestration with small aneurysm on digital subtraction angiography.

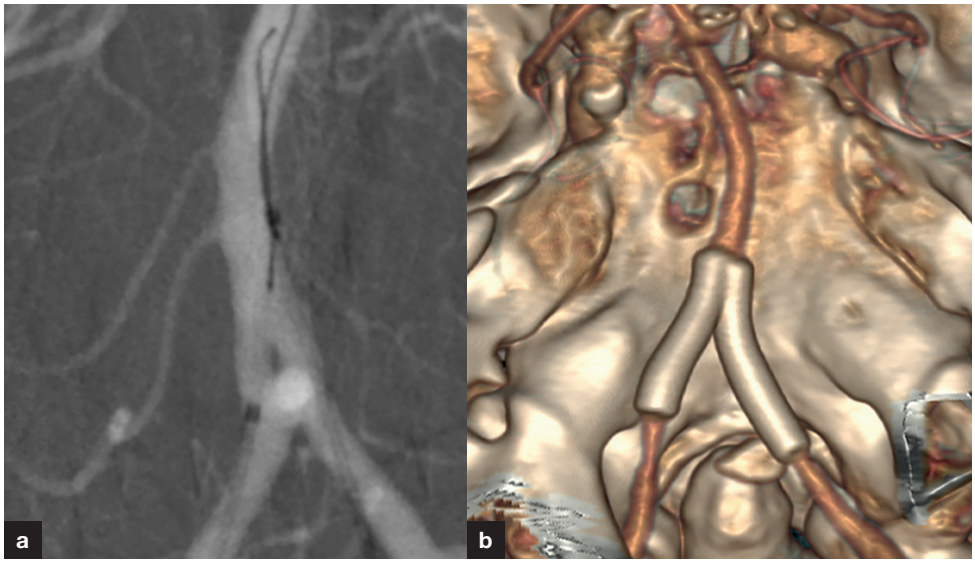

Figure 2. Placement of flow diverter stents using the kissing technique and follow-up imaging. a. The moment of dual-sided kissing stent placement. b. Follow-up volume rendering technique at 6-month check-up, demonstrating the successful use of this treatment.

Basilar artery fenestration aneurysms can be serious and may require treatment to prevent rupture and bleeding in the brain. Surgical intervention for basilar artery fenestration aneurysm presents significant challenges because of the complex surrounding anatomy, including the proximity of lower cranial nerves and blood vessel perforators running from the artery to the brainstem. The fenestration further complicates the surgery (Trivelato et al, 2016). As a result, endovascular management is the primary approach for treating basilar artery aneurysms, offering less invasive treatment and improved outcomes for patients. Endovascular treatment for basilar artery fenestration aneurysm is successful in 97% of cases (Korkmaz et al, 2021).

Endovascular methods for treating basilar artery fenestration aneurysms include standard coiling, balloon-assisted coiling, stent-assisted coiling, telescopic stenting and flow diverter stents. These are all performed under general anaesthesia. Type 1A and type 1B aneurysms with a narrow neck can be treated with the standard coiling technique, whereas balloon-assisted techniques, stent-assisted coiling and stent-assisted techniques (such as telescopic stenting and flow diverter stents) are used for type 2A and type 2 aneurysms with a wide neck (Korkmaz et al, 2021).

Flow diverter stents are used to reduce blood flow to the aneurysm without using coils, aiming to shrink or obliterate the aneurysm, and have been used in the cerebral region (Consoli et al, 2013). Flow diverter stents have been used as the first treatment method in only 12 cases (Consoli et al, 2013; Gontu et al, 2015; Toth et al, 2016; Gaikwad et al, 2021; Korkmaz et al, 2021; Styczen et al, 2022). In three other cases, flow diverter stents were not the initial treatment method but were used when retreatment was necessary (Styczen et al, 2022).

The kissing technique is so called because of the contact between flow diverter stents during placement. Initially used by Consoli et al (2013) to treat basilar artery fenestration aneurysms, this technique has not since been reported in any other cases. Reporting patients treated with flow diverter stents is crucial to increase the reliability of these treatments.

Learning points

- The ‘kissing’ technique using flow diverter stents offers a unique and successful approach for treating rare basilar artery fenestration aneurysms.
- The endovascular approach to treatment of basilar artery fenestration aneurysms is less invasive and offers improved patient outcomes.

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