Treatment of two blood blister-like aneurysms with flow diverter stenting

Arturo Consoli,[1] Sergio Nappini,[2] Leonardo Renieri,[1] Nicola Limbucci,[3] Fabrizio Ricciardi,[2] Salvatore Mangiafico[2]

[1]Department of Radiology, Careggi University Hospital, Florence, Italy
[2]Department of Interventional Neuroradiology, Careggi University Hospital, Florence, Italy
[3]Department of Interventional Radiology and Neuroradiology, 'Santo Spirito' Hospital, Pescara, Italy

Correspondence to
Dr Arturo Consoli, Department of Radiology, Careggi University Hospital, Largo Brambilla, 3, Florence 50134, Italy; onemed21@gmail.com

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ABSTRACT

Purpose Neurosurgical and endovascular treatment of fragile and recurrent aneurysms of the non-branching portion of the internal carotid artery, known as blister-like aneurysms, is challenging. The aim of this paper is to describe two cases of ruptured blister-like aneurysms of the internal carotid artery and of the vertebral artery at the origin of the postero-inferior cerebellar artery, which were both treated with flow diverter (FD) stents.

Methods Two patients with a sub-arachnoid hemorrhage secondary to the rupture of a blister-like aneurysm were treated with a Pipeline (ev3, Irvine, California, USA) stent. Digital subtraction angiography and clinical follow-up were carried out.

Results Both patients treated with FD stents had an excellent clinical (modified Rankin Scale, mRS 0) and angiographic outcome. In both cases the aneurysms were completely excluded after 6 months.

Conclusions Although the use of this endovascular approach is still debated because of poor experience and pharmacological limitations, FD stents may represent a valid alternative approach for treatment of this aneurysm subtype.

INTRODUCTION

Aneurysms of the non-branching supraclinoid portion of the internal carotid artery are commonly known as blister-like aneurysms, and are characterized by fragile and 'false' walls without a well-defined neck.[1] Surgical and endovascular treatment is very difficult because of these characteristics. Furthermore, these types of aneurysms often recur, even within a short period,[2 3] and high mortality and morbidity rates are described[1 3–5] as well as poor outcomes.[1 3–6] No cases of blister-like aneurysms of the vertebral artery or of the postero-inferior cerebellar artery (PICA) have been described previously in the literature.

CASE REPORTS

Case 1

A man in his early 40s was admitted to our hospital after an episode of sickness and vomiting. He was confused and revealed a left hemiparesis. A CT scan showed a peri-mesencephalic and parasellar sub-arachnoid hemorrhage (SAH) (Fisher scale 1; figure 1A). The patient immediately underwent digital subtraction angiography (DSA) evaluation, but no aneurysms were detected except for a focal irregularity of the profile of the right carotid siphon distal to the origin of the ophthalmic artery (figure 2A). Two days later brain MRI revealed parasellar hemosiderin residuals but no aneurysms or other vascular malformations. The patient was subsequently discharged, with no neurologic signs. A brain DSA was scheduled for 2 weeks later to examine any evolution of the focal irregularity of the siphon. However, 8 days later the patient represented after an exertional syncope. A CT scan showed a supra-clinoidal hyperdense rounded image, suspected to be an aneurysm (figure 1B). The patient again underwent cerebral DSA evaluation, which showed a medium-sized aneurysm (7×5 mm) in the same location as the irregular, spiculated profile of 10 days previously; the evolution of the lesion strongly suggested that it was a blister-like aneurysm. A surgical approach was excluded after a carotid compression test showed insufficient cross-flow. The aneurysm was therefore immediately embolized with jailing stent-assisted coiling (Enterprise 4.5×28 mm; Codman, Raynham, Massachusetts, USA) using four coils; during the procedure the last coil stretched and rested between the stent and the carotid wall. Double anti-platelet therapy was administered after complete exclusion of the aneurysm. DSA evaluation 2 days later revealed considerable re-growth of the neck of the aneurysm (3×5 mm; figure 2B). Therefore, we decided to implant an FD stent (Pipeline, 4×20 mm; ev3, Irvine, California, USA; figure 2C) which was not available at the time of the first procedure. After implantation of the FD stent, the contrast agent stagnated within the remnant. DSA performed 2 and 8 days later showed the residual aneurysm was stable. The patient was discharged 9 days later and continued anti-platelet therapy for an additional month. At 3 months DSA evaluation showed complete exclusion of the aneurysm, which was confirmed by DSA at 7 months (figure 2D).

Case 2

A woman in her early 60s was referred to our unit by another hospital, where she had been admitted after the onset of sudden cephalalgia; vomiting and rigor nucalis had occurred about 5 days previously. A brain CT scan (figure 3), a lumbar puncture and cerebral diagnostic DSA performed in the other hospital documented an SAH in the posterior cranial fossa secondary to a left PICA aneurysm. After the patient was admitted to our hospital, another DSA evaluation revealed a small blister-like aneurysm (1×1.5 mm) located at the origin of a left hypertrophic PICA (1.8 mm; figure 4A). Surgical occlusion of the vertebro–PICA junction was excluded because of the risk of an extended cerebellar infarction of the territory of the dominant PICA. Furthermore, clipping of an aneurysm of <2 mm was considered very likely to cause

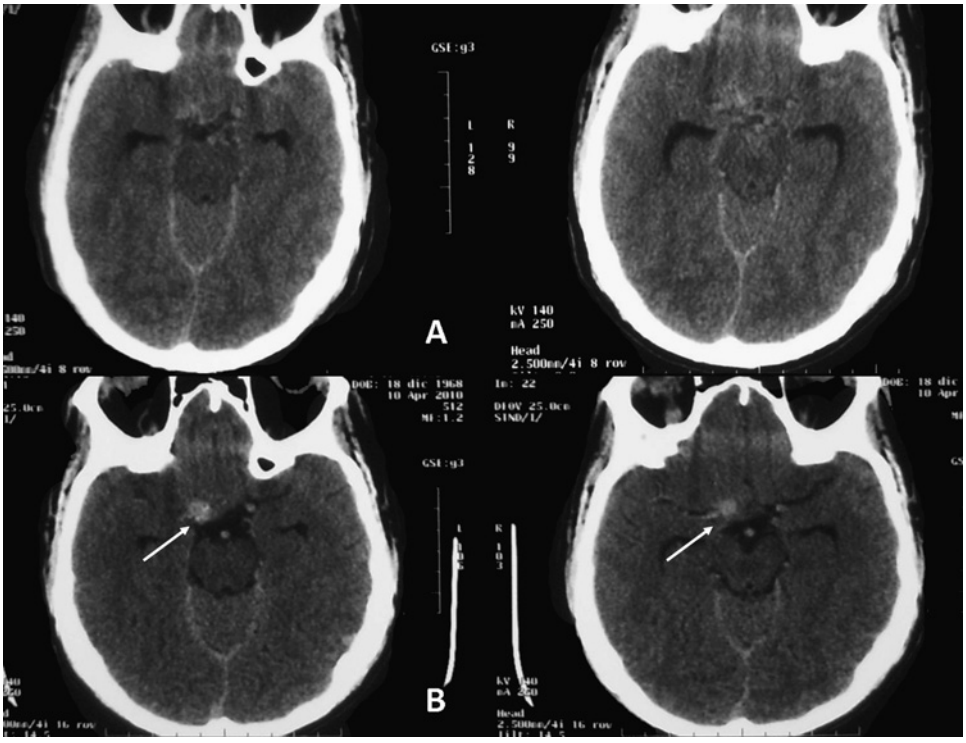

Figure 1 CT scans at first (A) and second admission (B) showing the subarachnoid hemorrhage and the internal carotid artery aneurysm (arrows).

intraoperative bleeding. As coiling was not feasible, we decided to treat the aneurysm by positioning and releasing an FD stent (Pipeline, 3.5×20 mm; ev3; figure 4B) in the left PICA. At the end of the procedure the contrast agent stagnated within the aneurysm (figure 4C). DSA evaluation 6 months later documented complete exclusion of the aneurysm (figure 4D).

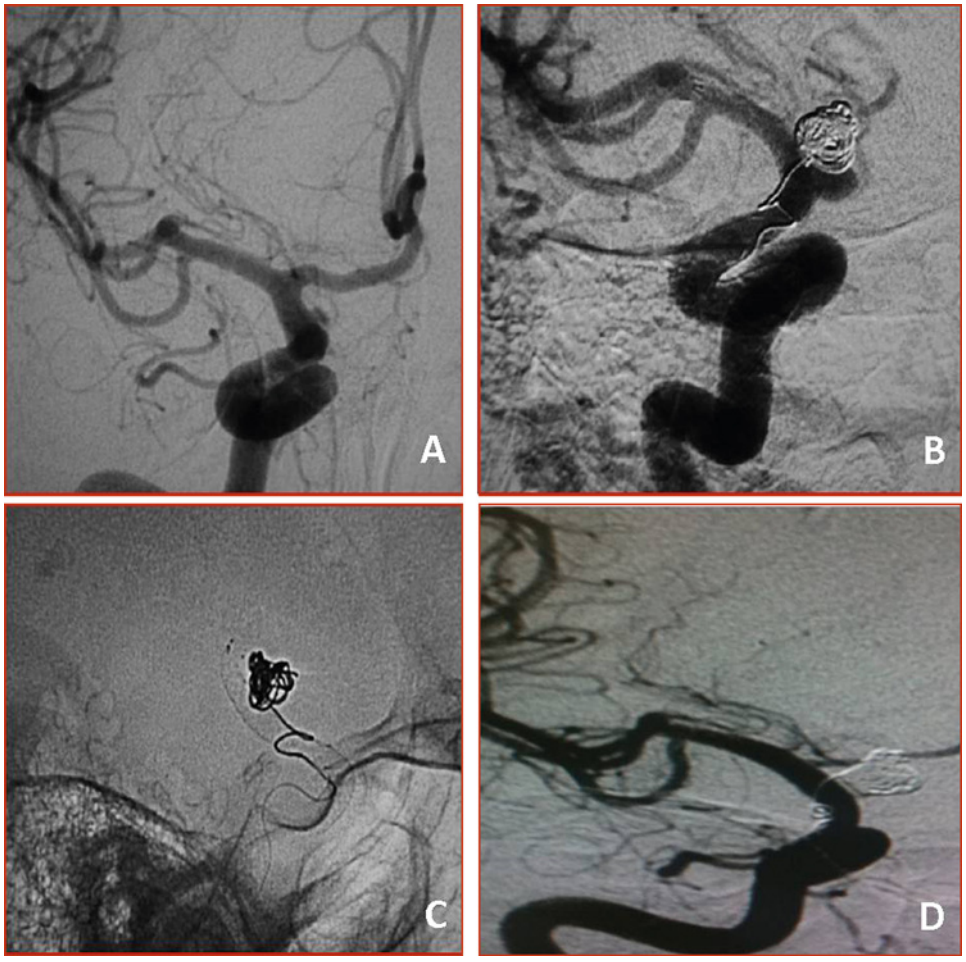

Figure 2 (A) Digital subtraction angiography (DSA) at first admission. (B) Basal re-growth after stent-assisted coiling. (C) Positioning of the flow diverter (FD) stent. (D) DSA follow-up at 3 months.

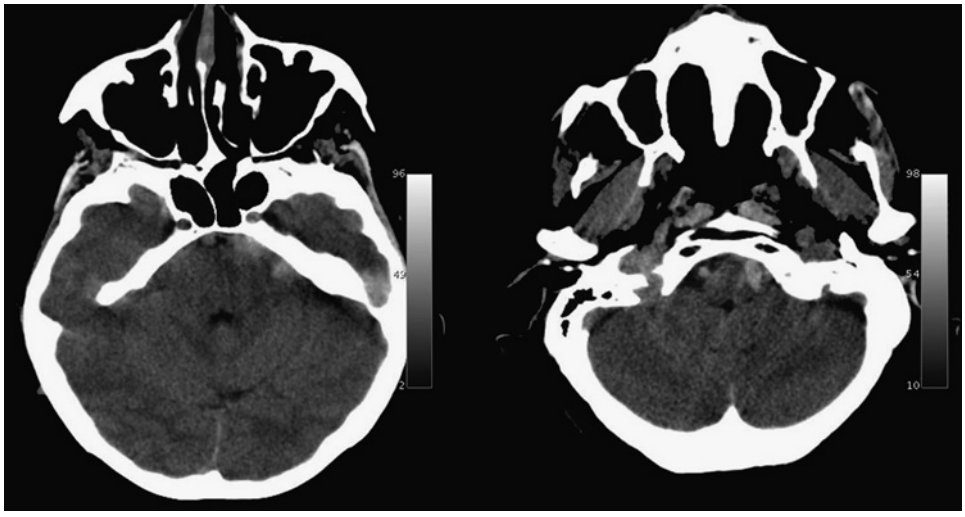

Figure 3 CT scan at admission.

DISCUSSION

Several authors have described different treatments for blood blister-like aneurysms, but mortality and morbidity rates are high and outcome is usually poor, especially if not treated. Blood blister-like aneurysms of the posterior cranial fossa have not been previously described and this nosological entity has never been defined. In case 2, the aneurysm showed angiographic characteristics not typical of berry aneurysms or fusiform dissections. The localization (inferior wall of the vertebro–PICA junction), its downward orientation (against the blood flow) and the broad-base morphology are unusual for a berry aneurysm and suggest a dissecting blister-like aneurysm with atypical localization. Surgical treatment, as well as simple or stent-assisted endovascular coiling, has some limitations, as previously described in literature.[3 6–9] If sufficient cross-flow is present, the best treatment remains occlusion of the carotid artery in the non-branching portion of the internal carotid artery[10 11] or surgical trapping.[12–15] Some authors proposed stent-in-stent assisted coiling to reduce the risk of recurrence.[16 17] FD stents may prove useful as they tend to reduce inflow and intrasaccular

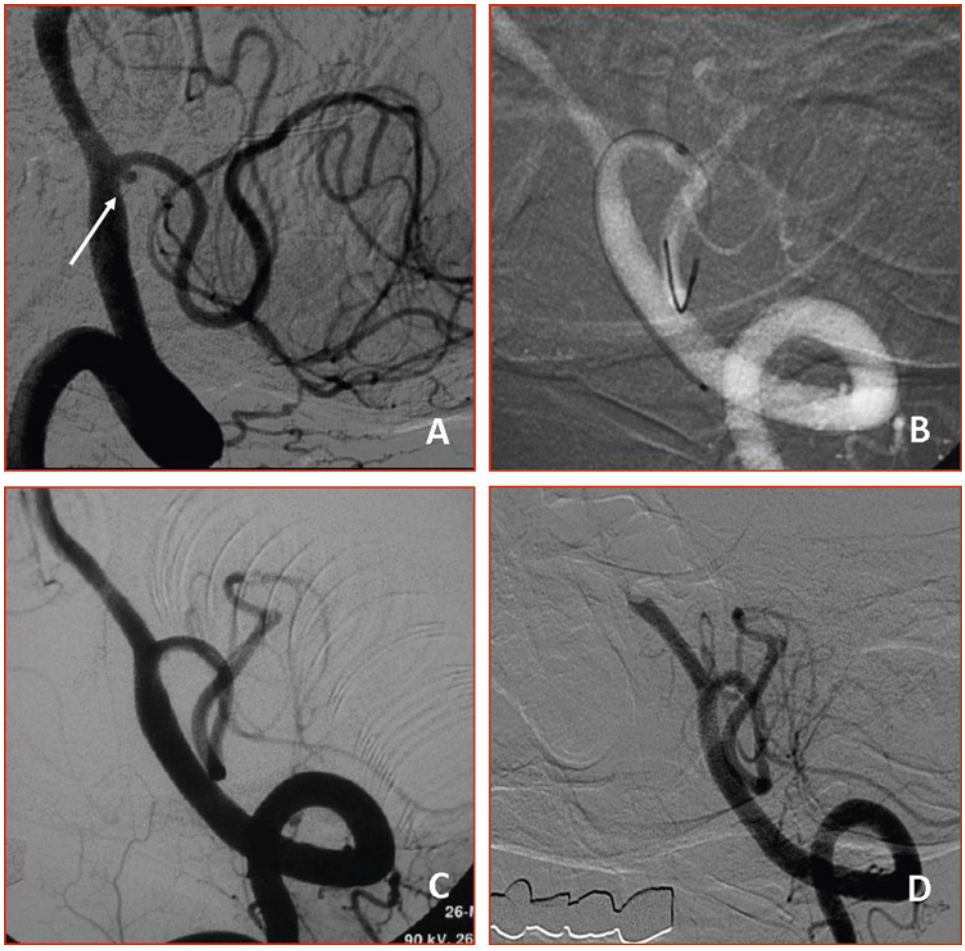

Figure 4 (A) Pre-treatment digital subtraction angiography (DSA) evaluation. (B) Positioning of the flow diverter (FD) stent. (C) DSA 30 min after implantation of the FD stent. (D) DSA follow-up at 6 months.

pressure leading to a slow and progressive thrombosis of the false aneurysm. The necessity of anti-platelet therapy to avoid acute thrombosis of the stent is an important concern in patients presenting with acute SAH and their use is debated. In the first case studied, stent-assisted coiling was ineffective in stopping the threatened evolution of the lesion. In the second case, occlusion of the parental artery was contra-indicated. Only two cases of blood blister-like aneurysms treated with FD stents are described in the literature.[18 19] In the first case, a small aneurysm was initially treated with a Leo+ stent (BALT Extrusion, Montmorency, France) and 5 weeks later a Silk FD stent (BALT Extrusion) was implanted inside the Leo+ with complete disappearance of the aneurysm at 5 months. In the second case, a 2 mm blood blister-like aneurysm in the non-branching supraclinoid siphon was treated with two Silk FD stents using a stent-within-stent technique. In our two cases, complete endothelization of the stent was observed and the wall was reconstructed with complete anatomical exclusion of the blood blister-like aneurysm from the vessel wall. Furthermore, after comprehensive review of the literature, we believe that this is the first reported case suggestive of a blood blister-like aneurysm of the posterior cranial fossa.

CONCLUSIONS

If a blister-like aneurysm is considered to be a false aneurysm, without a definite wall, the recommended therapy is reconstruction of the vessel wall; FD stents seem to be the only endovascular devices capable of this task. Implantation of an FD stent may be a feasible alternative approach for the endovascular treatment of blood blister-like aneurysms, although further studies and experience are required to confirm this.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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