CASE REPORT

Endovascular Coil Occlusion of a Traumatic Pseudoaneurysm of the Posterior Cerebral Artery: A Case Report

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ABSTRACT

A 51-year-old male developed traumatic pseudoaneurysms of the right- and left-posterior cerebral arteries following endoscopic resection of a pituitary adenoma. The right-sided aneurysm resolved spontaneously but the left progressed in size. This was treated endovascularly, with successful embolization of the sac. This is the first report of this approach to the management of a pseudoaneurysm of the posterior cerebral arteries to our knowledge.

Keywords: Coiling, endovascular, pseudoaneurysm, subarachnoid haemorrhage.

INTRODUCTION

A 51-year-old male developed traumatic pseudoaneurysms of the right- and left-posterior cerebral arteries following endoscopic resection of a pituitary adenoma. The right-sided aneurysm resolved spontaneously but the left progressed in size. This was treated endovascularly in two sittings, with successful embolization of the sac. This is the first report of this approach to the management of such a case to our knowledge.

CASE REPORT

A 51-year-old male underwent a transcranial subtotal resection of a large pituitary macroadenoma. This was followed by endoscopic transphenoidal resection a year later, with an uneventful post-operative period. On a follow-up magnetic resonance imaging, there was interval growth of a cystic component of the tumour (Fig. 1) for which he subsequently underwent a repeat endoscopic resection. At surgery, the plane between the tumour and the surrounding structures was very scarred and adherent. During surgical dissection, brisk arterial bleeding occurred. Haemostasis was achieved with Gelfoam and Surgicel. Further tumour resection was aborted and the site was repaired.

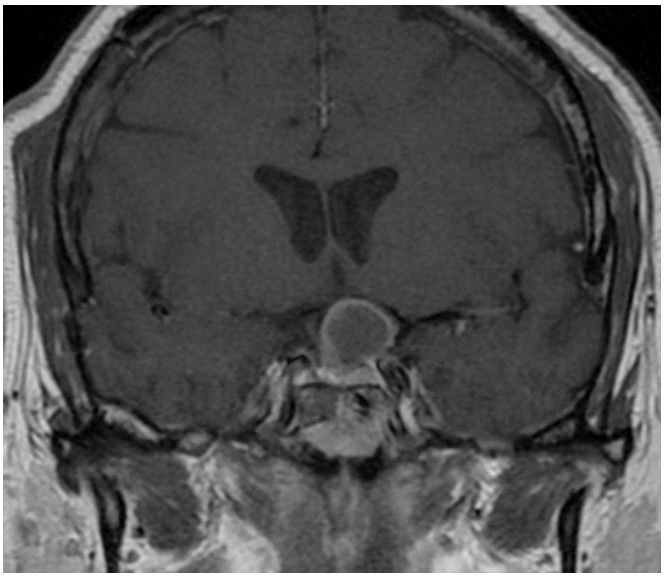

Fig. 1: Post-contrast T1 coronal magnetic resonance imaging demonstrating a cystic mass arising in the pituitary fossa.

An emergency digital subtraction angiography (DSA) was negative; however, non-contrast computed tomography (CT) scan demonstrated extensive subarachnoid haemorrhage with intraventricular extension (Fig. 2). A subsequent CT angiogram done to investigate vasospam revealed two arterial outpouchings on either side at the

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junction of the posterior communicating arteries and the posterior cerebral arteries, measuring 3.8 mm on the right and 2.5 mm on the left, presumed to be pseudoaneurysms (Fig. 3).

Fig. 2: Non-contrast CT head. Acute subarachnoid haemorrhage within the basal cisterns. There was intraventricular extension (not shown).

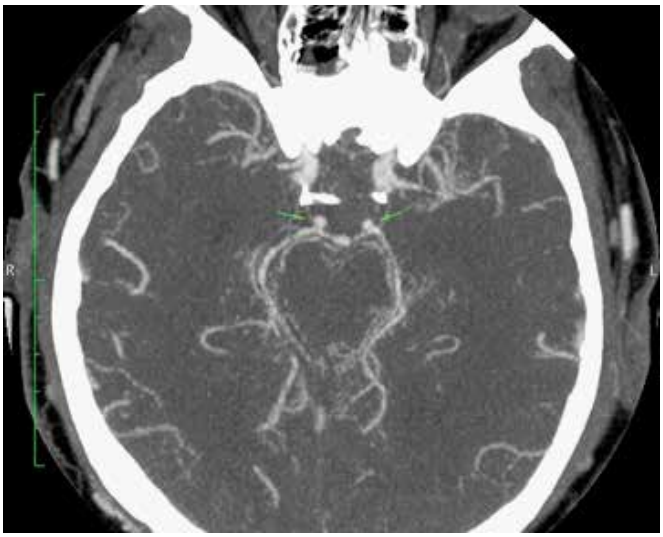

Fig. 3: Computed tomography angiogram of the head demonstrates two small saccular outpouchings (arrows) at the junctions of the P1 and P2 segments of the right- and left-posterior cerebral arteries.

Subsequent DSA confirmed these findings and showed that the left pseudoaneurysm filled from the posterior cerebral artery and the posterior communicating artery (Fig. 4). Minimal filling of the right-sided pseudoaneurysm was demonstrated. There was severe basilar artery and left P1 posterior cerebral artery vasospasm which was treated with intravenous milrinone with good effect. Initially, the CT angiography demonstrated decreased size of the pseudoaneurysms, but subsequent follow-up CT angiography demonstrated an increase in size of the left pseudoaneurysm to 6.7 mm in diameter (Fig. 5). Given the sudden increase in size of the left pseudoaneurysm, the decision was taken to treat it. Endovascular management was decided as post-operative changes might make surgical exploration difficult and potentially hazardous.

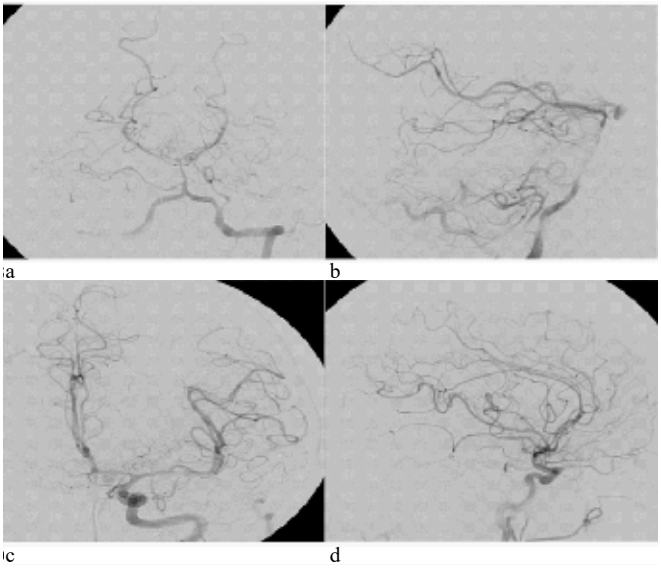

Fig. 4: Left vertebral angiogram anteroposterior and lateral views (a, b) demonstrating a pseudoaneurysm at the P1/P2 junction of the left-posterior cerebral artery. There is significant vasospasm of the basilar artery and the p1 segments of both posterior cerebral arteries. Left common carotid angiogram demonstrating filling of the pseudoaneurysm from the posterior communicating artery.

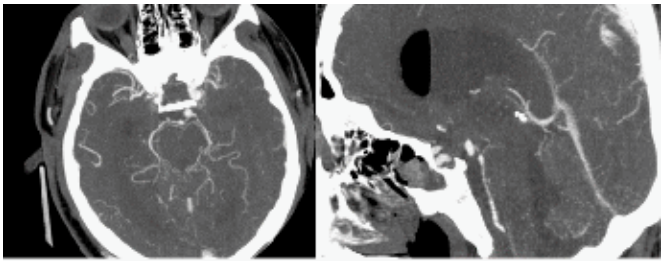

Fig. 5: Computed tomography angiogram demonstrating pseudoaneurysm at the P1/P2 junction of the left-posterior cerebral artery. On the sagittal reconstruction, there is hydrocephalus, with intraventricular air (secondary to recently placed endoventricular drain).

At intervention, a 5 Fr Envoy guide catheter was used to catheterize the left vertebral artery and perform the initial angiogram. An Excelsior SL-10 microcatheter was used along with a Transend soft tip microwire to navigate into the pseudoaneurysm sac at the left P1/P2 junction. The

sac was embolized with 4 Target Ultra 360 coils, ranging from 4 mm × 6 cm to 3 mm × 4 cm. Satisfactory coiling of the sac was achieved with very minimal filling along the lateral periphery of the sac (Fig. 6).

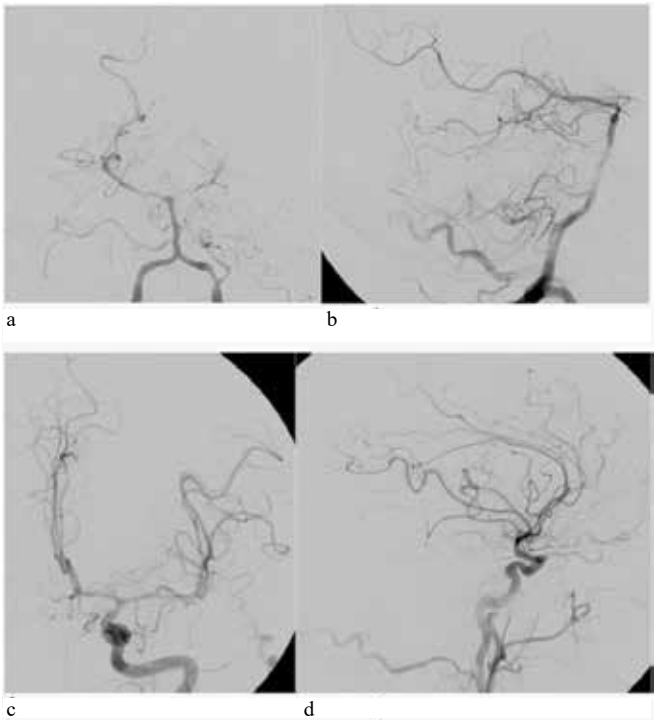

Fig. 6: Post coiling angiogram. Anteroposterior and lateral projections of a left vertebral artery injection (a, b). There is very mild filling laterally within the pseudoaneurysm. A portion of this contrast blush lateral to the coil mass mas believed to be overlapping from the P2 segment of the left-posterior cerebral artery. Anteroposterior and lateral projections of a left common carotid artery injection (c, d) demonstrate no filling from the posterior communicating artery.

Subsequent follow-up angiography demonstrated no interval change in the appearance of the coil mass or contrast filling. The patient improved and was discharged home. On a follow-up angiography 1 month after discharge, further recanalization of the left-sided pseudoaneurysm was demonstrated (Fig. 7). This measured 4 mm × 4 mm. He subsequently underwent endovascular coiling using 7 coils ranging in size from 4 mm × 6 cm to 2 mm × 2 cm. There was obliteration of the recanalized sac on post coil angiography with no complications (Fig. 8). To date, he has demonstrated no further recanalization.

DISCUSSION

Pseudoaneurysms represent contained haematomas, where there is complete disruption of the arterial wall. These are unlike true aneurysms, where portions of the arterial wall (typically the adventitia and media) remain intact. Given the histological morphology of these lesions, there is therefore no discrete neck or true wall. Initially, the 'wall' consists of surrounding clot and adjacent tissues. Over time, a fibrous capsule may form (1). They are associated with a high risk of rupture, and potentially poor outcomes with mortality rates reported as high as 50% (2, 3). Pseudoaneurysms may be fusiform or saccular. It is generally believed that saccular pseudoaneurysms are associated with a higher risk of rupture, but there is no published statistical basis for this (3).

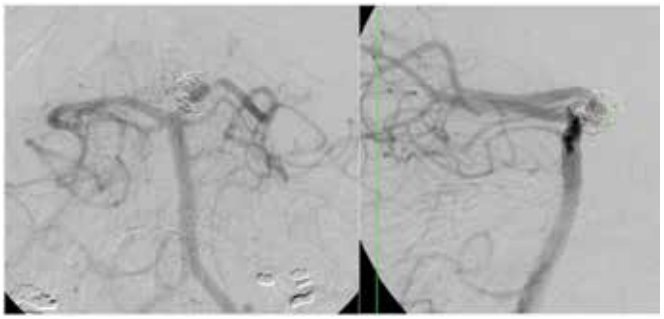

Fig. 7: Angiogram (anteroposterior and lateral projections) 1 month after discharge demonstrating further recanalization of the pseudoaneurysm (arrows).

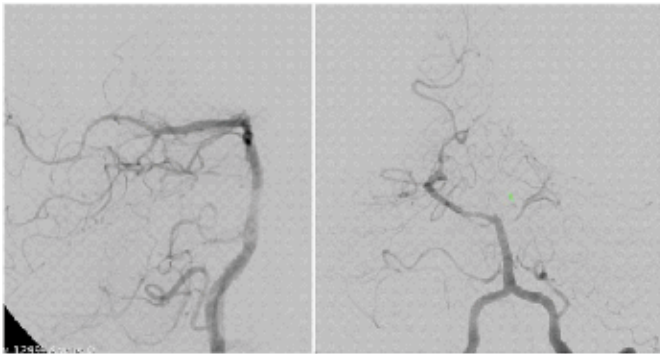

Fig. 8: Angiogram (anteroposterior [AP] and lateral projections) after second embolization demonstrating obliteration of most of the recanalized sac. There is still mild lateral filling best seen on the AP projection (arrows).

Previous reports have described arterial injury occurring during endoscopic transphenoidal resection of pituitary adenomas (4–6). These however described injury to the cavernous segment of the internal carotid artery. In these cases, epistaxis is the typical presentation, which is often delayed. This may be associated with high mortality. As in our case, vascular imaging may initially be negative for arterial injury (6).

Treatment of intracranial pseudoaneurysms may be approached surgically or endovascularly. There is no standard approach to treatment. In pseudoaneurysms within the subarachnoid space, surgical management is considered the ideal treatment. This typically involves

trapping and excision of the aneurysmal segment (2). Other approaches include bypass procedures combined with ligation of the feeding vessels (2, 7). Surgical clipping is not typically an option as there is usually no defined neck (2). Surgical treatment is not without complications. Dissection and retraction to expose the vessel may result in avulsion of the surrounding haematoma, resulting in acute haemorrhage. In some cases, ligation of the common carotid artery is required for control of haemorrhage. This may result in significant neurologic deficits, particularly in the absence of robust collateral circulation. Balloon occlusion testing prior to definitive management of these patients may be advisable.

Endovascular techniques for managing these lesions are varied. Treatment options include endovascular coil occlusion (2, 6). Limitations of endovascular treatment are related primarily to the anatomy of pseudoaneurysms. Without a true wall, there may be absence for support of the coils, which can easily migrate through the surrounding clot. This may result in haemorrhage, which may be difficult to control. In our case, this was a concern, which resulted in conservative coil deployment. Endovascular treatment of iatrogenic pseudoaneurysms in the subarachnoid space using coils has been reported in a very small number of case reports (8, 9), particularly since this entity is a rare event. These reports demonstrate feasibility of this procedure. The use of covered stents has been reported (10, 11). These stents however are used for treating aneurysms on the internal carotid artery, not branch vessels. The use of Onyx has been reported as safe for the treatment of intracranial pseudoaneurysms in a few case series (12). No prospective trials however have been published on the use of any endovascular technique for the treatment of traumatic intracranial pseudoaneurysms. Complex anatomy as well as distal location in the vascular tree may limit access, rendering an endovascular approach unfeasible.

Subarachnoid haemorrhage secondary to iatrogenic intracranial pseudoaneurysms is rare. Endovascular management of this entity seems to be a feasible option but requires further study, particularly for long-term follow-up to determine its durability. Although there are a few reported cases addressing the endovascular approach, this is the first reported case to our knowledge specifically describing endovascular coil occlusion of an intracranial pseudoaneurysm within the subarachnoid space located at the attachment of the posterior communicating artery and the posterior cerebral artery.

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