

CASE REPORT

Cervical–petrous internal carotid artery pseudoaneurysm presenting with otorrhagia treated with endovascular techniques

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SUMMARY

Cervical–petrous internal carotid artery (CP-ICA) pseudoaneurysms are rare and have different etiologies, presentations, and treatment options. A middle-aged patient with a history of chronic otitis media presented with acute otorrhagia and was found to have a left-sided CP-ICA pseudoaneurysm. The patient was a poor surgical candidate with difficult arterial access. The pseudoaneurysm was treated with stand-alone coiling via a left brachial approach with persistent contrast filling seen only in the aneurysm neck at the end of the procedure. The patient re-presented 12 days later with repeat hemorrhage and rapid enlargement of the neck remnant, and was treated with a covered stent via a transcervical common carotid artery cut-down. A covered stent may provide a more definitive treatment for CP-ICA pseudoaneurysms compared with standalone coiling.

BACKGROUND

Cervical–petrous internal carotid artery (CP-ICA) aneurysms are rare, and only a small number of cases have been reported.^{1–25} CP-ICA aneurysms have a number of etiologies, a variety of presentations, and are amenable to a number of surgical and endovascular treatments. Herein we report a case of a CP-ICA aneurysm presenting with otorrhagia treated with two endovascular techniques.

CASE PRESENTATION

A middle-aged patient with a history of end stage renal failure, atrial fibrillation, and chronic otitis media presented with bleeding from the left ear. The patient had experienced a similar episode 1 week prior that stopped spontaneously. The patient had a history of chronic otitis media without cholesteatoma, and had undergone tympanoplasty surgery 9 years earlier, but had persistent episodic drainage and severe sensorineural hearing loss despite the surgery. A CT scan of the head demonstrated evidence of chronic erosion of the left petrous temporal bone (figure 1). The current episode was controlled with external packing and reversal of warfarin and aspirin.

TREATMENT

Given the concern for a vascular lesion, the patient was taken directly for conventional angiography. Access was obtained via the left brachial artery as the patient could not straighten either leg and had



Figure 1 CT of the head, axial view. Chronic infection/inflammation of the left petrous temporal bone (arrow).

an arteriovenous fistula in the right arm. A 5 F Simmons 2 Glidcath (Terumo, Somerset, New Jersey, USA) was used to obtain access to the left common carotid artery (CCA) (figure 2). Injection

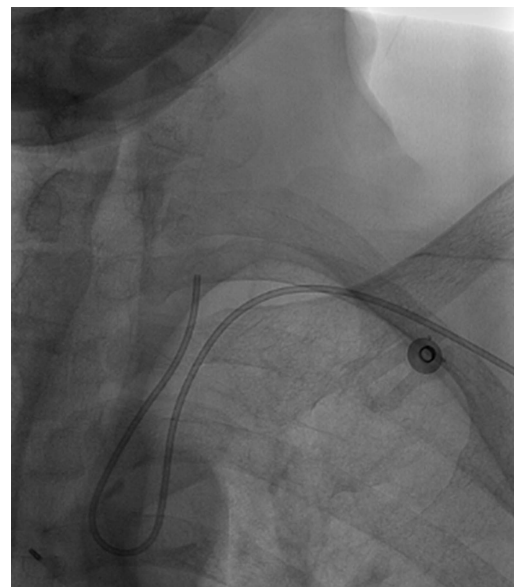


Figure 2 Angiogram, unsubtracted view. Left brachial approach to the left common carotid artery with Simmons II catheter.



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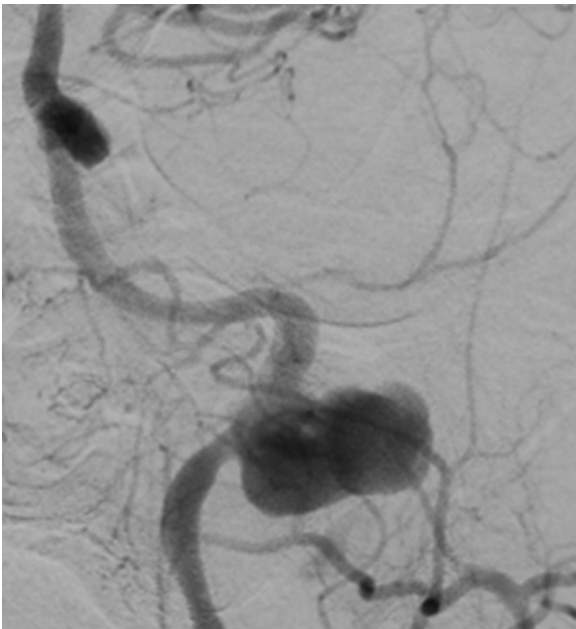


Figure 3 Angiogram, left common carotid artery injection, anteroposterior view. Left cervical–petrous internal carotid artery pseudoaneurysm projecting laterally.

of the left CCA revealed a left CP-ICA pseudoaneurysm measuring approximately 17×10 mm (figure 3).

The decision was made to proceed with standalone coiling. Through a 6 F Simmons 1 guide catheter (Cordis, Bridgewater, New Jersey, USA), a 2.6 F J-tipped PX Slim microcatheter (Penumbra, Alameda, California, USA) with a 0.014 inch Synchro² Standard microwire (Boston Scientific, Natick, Massachusetts, USA) was used to obtain access to the aneurysm, which was coiled with seven 0.0200 inch PC 400 coils (Penumbra), achieving a packing density of 21.16% with only residual filling in the aneurysm neck (figure 4). The patient did

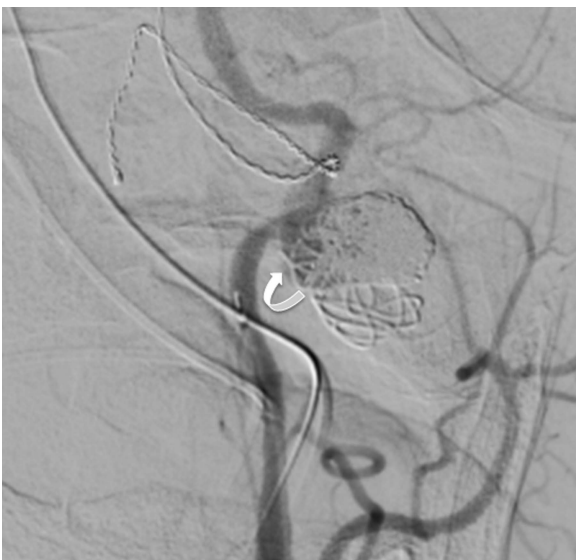


Figure 4 Angiogram, left common carotid artery injection, anteroposterior view. Status post coil embolization of the pseudoaneurysm with only contrast filling in the aneurysm neck at the end of the procedure (arrow).

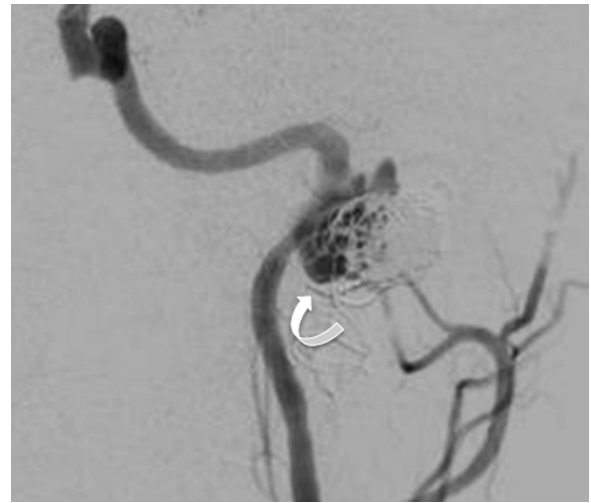


Figure 5 Angiogram, left common carotid artery injection, anteroposterior view. Coil compaction with increased contrast filling in the aneurysm neck and proximal dome (arrow).

well postoperatively and was discharged home 6 days after the procedure.

The patient presented 12 days after discharge with another episode of bleeding from the left ear, which occurred following hemodialysis and ceased without intervention. The patient was taken to the angiography suite for further investigation. Following induction of anesthesia and intubation, the patient experienced a hypertensive episode associated with a significant hemorrhage from the left ear that was controlled with external packing. Anticipating that a stent would not be easily positioned using the previous approach, access to the left CCA was obtained by an emergent transcervical cut-down. A sheath was inserted, and the initial angiograms demonstrated compaction of the coil mass and increased filling of the proximal pseudoaneurysm sac without extravasation (figure 5).

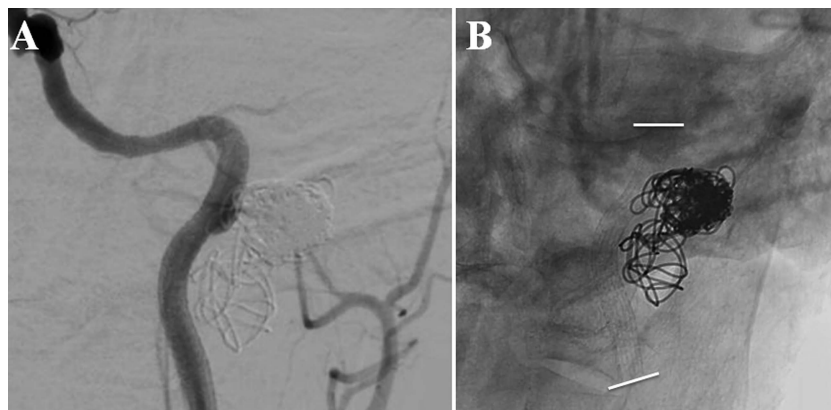
A 6×50 mm Viabahn Endoprosthesis (Gore) covered stent was deployed and followed by angioplasty to 5 mm to ensure adequate apposition to the vessel wall and the pseudoaneurysm defect. Final angiograms demonstrated exclusion of the pseudoaneurysm from the circulation (figure 6) and no evidence of distal thromboembolic complications. Perioperative antibiotics were given. The patient was immediately started on aspirin and Plavix, had an uneventful postoperative course, and was discharged 4 days later.

DISCUSSION

CP-ICA aneurysms have a number of different etiologies. Many of these aneurysms are pseudoaneurysms that arise as a result of trauma,^{2 9 21} iatrogenic injury,^{10 15 16 22 23} infection,^{7 19} radiation,^{8 11 22 25} or genetic abnormalities, such as fibromuscular dysplasia¹⁴ and Ehlers–Danlos syndrome.²⁴ In our case, chronic otitis media is a possible etiology with progressive erosion into the left ICA, although we cannot rule out iatrogenic injury given a history of tympanoplasty.

CP-ICA aneurysms can present in a variety of different ways, including headache, cranial neuropathies,^{1 20 23} Horner syndrome,²⁰ transient ischemic attack,⁴ pulsatile tinnitus,¹³ hearing loss,^{6 13} epistaxis,^{3 4 8 11 13 15 22} and otorrhagia.^{4 6–8 10 15 19 25} They may also be asymptomatic. A single case of both subarachnoid hemorrhage and epistaxis secondary to a ruptured petrous ICA aneurysm was reported.²² Occasionally the bleeding

Figure 6 (A) Angiogram, left common carotid artery injection, anteroposterior view. Status post placement of a covered stent with reconstruction of the vessel wall and no aneurysm filling. (B) Unsubtracted view demonstrating stent (delineated by white lines).



(whether it be epistaxis, otorrhagia, or subarachnoid hemorrhage) associated with a ruptured CP-ICA pseudoaneurysm can be life threatening, as occurred during our patient's second admission.

A number of different surgical and endovascular techniques have been used to treat CP-ICA aneurysms. Traditional surgical clipping of petrous aneurysms has not been greatly utilized due to the difficult location within the petrous bone. Surgical or endovascular ICA occlusion is an option if the patient passes a balloon test occlusion (BTO) or in the setting of life threatening hemorrhage when all other methods have failed.^{2 25} Surgical bypass has been used in conjunction with surgical or endovascular entrapment.^{1 6 17 19 22} Surgical excision of a cervical ICA aneurysm with end to end anastomosis has also been performed.⁵ Endovascular techniques have included balloon embolization,^{3 6} coil embolization,^{7 8 20} stand-alone stenting (typically with a covered stent),^{8–11 14 21 23} stent-assisted coiling,²⁶ and flow diversion.^{27–29} The bleeding²⁷ and thromboembolic complication²⁹ rate may be higher with flow diversion.

In our case, an endovascular approach was favored given that the patient was an extremely poor surgical candidate. The first procedure was technically challenging through a left brachial approach. The Simmons catheters offered a method for accessing the left CCA from the left subclavian artery (although this was still difficult). This approach facilitated standalone coiling but did not provide the support for a covered stent or a flow diverting stent. A BTO was contemplated during the first procedure but was not attempted given the anticipated difficulty of maneuvering a diagnostic catheter to the appropriate vessels in addition to the fact that the patient was under general anesthesia and could not be assessed neurologically. Given the great difficulty with arterial access and navigating through the great vessels during the first procedure, a transcervical approach was utilized in the second procedure. Had a BTO plus carotid sacrifice been an option, it likely would have been the safer approach given the risks of a carotid cut-down and covered stent placement in this particular patient.

Although the previous cases of stand-alone coiling did not report treatment failure, we experienced rapid coil compaction, aneurysm enlargement, and re-rupture. We initially chose not to aggressively pack the neck of the pseudoaneurysm with coils in an attempt to avoid ICA obstruction and thromboembolic complications. It is possible that the weakened pseudoaneurysm wall allowed for rapid enlargement and re-rupture of this neck remnant. This case would suggest that a covered stent may provide a more definitive treatment for CP-ICA pseudoaneurysms. It should be noted that treatment of infected pseudoaneurysms with covered stents carries a risk of infectious

complications,³⁰ but has been safe in our experience.³¹ This risk was deemed acceptable given the emergent circumstances and lack of other, better treatment options.

Learning points

- ▶ Cervical–petrous internal carotid artery (ICA) pseudoaneurysms are rare lesions that have a variety of etiologies, presentations, and treatments.
- ▶ A high degree of suspicion is necessary for patients presenting with otorrhagia.
- ▶ Coil embolization is not an unreasonable option if the ICA is not narrowed, but this case would suggest that the aneurysm neck should be completely occluded in addition to the dome.
- ▶ Complete exclusion of the pseudoaneurysm with a covered stent, however, may be a more definitive treatment.

Competing interests AKP is a consultant to Penumbra and this had no influence on the case report.

Patient consent None.

Provenance and peer review Not commissioned; externally peer reviewed.

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