Pseudoaneurysm Trapping and Reanastomosis of the Posterior Inferior Cerebellar Artery After Prior Microvascular Decompressions for Hemifacial Spasm

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BACKGROUND AND IMPORTANCE: Posterior inferior cerebellar artery (PICA) aneurysms are uncommon, and PICA pseudoaneurysms are even rarer. Endovascular treatment options exist for such lesions but usually require arterial sacrifice. This case report describes the successful treatment of a PICA pseudoaneurysm by trapping and end-to-end PICA reanastomosis.

CLINICAL PRESENTATION: A 70-yr-old woman with a history of multiple microvascular decompressions for hemifacial spasm presented with new-onset facial droop caused by an enlarging, unruptured left PICA pseudoaneurysm. It was treated with trapping and end-to-end PICA reanastomosis, which is the first reported case of this technique for a PICA pseudoaneurysm. The bypass was patent, the pseudoaneurysm occluded, and the patient recovered well from her surgery.

CONCLUSION: Pseudoaneurysm formation and growth after microvascular decompression is unusual. Albeit a deep and challenging bypass, trapping and an end-to-end PICA reanastomosis excluded the pseudoaneurysm, prevented further growth and/or rupture, and alleviated the patient’s compressive symptoms.

KEY WORDS: Aneurysm, Bypass, Irregular, PICA, Pseudoaneurysm, Unruptured

Pseudoaneurysms, or false aneurysms, are the result of blood collecting between layers of the arterial wall. With true aneurysms, all layers of the wall are incorporated in an outpouching.1 Pseudoaneurysms most commonly arise following a percutaneous procedure that traumatizes the vessel.1 Posterior inferior cerebellar artery (PICA) aneurysms are rare intracranial lesions that most commonly involve the proximal segment of the PICA near its origin from the vertebral artery.2 The few cases of PICA pseudoaneurysms described in the literature are mostly along the distal portion of the parent artery.3-8 Here, we applied the reanastomosis technique to treat an unusual unruptured PICA pseudoaneurysm that developed after multiple prior microvascular decompressions for hemifacial spasm.

The St. Joseph’s Hospital and Medical Center Institutional Review Board for Human Research approved the research study, and informed consent was waived.

CLINICAL PRESENTATION

A 70-yr-old woman with a history of multiple left microvascular decompressions for hemifacial spasm at an outside hospital presented with new-onset left facial droop (House-Brackmann 4). She was found to have a mass in her cerebellopontine angle suspicious for a cavernous malformation on magnetic resonance imaging (Figure 1). However, an iatrogenic left PICA pseudoaneurysm was found on computed tomography angiogram
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Preoperative axial magnetic resonance imaging revealing mass in the cerebellopontine angle (arrow) suspicious for a cavernous malformation. Used with permission from Barrow Neurological Institute, Phoenix, Arizona.

FIGURE 1.

Preoperative sagittal CTA with the arrow pointing at the left PICA pseudoaneurysm. Used with permission from Barrow Neurological Institute, Phoenix, Arizona.

FIGURE 2.

Preoperative digital subtraction angiography 3-dimensional reconstruction with a distal left PICA pseudoaneurysm (arrowhead) coming off of the left vertebral artery (arrow). Used with permission from Barrow Neurological Institute, Phoenix, Arizona.

FIGURE 3.

CTA (Figure 2) and confirmed on digital subtraction angiography (Figure 3). This broad-based, irregularly shaped proximal left PICA aneurysm measured $4.8 \times 4.2 \times 3.4$ mm with a 3.26 mm neck.

The patient was then taken to surgery for definitive treatment of the pseudoaneurysm (Figure 4). Through an extended retrosigmoid approach, the pseudoaneurysm was identified, and 2 clips were used to occlude the inflow and outflow arteries and trap the aneurysm. A temporary clip was placed on the proximal stump of the PICA, and the artery was transected. The distal PICA segment was transected from the pseudoaneurysm and mobilized to the proximal stump. The 2 ends were then approximated using 10-0 sutures, and an end-to-end reanastomosis was completed using a running continuous suture technique. The temporary clips were then removed, and patency of the Anastomosis was confirmed using indocyanine green (see operative video). The aneurysm was incised and its contents were evacuated to decompress the seventh and eighth nerve bundles. The aneurysm had been coated with polytetrafluoroethylene from the prior microvascular decompressions, and this material, along with granulomatous tissue, was partially removed. Aggressive aneurysm resection was not performed because, with extensive scarring from prior surgeries, it risked injury to the facial nerve.

The patient experienced some hoarseness, dysphagia, and mild facial weakness postoperatively. Postoperative CTA showed patency of the bypass with no residual aneurysm (Figure 5). The patient initiated a regimen of daily aspirin and was discharged to an acute rehabilitation facility. The patient’s lower cranial nerve
dysfunction and facial nerve dysfunction were temporary, and she was discharged from the rehabilitation facility after 4 wk without deficit.

**DISCUSSION**

PICA aneurysms account for less than 5% of all intracranial aneurysms, and various surgical techniques to treat these challenging aneurysms have been described. PICA pseudoaneurysms are even less common and are typically associated with arterial trauma. An enlarging PICA pseudoaneurysm can compress adjacent nerves and cause nerve injury or infarction. Treatment options in asymptomatic patients include observation, endovascular therapy, or open surgical management. Symptomatic patients require treatment, either endovascular or microsurgical, to alleviate deficits or keep them from progressing.

The optimal treatment for PICA pseudoaneurysms is unclear given the rarity of these lesions. Conventional clipping is not an option because these pseudoaneurysms lack a neck, and the pathology usually involves the entire segment of the artery. An

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**FIGURE 4.** Intraoperative microscopic images. A, PICA pseudoaneurysm is identified. B, Clips are placed, and the distal PICA is excised. C, The distal PICA is reanastomosed to the proximal PICA stump. D, The pseudoaneurysm is opened and decompressed. Abbreviations: a., artery; CN, cranial nerve; n., nerve; PICA, posterior inferior cerebellar artery. Used with permission from Barrow Neurological Institute, Phoenix, Arizona.
in situ bypass with a side-to-side anastomosis was described by Dehdashti\(^8\) for a pseudoaneurysm with a good result. To the best of our knowledge, ours is the first description of end-to-end PICA reanastomosis after pseudoaneurysm trapping. Reanastomosis was possible in this case because the transected ends of the artery were in close proximity and the gap between them was easily bridged. The loop of the medullary rootlets can be pronounced, creating redundant arterial length that allows the transected ends of the parent PICA to rejoin. The inflow artery was coursing superiorly into the aneurysm, and the outflow artery was coursing inferiorly from the aneurysm, with both arteries medial to the vagus and glossopharyngeal nerves. The aneurysm was located more superiorly with its dome projecting into the facial nerve and was causing the presenting symptoms. The proximal stump rotated nicely to align with the distal stump for easy reanastomosis. Other bypass options are certainly available, including an occipital artery-to-PICA bypass or end-to-side reimplantation of one stump onto the other, as well as a PICA-PICA bypass, which ultimately places additional vascular territories at risk and was suboptimal in the present case. Additionally, aggressive excision and removal of the inflammatory aneurysmal mass from the closely adherent facial nerve was not performed because to do so would increase the risk of a severe permanent facial deficit. This report is limited to a single case, and recommendations about the best bypass option or about pseudoaneurysm treatment cannot be made.

This is a rare clinical presentation for a PICA pseudoaneurysm. We were unable to retrieve earlier imaging studies for comparison. Thus, it remains unclear whether this pseudoaneurysm was present at the time of the earlier microvascular decompressions and wrapped as part of those procedures, or whether this pseudoaneurysm might have been caused by arterial injury during these multiple prior interventions. The polytetrafluoroethylene material and granulomatous reaction were impressive and unexpected. If wrapping of the dome was performed previously to prevent aneurysm growth and symptom progression, this was clearly insufficient.

**CONCLUSION**

PICA pseudoaneurysms are rare lesions that can enlarge to cause compressive deficits or hemorrhage. End-to-end PICA reanastomosis in the present case excluded the pseudoaneurysm and eliminated its compressive effects on the facial nerve, as demonstrated by the patient’s good radiographic and clinical outcomes. Trapping and bypass with cranial nerve VII decompression was an effective management strategy in this case. Aggressive aneurysm resection was not needed and, with extensive scarring from prior surgeries, risked injury to the facial nerve.

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**COMMENTS**

The authors discuss a case of posterior inferior cerebellar artery pseudoaneurysm formation in a patient who had a long history of microvascular decompression for hemi-facial spasm. The case is very rare and interesting. I applaud the authors on their technique, skill and approach to this challenging problem. For this case given the need for decompression of the facial nerve and the fact that there is common AICA-PICA on this side there are clear reasons for not choosing a PICA-PICA bypass approach. It is again important to stress that this inflammatory aneurysmal mass should not be excised and removed from the closely adherent 7th nerve as that would increase the chance of a permanent facial nerve palsy.

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