

Flow Diversion in the Setting of Primitive Persistent Trigeminal Artery Aneurysm

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Abstract:

Persistent primitive trigeminal arteries are an embryological remnant commonly associated with vascular abnormalities. We safely treated an aneurysm arising from this anatomical variant using flow diverting stents. Due to the rarity of these lesions, literature regarding the safety and efficacy of endovascular treatment options are limited.

Keywords: Aneurysm; Flow Diversion; Primitive Persistent Trigeminal Artery; Trigeminal Neuralgia

Introduction

Persistent primitive trigeminal arteries (PPTA) are the most common embryologic remnant of the cerebrovascular tree. This anatomical variant occurs with an estimated incidence of 0.1-1% [1]. PPTAs are associated with several vascular anomalies – namely saccular aneurysms – with a prevalence of 14-32% [1,2].

Given the rarity of this embryological remnant, limited data exists on endovascular options for the management of associated vascular lesions. Due to its anatomical course, lesions associated with a PPTA can compress the branches of the trigeminal nerve, with patients developing symptoms of trigeminal neuralgia [2].

Case Presentation

A 54-year-old woman presented with right-sided facial pain consistent with trigeminal neuralgia and a sixth nerve palsy. She was otherwise neurologically intact and without further evidence of symptomatic cranial nerve impingement, though she did complain of progressive headaches over several months. Imaging revealed a PPTA and an unruptured 12 mm aneurysm at the bifurcation of the cavernous internal carotid artery and the PPTA, compressing the trigeminal nerve (Figure 1A-B).

In this case, flow diversion was deemed an appropriate option as the proximal basilar artery adequately supplied the distal basilar artery, posterior cerebral arteries, and superior cerebellar arteries. This was confirmed using a balloon test occlusion (Figure 2). Flow diversion was subsequently achieved by placing a Pipeline Flex stent (Medtronic; Minneapolis, MN) across the origin of the aneurysm in the internal carotid artery. Cerebral angiogram at 5-months demonstrated no residual aneurysm and complete resolution of

headaches, facial pain, and diplopia (Figure 1C-D).

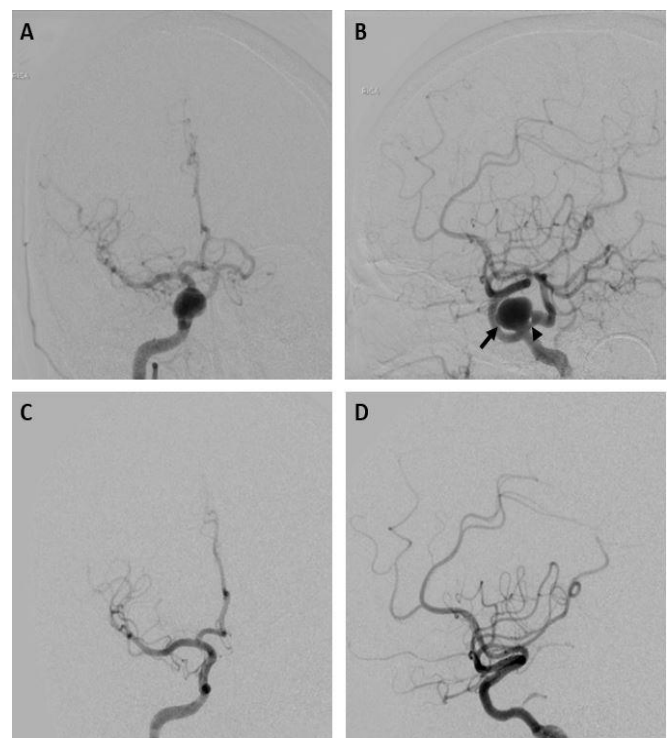


Figure 1: AP (A) and lateral (B) digital subtraction angiography with right ICA injection demonstrating a 12 mm aneurysm (arrow) arising from the cavernous ICA at the origin of the PPTA (arrowhead). The same views are shown 5 months after FD stent placement (C-D) with resolution of the aneurysm.



Figure 2: AP view digital subtraction angiography from left vertebral artery injection (A) before and (B) after endovascular treatment, with adequate supply to the vertebrobasilar circulation after FD placement over the PPTA.

Discussion

There is minimal literature investigating flow diverting stents as a management option in this scenario due to the risk of PPTA occlusion. Given the rarity of these lesions, data regarding endovascular management in this situation is uncommonly reported [3,4].

Of the carotid-to-vertebrobasilar anastomoses, the PPTA is the most common. These are usually found incidentally but can rarely present with cranial neuropathies due to the intimate nature of the cranial nerves to the vertebrobasilar system [5]. Recognizing the presence of a PPTA on pre-treatment imaging – especially if associated with a vascular pathology – is key, as the artery may supply delicate posterior fossa and brainstem structures. Occlusion can result in ischemia in these territories.

Coiling has been proposed, though we felt this would increase the risk of a pontine stroke as PPTAs often supply perforating arteries to the pons [6,7]. In this case, flow diversion was felt to be safe as the proximal basilar artery adequately supplied the remainder of the posterior circulation, as confirmed both radiographically and by balloon test occlusion.

Conclusion

This report provides further evidence that flow diversion is an effective alternative endovascular management technique for trigeminal neuralgia caused by compression by an unruptured aneurysm involving a PPTA.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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