

Aneurysmal Subarachnoid Hemorrhage In a Patient with a Fenestration of the Posterior Communicating Artery and Multiple Associated Intracranial Aneurysms: Case Report, Literature Review and Operative Management

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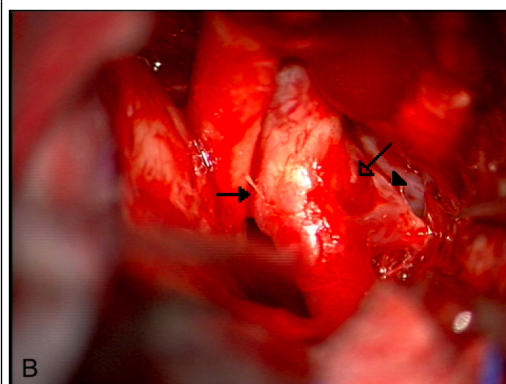
Introduction

Fenestrations of the posterior communicating artery (PCoA) are extremely rare. Fenestrations are a true developmental malformation and arise from the incomplete fusion of the primitive vessels present during embryonic development. Fenestration-associated aneurysms most commonly occur at the proximal bifurcation, secondary to a weakening of the medial or muscularis layer. More rarely, aneurysms have also been reported at the distal confluence of the two limbs of the fenestration. The combination of such a proximal defect with local hemodynamic forces places this region at risk for aneurysmal formation (4).

Methods

We describe a 52-year-old female who presented with a subarachnoid hemorrhage secondary to a ruptured saccular aneurysm at the proximal limb of a fenestrated right PCoA. A literature search was performed for PCoA fenestrations and associated proximal aneurysms. We then analyzed Padgett's embryological sections during intracerebral vascular development to better understand the mechanism for such fenestration formation (2).

Intraoperative View of Fenestration with PCoA



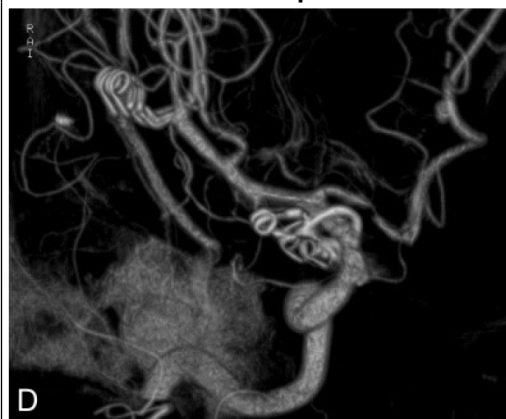
Arrow-ICA, Arrowhead-Fenestration, Open Arrow-Aneurysm

Fenestration



3D reconstruction illustrating the right PCoA (arrow head) and proximal aneurysm (arrow).

Post Op



CT Angiogram



Characteristics in four cases of documented PCoA fenestrations

Author (Year)	Age (yrs)/Sex	Side	Associated aneurysm	SAH	Distal/proximal aneurysm with respect to fenestration	Other intracranial aneurysms
Yasargil (1984)	NA	Rt	+	-	Proximal	NA
Tripathi et al (2003)	21/M	Rt	-	-	NA	-
Babe et al (2010)	62/M	Lt	+	-	Proximal	-
Weiner and Friedlander (Current Case)	52/F	Rt	+	+	Proximal	+

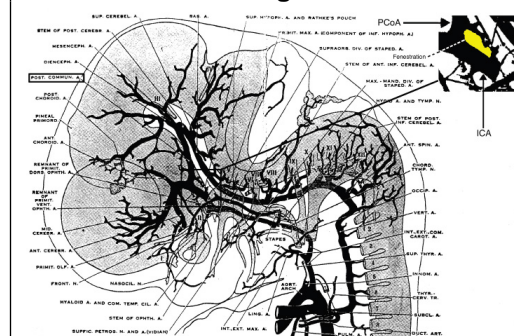
Results

Fenestrations of the PCoA are uncommon and have only been documented three other times in the literature (1,3,5). PCoA fenestrations are rare among the fenestrations of the anterior circulation, and of the three cases documented only two were associated with an aneurysm and none of them actually ruptured. In this particular case, it was the PCoA aneurysm that ruptured, and securing of the aneurysm was required.

Conclusions

The association between fenestrations and aneurysmal formation is not uncommon, but deciding whether such aneurysms are more prone to rupture than their counterparts lacking a fenestration remains controversial. By stage 4 (12-14mm embryo size) of Padgett's embryological study of the intracerebral vasculature, the anterior and posterior choroidal arteries, as well the basilar and vertebral arteries and associated branches are clearly delineated. It appears that it may be the persistence of the trigeminal artery in the form of a prominent carotidobasilar anastomosis that results in a small PCoA near the junction with the basilar artery that leads to such a fenestration.

Padgett



Padgett's illustration of the cranial arteries of an 18mm. embryo depicting a fenestration of the PCoA (box). (Illustrations are printed with permission from the Carnegie Institute).

Learning Objectives

It is unknown whether the incidence of rupture is higher for aneurysms without associated fenestrations, but management of these vascular anomalies must be equally as aggressive.

References

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