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Fenestration of P1 Segment of Right Posterior Cerebral Artery and Fetal Origin of Right PCA.

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ABSTRACT

Fenestration of P1 segment of right posterior cerebral artery (PCA) and fetal origin of right PCA is an extremely rare variation of cerebral arteries. We encountered and examined a case of a 30-year-old woman with complains of persistent headache, showing variations in right PCA, more particularly fenestration of the P1 segment of right PCA using 3D magnetic resonance angiogram. The purpose of this study is to understand one of the possible reasons for persistent and/or intermittent headaches, as well as establishing 3D magnetic resonance angiography as a reliable diagnosis tool for imaging anatomical variations of arteries.

Keywords: Fenestration, right Posterior Cerebral Artery (PCA), P1 segment, Fetal origin

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INTRODUCTION

Fenestration refers to segmental duplication of the intracranial arteries. They may be contrasted to arterial duplication, which consists of two distinct vessels with separate origins and no downstream convergence. They are rare anomalies, felt to result from incomplete fusion of primitive embryologic vessels. "Fenestration is the luminal division of the vessel into two separate and parallel channels which rejoin distally" [1]. Each channel has distinct endothelial and muscularis layers, may be differently sized, and may share adventitial layer depending on degree of embryological fusion. Although a fenestration is usually of considered to be of minimal significance, there is an association with aneurysm formation near proximal part of fenestration. This is hypothesized to be secondary to focal defects in media layer near sites of channel divergence/convergence.

Posterior cerebral arteries are the terminal branches of the basilar artery, which has four segments. P1 (precommunicating) segment joins the posterior communicating artery (PCoA) to become the P2 (ambient) segment, and then P3 (quadrigeminal) segment. The P4 segment is a terminal segment, and includes occipital and inferior temporal branch. There is reciprocity in caliber of precommunicating P1 segments of PCA and PCoA: at one extreme is the so called Fetal origin of PCA. Here, the P1 segments may be hypoplastic and even invisible on vertebral angiography. PCA and P1 segments gives of thalamoperforating arteries and thalamogeniculate arteries, which enter the posterior perforated substance.

The posterior cerebral artery has been noted in literature to have anatomical variations, specifically fenestration. Cerebral arteries with fenestrations are uncommon especially when associated with vascular pathologies [2-7].

MATERIAL AND METHODS

We examined a 30-year-old women with complain of persistent headache for over four day with medication having provided no relief to the patient. 3D TOF MR Angiography technique for Circle of Willis was adopted for data acquisition along with Coronal 2D time of flight sequence for MR Venography.

RESULTS

MRA clippings indicated fenestration of P1 segment of right PCA. Fetal origin of right PCA was also noted. Intracranial portion of the internal carotid artery and its bifurcation was observed to be normal on either side. Proximal portion of anterior cerebral artery and middle cerebral artery on both sides were normal. Basilar artery and left PCA also appeared to be normal. We did not find PCA aneurysm originating from fenestration, as well as from PCA without fenestration.

DISCUSSION

Fenestrations are the result of partial failure of fusion of paired primitive embryologic vessels or incomplete obliteration of different anastamosis. Fenestration of P1 segment of PCA is of particular importance for neuro-intervention. Fenestrations are more frequent in anterior cerebral arteries than posterior cerebral vessels.

Patients with TIA or infarct in the territory of PCA most probably will have fetal origin of PCA along with the internal cerebral artery stenoses.

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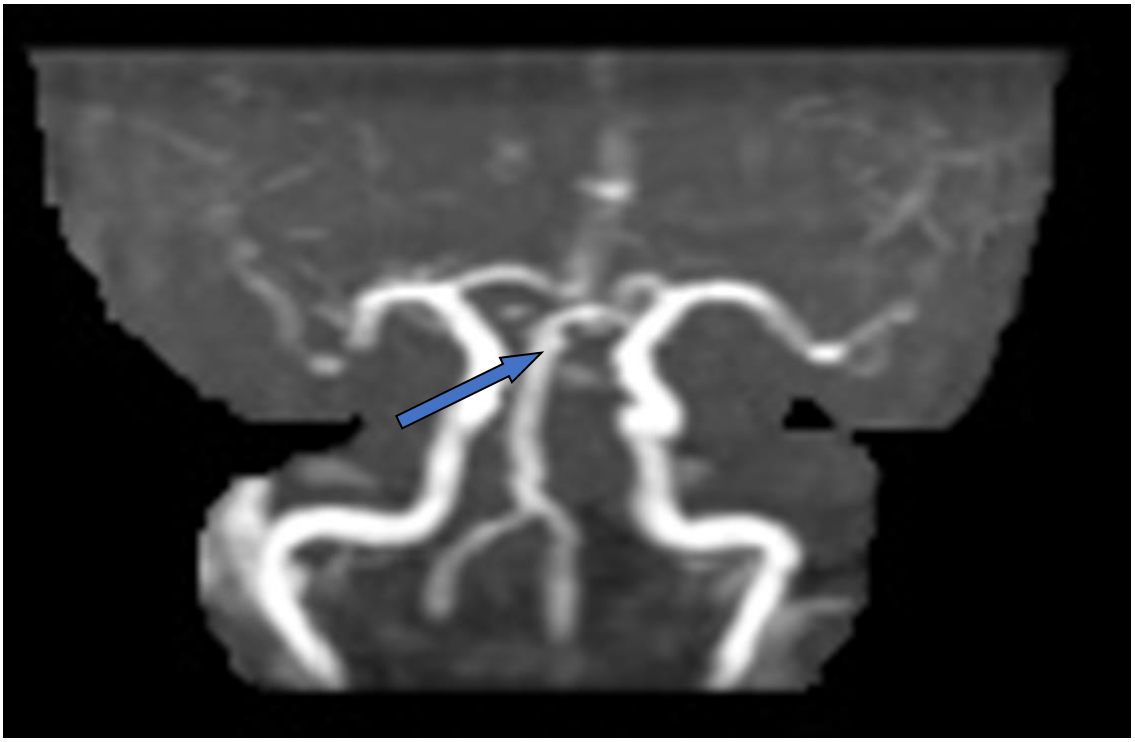

Figure 1: The arrow points to the fetal origin of right PCA

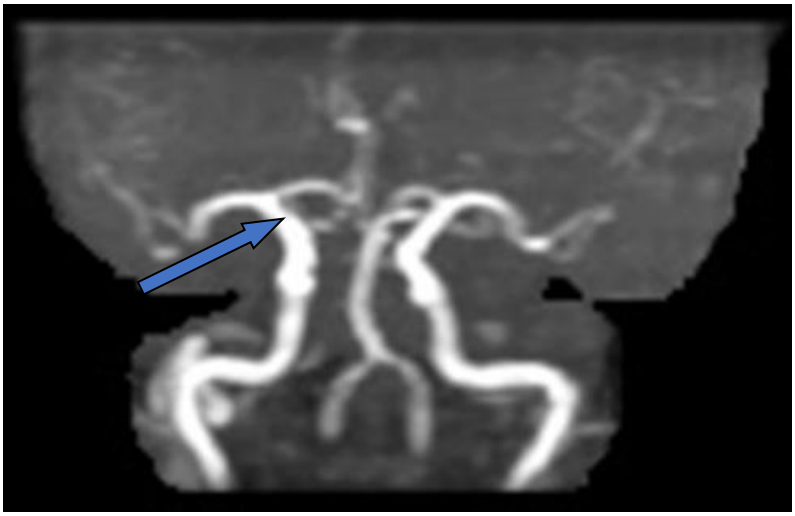

Figure 2: The arrow points to the fenestration of P1 segment of right PCA

CONCLUSION

The present case report provides a variation of PCA regarding fenestration within the P1 branch and fetal origin of right PCA. PCA morphology, symmetry and branching pattern helped us to figure out the variation and provided an example of a well identified fenestration in P1 segment of right PCA with MRA. Identifying the anatomical variation with appropriate imaging is of particular importance in neuro-interventional procedures and especially in early diagnosis and treatment of stroke.

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