

Fenestration of Proximal Segment of the Basilar Artery

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Abstract:

Basilar artery (BA) fenestrations are the most frequently observed variant of the cerebral arteries. During routine dissections for medical students we found fenestration at the proximal basilar trunk. The fenestration in our report was not associated with aneurysms and collateral branches. The window was measured 10 mm long. The left limb of the fenestration had a transverse diameter of 6 mm. The right limb had a lesser transverse diameter of 1.8 mm. Variations and fenestration of basilar artery influences occurrence of atherosclerosis and aneurysms, and is also important during cerebrovascular surgery and interventional neuroradiology at the basilar bifurcation, interpeduncular fossa and clivus.

Key words: fenestration, basilar artery, aneurysms,

INTRODUCTION:

The posterior circulation of the brain constitutes the vertebrobasilar system and its branches, are responsible for about 30% of the brain's blood supply. The right and left vertebral arteries normally join with each other forming the basilar artery at the level of the pontomedullary junction [1,2]. The basilar artery is the major artery of the posterior circulation of the brain which supplies cerebellum, pons, upper medulla oblongata, pineal body, superior medullary velum and tela chorioidea of the third ventricle, internal ear, uncus, parahippocampal gyrus, medial and lateral occipitotemporal gyrus, cuneus and precuneus, visual areas of the cerebral cortex and other structures in the visual pathway, subcortical structures, peduncle and the posterior thalamus, superior and inferior colliculi and medial geniculate body [3]. Duplication of the basilar artery can result from a failure of the fusion of these embryonic precursors. Both lumens of the fenestrated segments are lined by endothelial tissue and are separated by a tunica media, but they can share a common tunica adventitia [4].

CASE REPORT:

During routine dissection classes for medical undergraduates, vascular anomalies were noted at the base of the brain. We found fenestrated basilar artery at its formation at the pontomedullary junction. The fenestration in our report was not associated with aneurysms. No collateral branches originated from the two limbs of the fenestration. The window measured 10 mm long. The left limb of the fenestration had a transverse diameter of 6 mm. The right limb had a lesser transverse diameter of 1.8 mm. The basilar artery is the major artery to complete the posterior part of the circle of Willis. Many variations are seen in the basilar artery, majority of them in position, origin and shape of the artery. Literature on basilar artery describes various anomalies and morphological changes in its course. A fenestration or duplication is defined as a single artery with two luminal channels, which may or may not share their adventitial layer [5]. Fenestration can occur anywhere along the course of the basilar artery, but the most frequent site of basilar artery fenestration is in the proximal portion of the basilar trunk, close to the junction of the vertebral arteries. However, the distal segment of the

basilar artery is rarely affected. Duplicated basilar arteries are classified according their length as small (0–3 mm), medium (3.1–5 mm), and large (> 5.1 mm) [6].

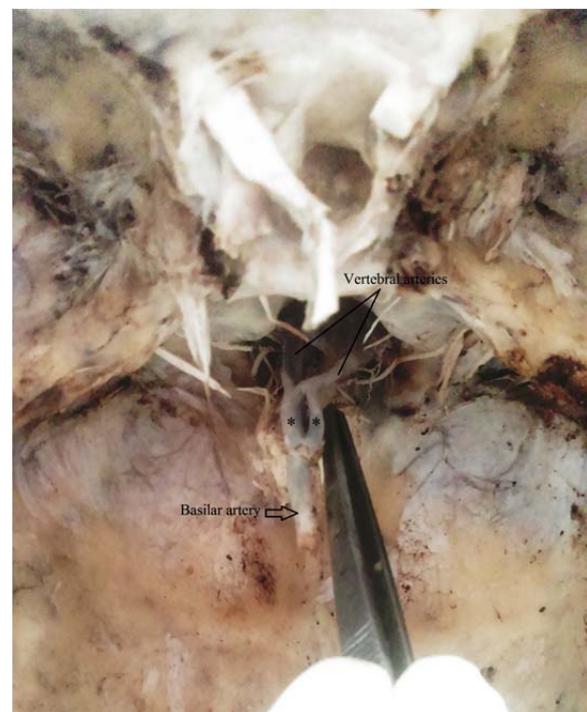


Fig. 1: showing fenestration of basilar artery

DISCUSSION:

The occurrence of fenestration can be explained on the basis of embryological development. During the development of the intracranial arteries, two bilateral, longitudinal vascular channels differentiate along the ventral surface of the hind brain from a plexus fed by intersegmental and transitory pre-segmental branches of the dorsal aorta and its forward continuation. These longitudinal channels are later connected cranially with the terminal branches of the internal carotid arteries and caudally with the vertebral arteries through the first cervical intersegmental arteries. Fusion of these two longitudinal channels results in the formation of the basilar artery. The incomplete fusion of two longitudinal vascular channels in

its proximal portion may result in the formation of basilar duplication [7].

In our study basilar window was 10mm in length and 4mm in width, and there were no associated aneurism and collateral branches. Surgical approach and endovascular treatment of basilar artery and basilar aneurysms is difficult because of the complex geometry of the fenestration, the proximity to the lower cranial nerves, the presence of multiple small perforating arteries, and difficulties in obtaining adequate surgical exposure [8].

CONCLUSION

The knowledge of the variations in the level of origin and termination of the basilar artery, presence of stenosis, aneurysms should be kept in mind by the neurovascular surgeons while performing surgeries and endovascular procedures on the basilar artery and radiologist during interventional radiology, CT, magnetic resonance imaging, angiography for a better interpretation, diagnosis and treatment.

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