Bilateral Absence of Posterior Communicating Arteries - A Case Report

Dr. Hemamalini¹, Kiran Kumar D²

¹ Assistant Professor, Department of Anatomy, JSS Medical College, Mysore – 570015, India
² Post Graduate in Anatomy, JSS Medical College, Mysore – 570015, India

Abstract: The major arterial supply to the brain is by an arterial circle - circle of Willis situated in the interpeduncular cistern of the brain. It is formed by the anastomosis of the branches arising from the internal carotid and vertebral arteries. Posterior communicating artery is the main anastomotic channel between the carotid and vertebrobasilar circulation. During routine dissection of brain for undergraduate students in a 70 years old male cadaver, we observed bilateral absence of posterior communicating arteries. Right vertebral artery was smaller than the left. There was hemorrhage in the right hemisphere in the inferior surface extending towards the occipital lobe. The internal carotid artery terminated by dividing into anterior cerebral and middle cerebral arteries. The two anterior cerebral arteries were connected to one another by anterior communicating artery. The basilar artery terminated at the upper border of the pons by dividing into right and left posterior cerebral arteries.

Keywords: circle of Willis, posterior communicating artery, aplasia, hypoplasia, vertebral artery

1. Introduction

Posterior communicating artery arises from the posterolateral wall of the cerebral part of internal carotid artery. It runs posteromedially very close to the posterior clinoid process medial to the oculomotor nerve to enter the interpeduncular fossa and joins the posterior cerebral artery. During its course, it gives off 2-10 posteromedial central branches which supply the optic chiasma, optic tract, mammillary body, hypothalamus, thalamus and posterior perforating substance. The internal carotid artery gives two terminal branches – anterior and middle cerebral arteries. The two anterior cerebral arteries are connected to each other by an anterior communicating artery. The basilar artery terminates into two posterior cerebral arteries at the upper border of the pons and each posterior cerebral artery is connected to internal carotid artery through posterior communicating artery. This arterial anastomosis forms the circle of Willis at the base of the brain. There are variations in the pattern and caliber of the arteries that form the circle of Willis. According to SA Gunnal, complete circle of Willis was found in 60% of cases. Incomplete circle of Willis was mostly because of absence of posterior communicating arteries. Maximum variations were seen in posterior communicating arteries like aplasia in 4% of cases, Hypoplasia in 27.33%, Fenestration in 0.66% of cases and fetal type in 18% of cases. Complete functional circle is very rare. The anastomosis provides alternate path for circulation under abnormal conditions such as block or sudden constriction of an artery

2. Case Report

During routine dissection of brain for undergraduates, we observed bilateral absence of posterior communicating arteries in the circle of Willis, in a male cadaver approximately aged 70 years in JSS medical college, Mysore. Right vertebral artery was smaller than the left. There was hemorrhage in the right


www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

Paper ID: SUB156293
and 20% in patients having both posterior communicating arteries.5

A S Szarazova reported that the right hypoplastic vertebral artery occurs in 6.2% of the population, while left vertebral hypoplasia is present in 4.5% of the population6. Klotzsch C found a retrograde flow and significantly elevated flow velocity in the ipsilateral posterior communicating artery in all patients with a unilateral internal carotid artery block7. Schomer DF et al., have reported that posterior communicating arteries having less than 1mm in diameter and no visible flow in the ipsilateral posterior communicating artery had ischemic necrosis in the cerebral hemispheres in patients with internal carotid artery occlusion7. Schomer DF et al., have reported that posterior communicating arteries having less than 1mm in diameter and no visible flow in the ipsilateral posterior communicating artery had ischemic necrosis in the cerebral hemispheres in patients with internal carotid artery occlusion7. Jean-Marc Bugnicourt et al., reported that there is link between the presence of incomplete posterior circle of Willis and migraine, suggesting that this abnormality may contribute to migraine development9. Eric S Sussman et al., reported that absence of the posterior communicating arteries can result in cognitive dysfunction after carotid endarterectomy with in 24hours10.

In occlusive vascular disease of the brain collateral circulation becomes important. Collateral circulation will be more effective in the presence of a complete circle of Willis than in the one in which deficiency is present. For effective collateral circulation through circle of Willis, presence of posterior communicating arteries and anterior communicating artery is very important. If one of these arteries is absent, then collateral circulation through the circle may be impaired. As it confirms high percentage of variations in the formation of circle of Willis, all surgical procedures should be done after confirming by angiography.

References


Figure 1: 1-Right and left posterior cerebral arteries, 2-Basilar artery, 3-right vertebral artery.
Figure 2: 1-Anterior communicating artery, 2-anterior cerebral artery, 3-middle cerebral artery.