

Duplication of Posterior Cerebral Artery

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Abstract

A case report of a forty-six-year old female patient with the duplication of the posterior cerebral artery (PCA) and concomitant vascular malformation. We try to explain the development of this variant and diagnostic approach in this particular case.

Keywords: Anatomic variant; Posterior cerebral artery; Angiography; Cavernoma

Introduction

The duplication of posterior cerebral artery is a very rare anatomic variant [1,2]. Although digital subtraction angiography is the gold standard in cerebral blood vessels diagnostics, new angiographic techniques are enough for diagnosis in most cases and even show certain advantages, in some cases.

Case

Our patient has had rare visual attacks with headaches sometimes accompanied by since she was nine. At the age of twenty-nine, she had a partial epileptic seizure of short duration with a normal neurological status. EEG showed focal abnormality in the right temporal region and computer tomography scans found a 15mm hyperdense lesion in the right temporal lobe. MRI established the diagnosis of cavernoma. To exclude the possibility of concomitant vascular malformation the patient was sent to DSA which showed normal brain circulation without aneurysm or vascular malformation. Recently, she noticed a change in her behaviour accompanied by a stereotypic motion of left hand. Her neurological status and laboratory was normal. The patient was referred for brain MRA which revealed an extremely rare anatomic variant of the posterior cerebral artery (Figure 1).

In this variant, the internal carotid artery gives rise to a “fetal” posterior cerebral artery from which the posterior temporal artery, calcarine artery and partially parieto-occipital artery arise. A duplication of the posterior cerebral artery arises from the basilar artery. This duplicated artery predominantly gives rise to the parieto-occipital branch of the posterior cerebral artery.

Discussion

The development of partial epileptic seizures in our patient was

probably caused due to haemorrhage into cerebral cavernoma. Vascular malformations are more frequent in persons with anatomical vascular variants and this is a first case of PCA duplication with vascular malformations [3]. Cavernoma is an angiographic occult vascular malformation [4]. Resistance to antiepileptic therapy in our patient without further bleeding or growing of cavernoma was the indication for DSA to exclude other concomitant vascular malformations

The PCA develops during the posterior expansion of the forebrain in the eighth gestational week. This artery originates from primitive carotid artery branches and by differentiation of the posterior plexus. The completed posterior cerebral artery is made up of a part of the caudal ramus of the internal carotid, the posterior choroid, diencephalic, mesencephalic arteries and from the capillary plexus of the telencephalic vesicle [5]. The other branch of primitive internal carotid artery, anterior choroid artery sends a large branch to the posterior part of the telencephalon, where it breaks up into a capillary plexus from which the distal part of the posterior cerebral artery will develop [5,6]. The communication between PCA and the basilar artery develops later, during the differentiation of the posterior capillary plexus.

In our case, the duplication of PCA can be explained by the persistence of the caudal ramus of the primitive internal carotid artery, with only a partial connection between itself and the primitive posterior plexus. The primitive posterior plexus forms a major part of the second PCA, which is a branch of the basilar artery and supplies one part of posterior circulation.

The complexity of PCA development does not seem to be connected with PCA duplication. As far as we know, only three cases of PCA duplication have been published. Only one of the above is a real duplication of this artery and consists of two separate arteries. In this case, according to the article, one PCA arises from ICA and ends in the internal occipital artery and its branches, the calcarine artery, parietooccipital artery and the posterior pericallosal artery [1]. The other duplication of the posterior cerebral artery arises from the basilar artery and gives rise to the posterior temporal branch of the posterior cerebral artery [1]. This case is different from ours, where PCA arises from the left ICA and predominantly gives rise to the posterior temporal and calcarine branches of the posterior cerebral artery (Figures 1 and 2).

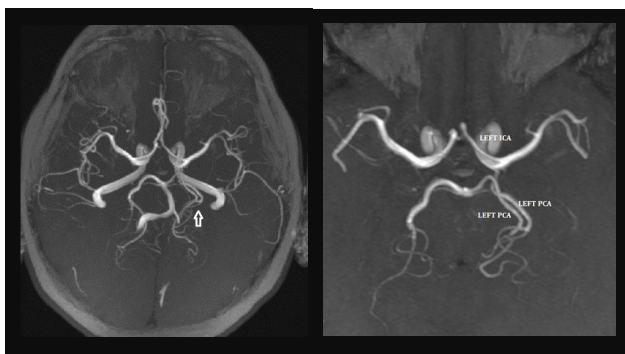


Figure 1: Duplication of the posterior cerebral artery on 3D TOF MR transversal view.

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Received October 10, 2015; Accepted November 19, 2015; Published November 26, 2015

Citation: Štula I, Buča A, Novak K, Batinić T (2015) Duplication of Posterior Cerebral Artery. J Clin Case Rep 5: 643. doi:10.4172/2165-7920.1000643

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Figure 2: DSA showed a duplicated PCA arises from of the left ICA.

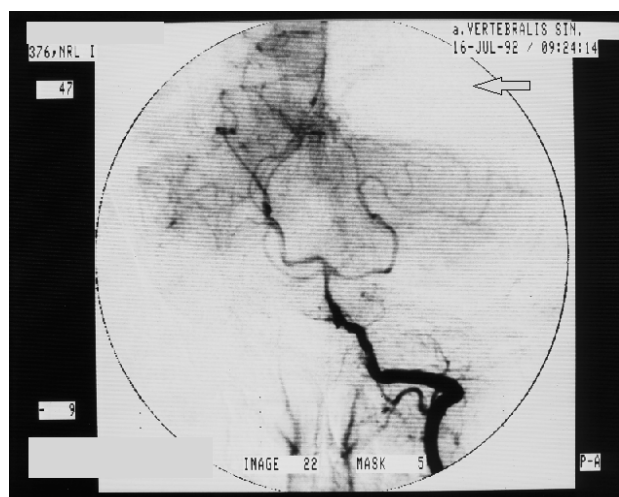


Figure 3: DSA of the left vertebral artery did not show parietal-occipital branches of left PCA.

In another article, its authors described two cases of PCA duplication but in these cases only P1 segment was duplicated, which is a long fenestration of PCA and not really a duplication of the artery [2]. The duplication of PCA was mistaken for the foetal form of PCA, which receives blood through the wide open posterior communicating artery (A ComP), on selective left ICA angiogram of our patient. (Figure 2). Although the left vertebral artery was catheterized and vertebra-basilar circulation was shown without one part of the left PCA parietal-occipital network, it was interpreted as spasm due to the direct catheterization of the left VA (Figure 3). A clear appearance of vessels on the skull base and the presentation of all arteries at the same time was crucial for the recognition of the duplicated PCA on MRA [7].

In patients with nonspecific and long-lasting neurological symptoms we must always think of a possibility of brain artery anatomic variants. Less invasive methods, especially MRA, should always be preferred in the diagnostic algorithm.

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