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Case Report

Brief Report: Large Fusiform Aneurysm of a Circumflex Branch of the Posterior Cerebral Artery

Vural HAMZAOGLU[1], Hakan OZALP[1], Mevci OZDEMIR[2], Aclan DOGAN[3]

[1]Mersin University, Faculty of Medicine, Department of Neurosurgery, Mersin, Turkey
[2]Pamukkale University, Faculty of Medicine, Department of Neurosurgery, Denizli, Turkey
[3]Oregon Health & Science University, Department of Neurosurgery, Portland, OR, USA

ABSTRACT

We report on a large fusiform aneurysm in a 20-year-old male with a history of cerebral palsy. Aneurysm location relative to four anatomical posterior cerebral artery segments dictates which approach should be used for treatment: pterional transsylvian, subtemporal, or parietooccipital interhemispheric transtentorial approach. A right temporal craniotomy via a subtemporal approach was performed and used to expose the right P1 and P2 segments of the posterior cerebral artery and the posterior communicating artery. Due to significant collateral circulation between the circumflex posterior cerebral artery and superior cerebellar artery branches, trapping of a fusiform aneurysm can be safely achieved without significant deficit.

KEYWORDS: Aneurysm, Fusiform, Posterior cerebral artery

INTRODUCTION

Aneurysms of the posterior cerebral artery (PCA) are uncommon, and represent approximately 1% of all intracranial aneurysms (6,8,10). These aneurysms tend to be large, giant, fusiform, dissecting or mycotic aneurysms when compared to aneurysms found in other locations. Aneurysm location relative to four anatomical PCA segments dictates which approach should be used for treatment: the pterional transsylvian, the subtemporal, or the parietooccipital interhemispheric transtentorial approach.

CASE REPORT

A 20-year-old male with a history of cerebral palsy was admitted to the Oregon Health & Science University Hospital. Increased headache and neck pain were reportedly the major complaint. Eight months previous the patient undergone a posterior spinal fusion to treat severe neuromuscular scoliosis and in the two months following reported significant headache and neck pain. Neurologic exam revealed that the patient had spastic tetraparesis and bilateral cortical blindness. The patient was unable to verbally communicate a precise pain local. Head magnetic resonance (MR) imaging (Figure 1A, B) and computed tomography (CT) revealed a large ovoid mass lesion that was anterior to the brain stem and thought to be consistent with a large fusiform aneurysm. An indentation was evident on the right side of the pons and the midbrain. Angiography revealed an aneurysm arising from the P1-P2 junction of the right PCA (Figure 2A-D). Since the patient was febrile, it was postulated that the aneurysm was mycotic in nature. A right temporal craniotomy was performed via the subtemporal approach and the right P1 and P2 segment of the PCA and posterior communicating arteries (PcomA) exposed. The aneurysm was a large fusiform dilatation of the circumflex branch arising from the P1 segment. A laser Doppler probe revealed blood flow in the aneurysm but not in the artery just distal to the aneurysm. The aneurysm was trapped using two 5 mm blade aneurysm clips (Figure 3A-D). An aneurysm wall biopsy revealed inflammatory tissue and no growth on cultures. Postoperative angiography revealed complete obliteration of the aneurysm with preservation of the PCA (Figure 4A-C). The patient was discharged without additional neurologic deficit.

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Corresponding author: Vural Hamzaoglu
E-mail: vuralhamzaoglu@gmail.com, hamzaogl@ohsu.edu

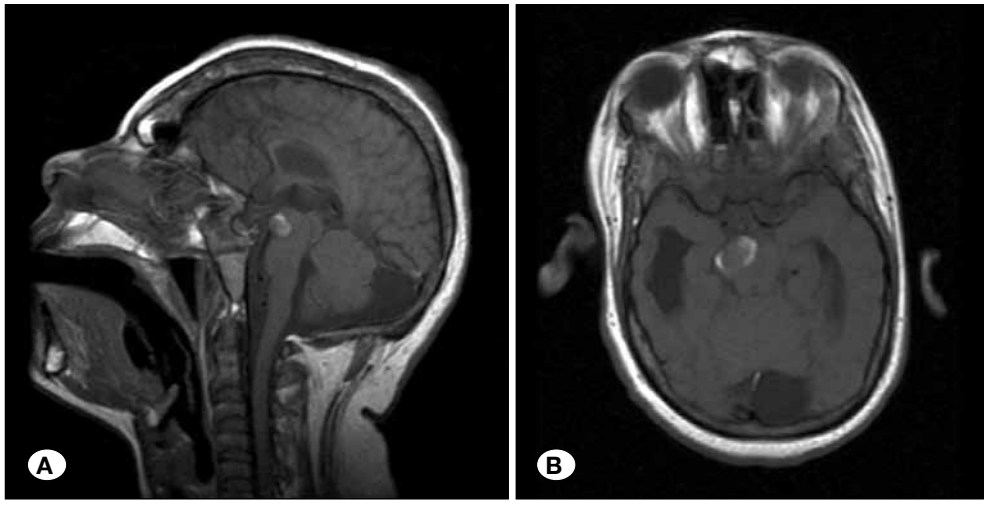

Figure 1: Sagittal **(A)** and axial **(B)** T1 weighted MR images. Visible is a mass lesion in the right side of the brain stem.

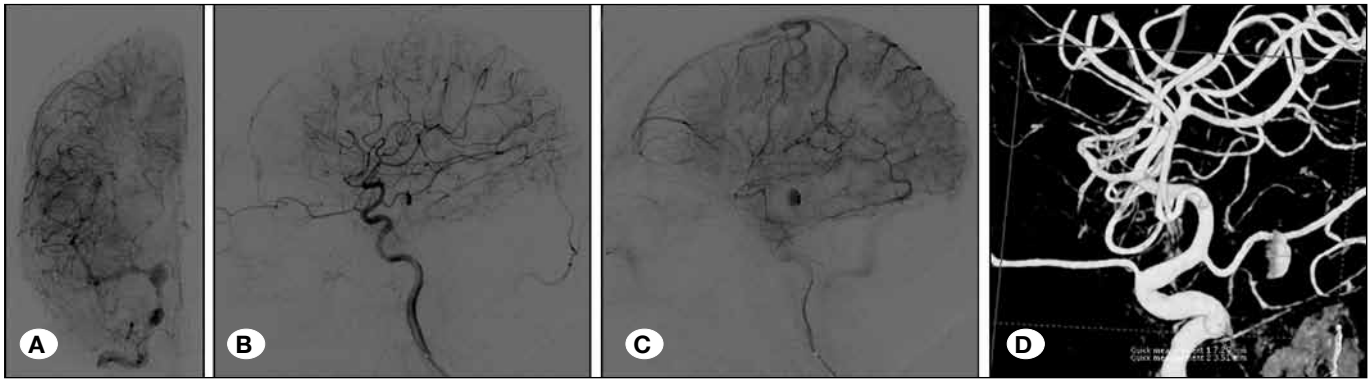

Figure 2: Right internal carotid artery angiograms show the fetal origin of the posterior communicating artery and aneurysmal dilatation at the P1-P2 junction. Anteroposterior view **(A)**, lateral views **(B and C)** and 3D angiogram **(D)**.

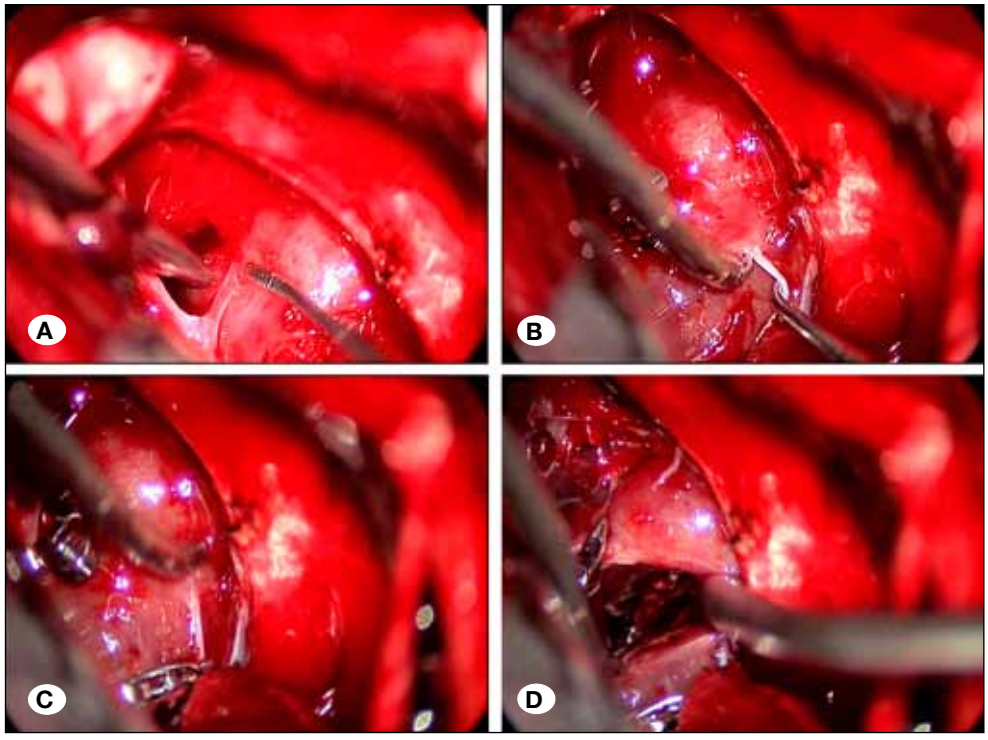

Figure 3: Intraoperative pictures show: fusiform dilatation of the circumflex branch and proximal and distal arteries **(A and B)**, trapping of the aneurysm with proximal and distal aneurysm clips **(C)**, and opening of the aneurysm dome **(D)**.

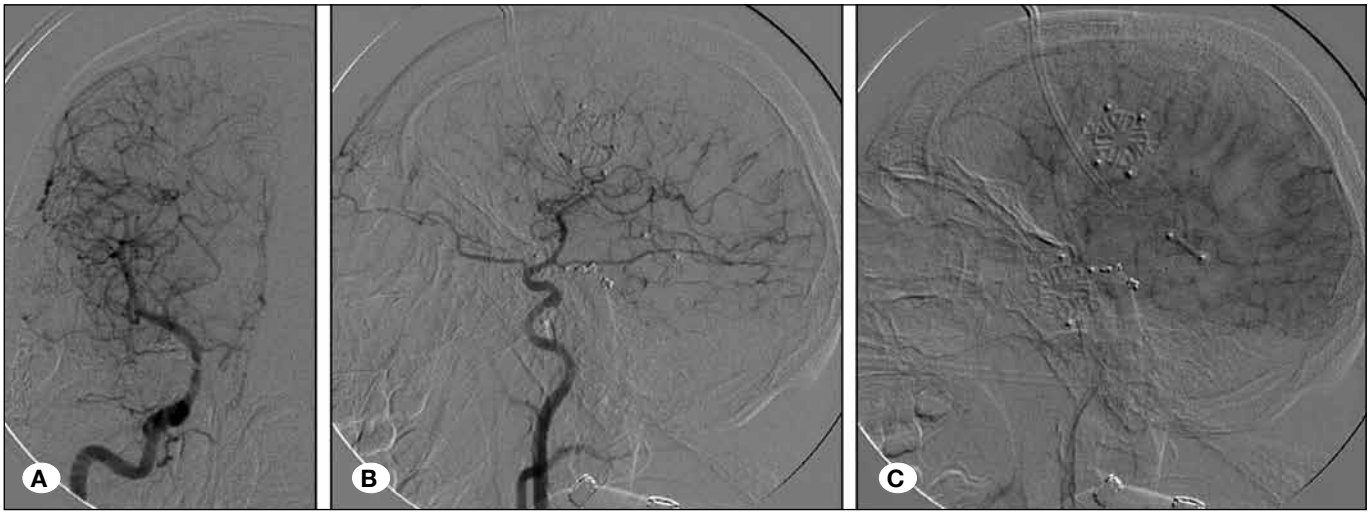

Figure 4: Postoperative right ICA angiograms show total occlusion of the aneurysm. Anteroposterior view **(A)** and lateral views **(B and C)**.

DISCUSSION

PCA has four segments as it courses around the midbrain. The P1 extends from the basilar bifurcation to the junction with the PComA. The P2 segment begins at the PComA lies within the crural and ambient cisterns and terminates lateral to the posterior edge of the midbrain. The P3 proceeds posteriorly from the posterior edge of the lateral surface of the midbrain and ambient cistern to reach the lateral part of the quadrigeminal cistern and ends at the anterior limit of the calcarine fissure. The P4 segment includes the branches distributed to the cortical surface and terminates within the calcarine fissure. In literature, almost half of the reported PCA aneurysms occur on the P1 segment or P1-P2 junction (4,12). PCA aneurysms tend to be giant aneurysms. Drake (3) and Yasargil (13) reported the incidence of giant aneurysms as 42% and 50%, respectively. A higher incidence of nonsaccular type aneurysms such as fusiform, dissecting, or mycotic aneurysms were reported in the series of Chang et al.(1), where approximately 46% were reportedly fusiform. In a review of 15 PCA aneurysm cases, Seoane et al. (11) reported two mycotic aneurysms. We present an unusual case of large, fusiform, possibly mycotic aneurysm of the circumflex branch of the PCA P1 segment. Koike et al. (7) have previously reported an infundibular dilation of a circumflex branch of the PCA.

Although 80% of patients with PCA aneurysms present with subarachnoid hemorrhage (SAH) (5,6,8), Pia and Fontana (8) reported a 27% incidence of visual problems that included, oculomotor nerve palsy and hemianopsia. In the series of Ciceri et al. (2) five of 20 patients presented with hemianopsia and third nerve palsy. In that case there was no SAH and headache, neck pain was the major complaint.

Surgical approach to aneurysms of the P1 and P1-P2 junction is similar to that used for basilar bifurcation aneurysms and is via either the pterional approach, as described by Yasargil (13) or the subtemporal approach, as described by Drake et al. (4). The pterional approach provides advantages of: (1) bilateral visualization of the basilar tip, PCA and superior cerebellar artery (SCA), (2) less temporal lobe retraction, (3) less oculomotor nerve injury and (4) is more familiar to most surgeons when compared to the subtemporal approach. Conversely, visualization of critical thalamoperforating vessels (TPV) is improved with the subtemporal approach. In this case report, we selected the subtemporal approach because of the enhanced visualization of the TPV.

Although PCA occlusion may cause visual field defects, there are several reports indicating good outcome after ligation of the PCA proximal to aneurysm or to the trapping procedure (3,4,13). The low incidence of the neurologic deficits following parent artery occlusion may be related to the significant leptomeningeal collaterals between the branches of the PCA and other arteries. Although occlusion of the PCA is usually well tolerated, this may not be the case following occlusion of the small PCA perforators. There are two main perforating branches of the PCA, direct perforating and circumflex arteries. Direct perforating branches include, the thalamoperforating arteries that arise from the P1 segment, and the thalamogeniculate and peduncular perforating arteries that arise from the P2 segment. The circumflex branches are divided into long and short groups. Occlusion of the long circumflex artery may result in defects of vertical gaze caused by infarction of the posterior commissure or of the nuclei of Darkschewitsch or Cajal (Parinaud's syndrome) (9). We did not hesitate to occlude the circumflex branch because the patient already had bilateral cortical blindness. Intraoperatively, the artery located just distal of the aneurysm showed no Doppler flow. Bypass was not an option because of the small caliber of the vessel. A postoperative MR image of the brain showed no ischemic region.

CONCLUSION

To our knowledge, this is the first report of a fusiform aneurysm of a circumflex PCA branch. Due to significant collateral

circulation between the circumflex PCA branch and the SCA branches, trapping of this fusiform aneurysm can be safely achieved without causing any significant deficits.

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