

Case Report

Microsurgical clipping for the true posterior communicating artery aneurysm in the distal portion of the posterior communicating artery

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Abstract

Background: Aneurysms arising from the posterior communicating artery (PCoA) itself are rare in which aneurysms usually located in the proximal portion of the PCoA. The authors report a case of the true PCoA ruptured aneurysm in the distal portion of the PCoA.

Case Description: The patient was an 83-year-old man who suffered subarachnoid hemorrhage. Cerebral angiography revealed a saccular aneurysm arising on the fetal type right PCoA itself in the distal portion of the PCoA. 2 days after the onset of symptoms, the patient underwent right interfascial pterional craniotomy, with anterior temporal approach. The aneurysm was successfully clipped with the preservation of both the PCoA and the thalamoperforating artery.

Conclusion: We speculated that blood flow into the PCoA gradually increased after occlusion of the left vertebral artery, which induced tortuosity of the PCoA. As a result, hemodynamic stress might increase near the curvature and cause aneurysm formation.

Key Words: Anterior temporal approach, microsurgical clipping, true posterior communicating artery aneurysm

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INTRODUCTION

The true posterior communicating artery (PCoA) aneurysms can be defined as aneurysms, which arise from the PCoA itself and are attached to neither the internal carotid nor the posterior cerebral artery (PCA). Aneurysms usually located within a few millimeters from the carotid artery. Among the true PCoA, the aneurysms in the distal portion of the PCoA were rare.^[1,11] We experienced a case of the true PCoA aneurysm in the distal portion of the PCoA, which was treated surgically through the anterior temporal approach.

CASE REPORT

An 83-year-old man suffered severe headache and subsequent loss of consciousness and was admitted to our hospital. There was no focal neurological abnormality. Initial computed tomography (CT) showed typical findings of subarachnoid hemorrhage in the basal cistern. Three-dimensional digital subtraction angiography revealed a saccular aneurysm arising on the right PCoA itself in the distal portion of the PCoA [Figure 1]. Aneurysmal fundus projected supero-medially and aneurysm developed near the curvatures of the PCoA.

Collateral flow to the bilateral PCA and right superior cerebellar artery through the right PCoA was seen. The left vertebral artery (VA) angiography revealed an occlusion of the left VA. The muscle branches of the left VA had anastomosed to the left occipital artery.

Two days after the onset of symptoms, the patient underwent right interfascial pterional craniotomy in the manner described by Yasargil *et al.*, with anterior temporal approach.^[5,12,14,17] Whole length of the PCoA, from the junction of the internal carotid artery (ICA) to the junction of the PCA was confirmed [Figure 2]. The aneurysm was located at proximal to the curvature and the aneurysmal fundus projected supero-medially. The aneurysm was clipped with Yasargil titanium mini clip with fenestration (FT804T). Complete aneurysm occlusion and the patency of both the PCoA and the thalamoperforating artery were confirmed by indocyanine green angiography, intraoperatively.

Postoperatively, the patient experienced no cerebral ischemic events. Follow-up cerebral angiography 23 days after the operation showed disappearance of the aneurysm [Figure 3]. However, CT identified signs of normal pressure hydrocephalus 1-month after the operation. The patient received a lumboperitoneal shunt.

DISCUSSION

The true PCoA aneurysms are among the rarest intracranial aneurysms. Although scant, the literature suggests that these aneurysms comprise between 0.1% and 3.6% of all aneurysms and ~4.6% and 13.0%, of all PCoA aneurysms.^[4,7,8,15,18] These true PCoA aneurysms typically arise within 2–3 mm of the carotid artery. Among the true PCoA, the aneurysms in the distal portion of the PCoA were rare.^[11,11]

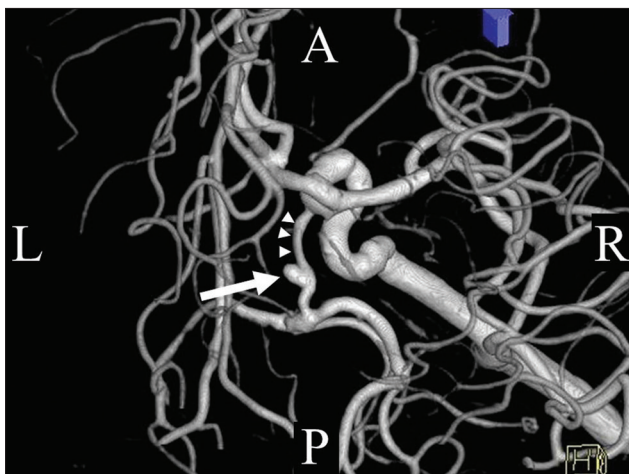


Figure 1: Preoperative three-dimensional digital subtraction angiography, axial view, showing an aneurysm (white arrow) and its relationship to the posterior communicating artery (white arrowheads) and surrounding structures. A: Anterior, P: Posterior, R: Right, L: Left

It has been generally considered that hemodynamic factor plays an important role in the formation, the growth, and the rupture of the cerebral aneurysm.^[2,3,10,16] According to the literature, a combination of the fetal type PCoA and formation of the true PCoA aneurysm has been reported in most cases.^[9] He *et al.* reported that the ipsilateral PCoA/P1 ratio and ipsilateral P2/P1 ratio were observed to be significantly larger in true PCoA aneurysms than in junction of the PCoA aneurysms.^[4] Kondo *et al.* reported in an experimental study that a morphological change such as tortuosity in the vessels further aggravates hemodynamic stress on a certain portion, such as the corner of the curvatures.^[6] In his study, most aneurysms developed at or near the curvatures. Only two cases of the true PCoA aneurysms located in the distal portion of the PCoA have been previously described. Abiko and Orita reported a case of ruptured true PCoA fusiform aneurysm arising on the fetal type and tortuous PCoA.^[1] Ogasawara *et al.* reported a case of ruptured true PCoA aneurysm 13 years after surgical occlusion of the ipsilateral cervical ICA with superficial temporal artery-middle cerebral artery anastomosis for ruptured right ICA aneurysm.^[11] In the present case, the left VA angiography revealed an occlusion of the left VA and the right cerebral angiography revealed the collateral flow to the bilateral PCA and right superior cerebellar artery through the right PCoA. Therefore, we speculated that blood flow into the PCoA gradually increased after occlusion of the left VA. As a result, hemodynamic stress might increase near the curvature and cause aneurysm formation.

In treating these aneurysms, it is critical to preserve the patency of both the PCoA and the thalamoperforating arteries arising from it. The aneurysms in the proximal portion of the PCoA were easily visualized and clipped by using a standard pterional approach, because the

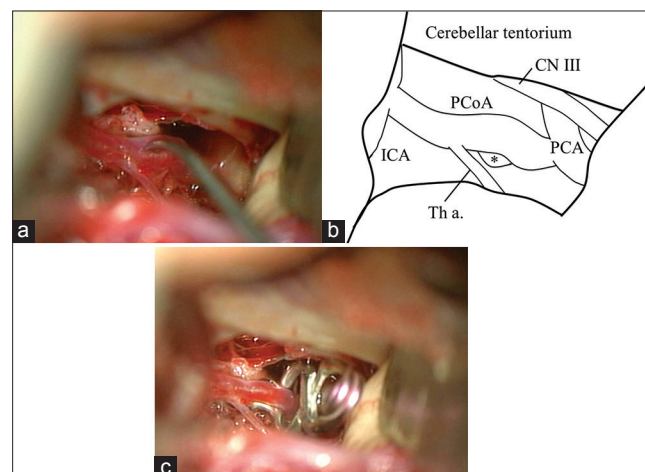


Figure 2: Intraoperative photographs (a and c) and schematic drawing (b). CN III: Oculomotor nerve, ICA: Internal carotid artery, PCA: Posterior cerebral artery, PCoA: Posterior communicating artery, Th a.: Thalamoperforating artery, *Aneurysm

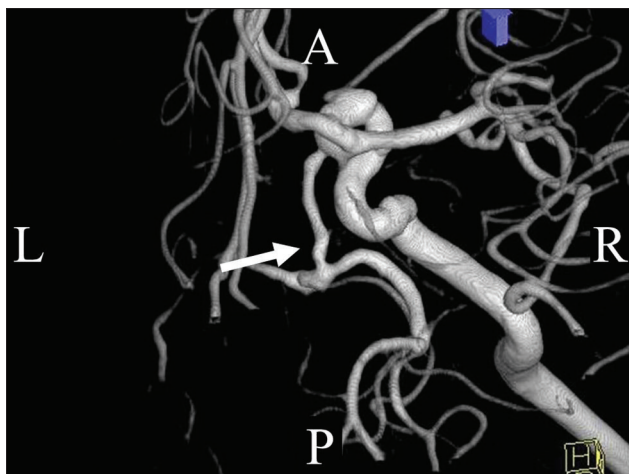


Figure 3: Postoperative three-dimensional digital subtraction angiography, axial view, showing the obliteration of the aneurysm and the patency of the posterior communicating artery (white arrow)

aneurismal fundus projects to the laterally within the carotid cistern and most of the aneurysms are unrelated to perforating arteries.^[8,13] The true PCoA aneurysm in the distal portion of the PCoA located in the interpeduncular cistern, which is a difficult region to approach through conventional methods due to its deep location and important adjacent neurovascular structures. In the present case, the patient underwent microsurgical clipping via the anterior temporal approach because standard pterional approach provide insufficient exposure of lesions in the interpeduncular cistern. With this approach it was possible to visualize whole length of the PCoA, from the junction of the ICA to the junction of the PCA.

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