Fenestration of the oculomotor nerve by a duplicated posterior cerebral artery and aneurysm

Case report

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The authors report a case of a posterior cerebral artery aneurysm arising from an aberrant arterial branch that was found to be splitting the oculomotor nerve. This 63-year-old man presented with headaches, and CT imaging revealed subarachnoid hemorrhage primarily within the basilar cisterns. Formal angiography and CT angiography revealed a saccular aneurysm arising from the posterior cerebral artery. Intraoperatively, the third cranial nerve was found to be fenestrated with the artery and aneurysm. (DOI: 10.3171/2009.2.JNS081688)

Key Words • aneurysm • posterior cerebral artery • oculomotor nerve

Cranial nerve splitting or infiltration by intracranial aneurysms has been reported in the literature. Typically, this anomaly has been seen with the optic nerve or chiasm and involvement with ophthalmic artery or anterior communicating artery aneurysms. The authors describe the first reported case of a PCA aneurysm arising from a duplicated arterial branch that was found to be splitting the oculomotor nerve.

Case Report

History, Presentation, and Examination. This 63-year-old man experienced the sudden onset of the “worst headache of his life” 2 days before presenting to the emergency room of another institution. Clinical assessment indicated the patient’s neurological status was Hunt and Hess Grade I, and CT imaging of his brain revealed a Fisher Grade 3 subarachnoid hemorrhage in the right ambient cistern and Sylvian fissure. He was then transferred to our institution where CT angiography revealed what appeared to be an aneurysm near the right P1-P2 junction.

Formal angiography revealed a broad-necked aneurysm extending off an aberrant duplicated branch of the right P1 segment, prior to the P1-P2 junction (Fig. 1).

Operation and Postoperative Course. A subtemporal craniotomy was performed, and the right PCA was easily found, and the aberrant branching point and aneurysm were identified. The aneurysm was observed with the dome projecting inferiorly into the oculomotor nerve. Interestingly, the oculomotor nerve split around the aneurysm and the parent artery, and the dome of the aneurysm was embedded within the split fibers of the nerve (Fig. 2). The nerve fibers were carefully dissected free from the dome of the aneurysm, and the aneurysm clip was placed with the tips between the branches of the third nerve itself (Fig. 3). The patient tolerated clipping well, and no residual aneurysm was seen on postoperative angiography (Fig. 4). Careful examination of the neurovascular relationship revealed that the aberrant duplicate PCA branch entered and traversed the split oculomotor nerve at the region where the aneurysm arose. The patient

Abbreviation used in this paper: PCA = posterior cerebral artery.
did have a transient partial third nerve palsy that quickly improved throughout his hospital stay; he had only slight ptosis at the time of discharge with full extraocular movements noted at the 1-month follow-up visit.

**Discussion**

A review of the literature reveals several case reports in which the authors describe berry aneurysms within the optic nerve. Milliser et al.\(^6\) reported this condition with an incidental anterior communicating artery aneurysm, and Date et al.\(^2\) reported penetration of the optic chiasm by a ruptured anterior communicating artery aneurysm. A few cases in which the optic nerve is penetrated by ophthalmic artery aneurysms have been described.\(^1,5\) In 2 of these cases, the patients presented with unruptured aneurysms, and in 1, the patient had an aneurysmal rupture.

Cases in which the oculomotor nerve is split by an aneurysm are rare. In fact, only two other cases of oculomotor fenestration by an internal carotid artery–posterior communicating artery aneurysm have been reported. Hiuchi et al.\(^4\) reported a patient who presented with headache and oculomotor paresis, 10 years after a previous episode. An internal carotid artery–posterior communicating artery aneurysm penetrating the oculomotor nerve was identified. In this case, the authors concluded that the event 10 years earlier might have been a sentinel hemorrhage causing a rent in the nerve into which the aneurysm could grow.

Our case differs in that our patient had no such pri-
or events and at no time prior to surgery had symptoms consistent with oculomotor involvement. In addition, the aneurysm in our case was actually arising from an aberrant duplicated branch of the PCA, a situation that has not been described previously. The artery traversed the nerve, and the aneurysm arose within the region of this fenestration. To our knowledge, this anatomical relationship has not been previously reported.

Disclosure

The authors do not report any conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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