Endovascular Coiling of Posterior Communicating Artery Aneurysm Present With Ophthalmoplegia : A Case Report

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Abstract

Introduction: Posterior communicating artery aneurysm is one of the most common aneurysms encountered. The aneurysm can be asymptomatic, or present with a variety of symptoms ranging from severe headache, cranial nerves palsy, loss of consciousness. The aneurysm are often associated with ipsilateral oculomotor nerve palsy. Recent study suggested that posterior communicating artery aneurysms may have a higher rate of rupture than other anterior circulation aneurysms. Endovascular coiling and microneurosurgery clipping are the options to manage this aneurysm.

Case: Female, 59 years, presented with severe headache, VAS 8-9, and left oculomotor nerve palsy. Brain CT-Scan with contrast revealed a normal findings. Digital substraction angiography revealed a saccular bilobed aneurysm in left posterior communicating artery, 6mm x 3 mm in diameter with lateral projection. Endovascular coiling was performed using 3D coil 6 mm x 15 cm followed with helical coil 5 mm x 15 cm. Check angiography revealed a Raymond-Ray Classification I. The patient
showed clinical improvement after three months. There was an improvement of oculomotor nerve palsy and headache completely diminished without analgetics.

**Conclusion:** This case showed clinical improvements using endovascular treatment although microneurosurgery clipping of a posterior communicating artery aneurysm causing oculomotor nerve palsy seems to be associated with a higher probability of complete recovery. Oculomotor nerve palsy recovers on average within six months. Hence this case needs further follow up.

**Keywords:** Aneurysm, Endovascular Coiling, Posterior Communicating Artery.

**Introduction:**
Posterior communicating artery aneurysm (PcomA) is one of the most common aneurysms encountered. It has high prevalence; this aneurysm comprises approximately 25% of all intracranial aneurysms and about 50% of all aneurysms of the internal carotid artery. Recent evidence has suggested PcomA may have a higher rate of rupture than anterior circulation aneurysms, the risk of rupture of posterior circulation aneurysms [<7 mm (2.5%), 7-12 mm (14.5%), 13-24 mm (18.4%), >25 mm (50%)] was found to be higher than that of anterior circulation aneurysms [<7 mm (0%), 7-12 mm (2.6%), 13-24 mm (14.5%), >25 mm (40%)]. The prevalence of small ruptured PcomA was particularly high with 87.5% of aneurysms measuring less than 10 mm in diameter and 40% measuring less than 5 mm. PcomA can be asymptomatic, or present with a variety of symptoms ranging from severe headache, cranial nerves palsy, loss of consciousness. The aneurysm are often associated with ipsilateral oculomotor nerve palsy. Compression of the oculomotor nerve resulting in oculomotor nerve palsy in some cases is the only neurological deficit in patients with this type of aneurysm. Thus, identifying this aneurysm before it ruptures is key to improving patient outcomes.

Endovascular coiling and microneurosurgery clipping are the options to manage this aneurysm. Oculomotor nerve palsy resolution after endovascular coiling of posterior communicating artery aneurysms has been reported previously.

**Case Presentation**
Female, 59 years, presented with severe headache, VAS 8-9, and left oculomotor nerve palsy (figure 1).

![Figure 1](image1.png)

**Figure 1.** Patient’s eye movements before coiling. There was a ptosis on the left eye, and the patient was unable to adduct the left eye.

Brain CT-Scan with contrast revealed normal findings. Digital subtraction angiography revealed a saccular bilobed aneurysm in left posterior communicating artery, 6mm x 3 mm in diameter with lateral projection.
Following the findings of angiography, endovascular coiling was performed under general anesthesia. A 6F guiding catheter (Concierge; Merit, USA) was placed in cervical segment of left internal carotid artery. Using co-axial system, a microwire 0.010” (Arigo; Medtronic, USA) inside a microcatheter (Echelon -10; Medtronic, USA) was navigated inside the aneurysm sac, performing a basket using 3D coil (Axium™ 3D; Medtronic, USA) 6 mm x 15 cm followed with helical coil (Axium™ Helix; Medtronic, USA) 5 mm x 15 cm. Check angiography revealed a Raymond-Roy Classification I. Check angiography was performed to ensure no occlusion of blood vessels (figure 3).

The patient showed clinical improvement after three months. There was an improvement of oculomotor nerve palsy and headache completely diminished without analgetics (figure 4).

**Discussion**

Posterior Communicating artery is a common site for aneurysm development. Aneurysms at this location have larger rupture risk than aneurysms at other locations such as the middle cerebral artery or other segments of the internal carotid artery. Currently available literature demonstrates that other factors including age over 60 years, female sex, Finnish or
Japanese descent, aneurysm size over 5 mm, posterior circulation location, and symptomatic unruptured aneurysms have a higher risk of rupture\(^2\). Based on these factors, the patient in this case was at risk of ruptured aneurysm.

Symptoms suggestive of PcomA vary, but most references agree that the presence of oculomotor nerve palsy and severe SAH-like headache are the most common, as presented in this case. Compression of the oculomotor nerve resulting in oculomotor nerve palsy is a common initial symptom and in some cases the only neurological deficit in patients with PcomA.\(^3,4\) The possible mechanisms of oculomotor nerve palsy secondary to intracranial aneurysm are direct compression of the oculomotor nerve by an aneurysmal mass and the pulsating effect of the aneurysm. In case of ruptured aneurysm, irritation of the nerve by the subarachnoid hemorrhage could also be the possible mechanism\(^5\).

Management of unruptured PcomA takes various issues in decision making, including observation versus treatment and surgical clipping vs endovascular therapy. Treatment of unruptured aneurysms would be indicated when the risk of rupture from natural history is higher than the risk of treatment and follow-up\(^3\). The risk factors that should be considered include aneurysmal factors, such as location, size, morphology, whether a thrombus exists within the aneurysm, and the presence of a daughter sac or multiple lobes, and patient factors such as age, medical history, history of subarachnoid hemorrhage, and family history of subarachnoid hemorrhage\(^4\). As previously mentioned, various risk factors found in the patient in this case report put the patient at risk of ruptured aneurysm. Oculomotor nerve palsy recovery after aneurysm treatment has been widely studied over the past few decades but there is still some debate about the efficiency of surgical clipping and endovascular coiling on the resolution of oculomotor nerve palsy induced by PcomA. Surgical clipping resulted in significantly higher disability using the Modified Rankin Scale when compared with coiling. Complications were also higher with clipping, including neurological and cardiac complications. Clipping resulted in significantly greater disability in the short term (≤6 months), but not in the long term (>6 months). However, endovascular coiling was associated with higher rate of retreatment than clipping\(^3,6\).

In regards of oculomotor nerve palsy, surgical clipping of a PcomA seems to be associated with a higher probability of complete recovery than endovascular treatment. During surgical clipping, the aneurysm mass effect can be removed, while endovascular coiling does not resolve all the mass effect. Additionally, the coil itself can contribute to the mass effect. However, oculomotor nerve palsy resolution after endovascular coiling of PcomA has been reported previously. The elimination of aneurysmal pulsatility was deemed responsible for the improvement after coiling.\(^1,6\) The major drawback of endovascular coiling is the high recurrence rate and requiring retreatment. Factors associated with recurrence included aneurysm size, treatment during acute phase of rupture, incomplete initial occlusion, and duration of follow-up. Despite this high risk of recurrence, the risk or rebleeding is relatively low. Songsaeng et al, recently found five morphological factors in coiled PcomA, which were predictive of initial occlusion and long-term stability on follow-up\(^6\). Two of these factors (small size, and dome to neckration < 2) are known and supported by other studies. Another factors described is a small size of PCOM artery. The last two factors described in this study are an ICA-fundus angle of 160-
180° and a posteroinferior dome orientation.

Clinically, oculomotor nerve palsy resolved completely within 6 months of treatment, regardless of the treatment method. The length of palsy before treatment had no significant effect on its complete resolution, nor did age or the size of the aneurysm. However, the preoperative degree of nerve palsy (i.e., complete or partial) was associated with a significant degree of resolution of oculomotor nerve palsy. In this case, patient showed partial resolution of oculomotor nerve palsy after three months follow up.

The morbidity and mortality for PcomA is likely much less given that aneurysms in this location are typically easier to treat than aneurysms in other locations. A more recent study on the morbidity and mortality of unruptured intracranial aneurysms found that coiling was associated with a lower mortality and morbidity.

Conclusion
This is a case of unruptured PcomA with risk of being ruptured and treated with endovascular coiling. Patient showed clinical improvements using endovascular treatment although microneurosurgery clipping of a posterior communicating artery aneurysm causing oculomotor nerve palsy seems to be associated with a higher probability of complete recovery. According to previous study, oculomotor nerve palsy recovers on average within six months. Hence this case needs further follow up.

References