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## Bilobulated Aneurysms at the Origin of the Posterior Communicating Artery

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**Objective.** The purpose of this paper is to describe the occurrence of bilobulated aneurysms at the origin of the posterior communicating artery.

**Background.** Bilobulated aneurysms at the origin of the posterior communicating artery from the internal carotid artery are rarely reported in the literature. A review of the literature showed only one report in which this type of aneurysm was addressed.

**Methods.** A consecutive series of 85 aneurysms operated by a single surgeon in 75 patients during an eight-year period (March 1995-February 2003) at the University Hospital was reviewed retrospectively. The incidence, radiological findings, intraoperative findings, surgical treatment and outcome of patients with bilobulated aneurysms at the origin of the posterior communicating artery were analyzed. The pathophysiologic mechanism for the formation of the bilobulated aneurysm was analyzed for each case.

**Results.** Thirty-two aneurysms (37.6%) located at the origin of the posterior communicating artery were operated. Four patients who had angiographic evidence of a bilobulated aneurysm at the origin of the posterior communicating artery were identified and operated. Among those four patients, only three had a bilobulated aneurysm. In one patient, microsurgical exploration revealed the presence of two consecutive aneurysms originating from the posterior communicating artery. The incidence of bilobulated aneurysms at the origin of the posterior communicating artery was 9.4%. One patient died during the postoperative period for a 25% mortality rate.

**Conclusions.** The incidence of this type of aneurysm is low; therefore, they represent a technical challenge to the neurosurgeon.

**Key words:** Aneurysm, Bilobulated, Posterior communicating artery

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**B**ilobulated aneurysms at the origin of the posterior communicating artery (PCoMA) from the internal carotid artery (ICA) are rare. The purpose of this study was to assess the incidence of this type of aneurysm and the difficulties in its management. A review of the literature showed only one report in which this type of aneurysm was specifically addressed for endovascular embolization treatment (1).

### Clinical Material and Methods

A retrospective review of 85 consecutive aneurysms operated in 75 patients during an eight-year period (March 1995-February 2003) at the University Hospital in San Juan, Puerto Rico by a single surgeon. Thirty-two aneurysms (37.6%) located at the origin of the PCoMA were identified

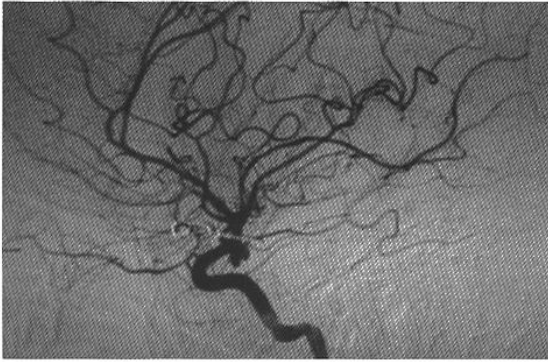
and four patients who had angiographic evidence of a bilobulated aneurysm at the origin of the PCoMA were operated. The incidence, radiological findings, surgical treatment, intraoperative findings and surgical outcome of these four patients were analyzed. The pathophysiologic mechanism for the formation of the bilobulated aneurysm was analyzed in each case.

**Case 1.** A 31 year-old female with history of human immunodeficiency virus infection and a right pterional craniotomy four years earlier at another hospital for clipping of a right PCoMA aneurysm had sudden onset of a complete left III cranial nerve palsy not associated to headache or nuchal rigidity. Head computed tomography (CT) scan showed no subarachnoid hemorrhage (SAH). She was consulted late to our service due to an initial diagnosis and management of acute cervicitis with significant and severe vaginal bleeding causing anemia and requiring multiple blood transfusions. Digital subtraction angiography (DSA) showed a bilobulated aneurysm located at the origin of the left PCoMA (Figure 1). Surgery was done 30 days after the initial symptoms. The left III cranial nerve was causing an indentation at the aneurysm dome producing a true bilobulation. Clipping of the aneurysm required two clips

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**Figure 1.** Left lateral DSA of the ICA shows a bilobulated aneurysm located at the origin of the left PComA. There is a right-sided aneurysm clip from a previous surgery that projects on this image.

for complete obliteration of the neck of the aneurysm. Postoperative head CT scan showed a small acute subdural hematoma. It was not surgically drained, since she was alert and without focal deficits. During the postoperative period, a coagulation diathesis secondary to thrombotic thrombocytopenic purpura was diagnosed. She continued under closed observation but after multiple attempts to correct her thrombocytopenia including plasmapheresis, the patient deteriorated to a comatose state. She was operated for drainage of the hematoma but did not improve and died three days later.

**Case 2.** A 52 year-old female with history of arterial hypertension had a sudden episode of severe headache, neck pain and vomiting. Upon initial examination, the patient was alert and fully oriented, she had moderate nuchal rigidity and the head CT scan showed a diffuse SAH, more prominent on the right side. DSA showed a bilobulated aneurysm located at the origin of a right fetal type PComA (Figure 2). She underwent surgery 48 hours



**Figure 2.** Right oblique DSA of the ICA shows a bilobulated aneurysm located at the origin of a right fetal type PComA.

after the onset of her symptoms. During surgery, the fetal type PComA was identified and dissected from the aneurysm. The bilobulation was caused by compression from the tentorium. The neck of the aneurysm was clipped without including the fetal type PComA. Postoperative DSA showed adequate obliteration of the aneurysm and a patent fetal type PComA. Three months after the surgery, the patient remained stable and fully functional.

**Case 3.** A 50 year-old female developed a partial left III cranial nerve palsy five weeks prior to surgery. Before the palsy appeared, the patient had a sudden episode of headache, nausea, and vomiting; by then the head CT scan showed a diffuse SAH. The patient was fully oriented, without nuchal rigidity or focal deficits besides the residual partial left III cranial nerve palsy. She was transferred to our institution and a DSA showed a bilobulated aneurysm at the origin of the left PComA (Figure 3). During surgery, a bilobulated aneurysm originating from the origin of the



**Figure 3.** Left oblique DSA of the ICA shows a bilobulated aneurysm located at the origin of the left PComA.

left PcomA was found. One lobe was above the tentorium and the other lobe was below the tentorium. The intraoperative exploration showed that the tentorium did not cause the bilobulation; complete obliteration of the aneurysm required two clips. One clip was placed at the neck of the aneurysm with collapse of one of the lobes. The lobe that was below the tentorium showed slow filling from retrograde flow from the PcomA and an additional clip was placed over this lobe to collapse it. Three months after the surgery, patient was stable and fully functional.

**Case 4.** A 44 year-old female with history of arterial hypertension suffered a sudden episode of headache and syncope. On examination, she had Wernicke-type aphasia and the head CT scan showed a left sided SAH, so she was referred to our institution for management. DSA revealed a bilobulated aneurysm located at the origin of the left PComA (Figure 4). She was taken to surgery 47



**Figure 4.** Left lateral DSA of the ICA shows a bilobulated aneurysm located at the origin of the left PComA. At surgery, two consecutive aneurysms were found at the origin of the PComA rather than a true bilobulation. Both aneurysms were located before the origin of the anterior choroidal artery.

days after the onset of her symptoms. At surgery, two consecutive aneurysms were found at the origin of the PComA rather than a true bilobulation. Both aneurysms were located before the origin of the anterior choroidal artery. After proximal and distal temporary clipping of the ICA, both necks were clipped with a single clip. Ten months after surgery the patient remains with a minimal residual aphasia but is completely functional.

## Results

All the patients were treated by microsurgical clipping of the aneurysm using a pterional approach. Ninety-four percent of the patients with PComA aneurysms were female and all patients with angiographic evidence of a bilobulated aneurysm were female. Among the four patients with angiographic evidence of a bilobulated aneurysm, only three had a true bilobulated aneurysm. In one patient, microsurgical exploration revealed that what appeared to be a bilobulated aneurysm by the DSA was in fact two consecutive aneurysms originating from the origin of the PComA (Case 4). The incidence of bilobulated aneurysms at the origin of the PComA was 9.4%. One patient died during the postoperative period for a 25% mortality rate.

## Discussion

A recent report of 424 cases of PComA aneurysms operated by a single author does not point out the incidence of bilobulated aneurysms (2). We could not find a literature review in which the incidence is reported. Endovascular occlusion of bilobulated aneurysms is

considered a technical challenge (1). Careful evaluation of the DSA is required before surgery to plan the intraoperative exploration of the aneurysm. The position of the lobes may be suspected from the DSA and must be confirmed intraoperative. In the patient who had two consecutive aneurysms, this preoperative planning was very helpful. During intraoperative exploration, a single lobe aneurysm was identified. Because we were suspecting a bilobulated aneurysm, the ICA was explored distally along its lateral surface and the second single lobe aneurysm was found before the origin of the anterior choroidal artery. Due to the close proximity of the necks, both were clipped with a single clip. Yasargil (3) reported two cases in which a similar arrangement of two separate aneurysms distal to the PComA but proximal to the anterior choroidal artery were found.

A PComA aneurysm usually arises from the superior aspect of the posterior communicating artery (2). In the majority of the cases, the PComA can be separated from the neck of the aneurysm. Bilobulated aneurysms pose more difficulty when clipping the neck of the aneurysm. The lobes may interfere with the dissection of the neck, since one of the lobes may project inferiorly with improper visualization of the PComA. In some cases it may be very difficult to dissect the PComA and it has to be included in the clip as in two of our cases. These patients did not manifest any clinical sequelae postoperatively. In aneurysms with large lobules, the anterior choroidal artery may also be concealed beneath one of the lobes and must be dissected from the neck of the aneurysm. Opening widely the Sylvian fissure helps in the exposure of the ICA and the aneurysm. The pathophysiologic mechanisms of bilobulation can be considered to result from the growth of a daughter sac, the presence of bi-directional hemodynamic stress in an aneurysm sac and the presence of intervening tissues (1). The formation of the bilobulated aneurysm in our three patients was the tentorium in one case and the III cranial nerve in another. In one case, no anatomical structure could be identified as the possible cause of the bilobulation.

We conclude that the incidence of a bilobulated aneurysm at the origin of the PComA is low and they represent a technical challenge to the neurosurgeon. Adequate management requires careful evaluation of the DSA, a thorough preoperative surgical planning, an optimal intraoperative visualization of the lobes and preservation of the perforating arteries during the surgical procedure.

## Resumen

El propósito de este trabajo es describir los aneurismas bilobulados que ocurren en el origen de la arteria posterior

comunicante. En una serie consecutiva de 85 aneurismas operados se estudió la incidencia, hallazgos radiológicos, hallazgos intraoperatorios, tratamiento quirúrgico y resultado clínico. Se identificaron treinta y dos aneurismas (37.6%) localizados en el origen de la arteria posterior comunicante. Se manejaron quirúrgicamente cuatro pacientes con evidencia angiográfica de un aneurisma bilobulado en el origen de la arteria posterior comunicante. En la exploración quirúrgica de un paciente, se descubrieron dos aneurismas consecutivos que se originaban de la arteria posterior comunicante. Sólo tres pacientes tenían un verdadero aneurisma bilobulado. La incidencia de aneurismas bilobulados en el origen de la arteria posterior

comunicante fue de un 9.4 %. La incidencia de este tipo de aneurisma es baja; por lo tanto, representan un desafío técnico al neurocirujano.

### References

1. Kwon OK, Han MH, Lee KJ, Oh CW, Ko YC. A technique of GDC embolization for deeply bilobulated aneurysms. *Am J Neuroradiol* 2002;23:693-696.
2. Lee KC, Lee KS, Shin YS, Lee JW, Chung SK. Surgery for posterior communicating artery aneurysms. *Surg Neurol* 2003; 59:107-113.
3. Yasargil MG. *Microneurosurgery: In 4 Volumes. Vol II.* New York: Thieme Stratton, 1984.p.76.