



Case Report

Ruptured Pericallosal Artery Aneurysm: A Case Report



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ABSTRACT

Background: Pericallosal artery aneurysm (PCA) is a rare intracranial aneurysm, accounting for 2–9% of all cases, with only 4% of these rupturing. Despite their small size, PCA aneurysms have a higher rupture risk compared to other anterior circulation aneurysms. Surgical management, particularly clipping via interhemispheric approaches, poses significant challenges and risks. This report discusses a case of ruptured PCA aneurysm managed successfully through microsurgical intervention.

Case Presentation: A 47-year-old woman presented with a week-long history of intense headache. Initial evaluation revealed a Glasgow Coma Scale score of 15 and positive signs of meningeal irritation. CT imaging showed subarachnoid hemorrhage, and CT angiography confirmed a saccular aneurysm in the left pericallosal artery. Classified as Hunt and Hess grade 2, the patient underwent aneurysm clipping via an anterior interhemispheric approach. The operation included bifrontal craniotomy, meticulous arachnoid dissection and clip application, confirmed with intraoperative fluorescence. Postoperatively, the patient demonstrated an uneventful recovery with no neurological deficits or rebleeding during a 3-year follow-up period.

Conclusion: This case highlights the challenges of managing PCA aneurysms, emphasizing microsurgical clipping as a safe and effective treatment, particularly in resource-limited settings. Early surgical intervention, meticulous operative planning, and follow-up are critical for optimizing outcomes and minimizing complications.

Keywords: Neurosurgical procedures, Saccular aneurysm, Subarachnoid hemorrhage

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Highlights

- Pericallosal artery aneurysms (PAAs) are rare, accounting for only 2-9% of intracranial aneurysms.
- Despite their small size, pericallosal aneurysms have a high rupture risk and morbidity.
- Microsurgical clipping effectively managed our case via an interhemispheric approach.
- Endovascular therapy is often avoided due to the aneurysm's anatomical complexity.
- A 3-year follow-up showed no neurological deficits or aneurysm recurrence post-surgery.

Introduction

Pericallosal artery aneurysm (PAA) is a rare experience in routine clinical practice, constituting only 2-9% of all intracranial aneurysm cases [1]. Among these cases, merely 4% have been noted to rupture [2, 3]. Typically saccular in shape with a large neck, PAA aneurysms, despite their relatively small size, exhibit a heightened predisposition to rupture compared to their anterior circulation counterparts [4, 5]. Surgical intervention for this rare anomaly poses a significantly escalated risk of morbidity and mortality compared to other aneurysm types [5, 6].

In this instance, we aimed to elucidate the interhemispheric approach surgical procedure employed in a female patient harboring a PAA at our institution. We furnish detailed insights into the operative management undertaken on the patient, contextualizing our discussion with reference to existing literature.

Case Presentation

A 47-year-old woman was presented to the emergency department with a severe headache that had persisted for the past week. The headache had worsened over the last two days and was described as intense, resembling heavy pressure. The patient sought treatment at our facility after an unsuccessful 4-day treatment at a hospital in a border region. Upon examination, the patient was fully conscious and denied any history of fainting, nausea, vomiting, seizures, or motor and sensory deficits in her limbs. Although she had a history of hypertension, she reported inconsistent adherence to her prescribed medication.

Upon arrival, the patient reported a visual analog scale reading of 5/10. She maintained full consciousness with

a Glasgow coma scale (GCS) score of 15. A neurological examination revealed positive signs of meningeal irritation. A head CT scan unveiled subarachnoid hemorrhage (SAH) in bilateral frontal regions, the interhemispheric fissure, and both Sylvian fissures. Further investigation via computed tomography angiography (CTA) revealed a saccular aneurysm in the left pericallosal artery (Figure 1), leading to the recommendation of aneurysm clipping. The patient was classified as Hunt and Hess, grade 2.

Operative procedure

The patient underwent aneurysm clipping via an interhemispheric approach in a supine position with her head in a neutral position and slightly extended. Stabilization ensued using Mayfield 3-point fixation, followed by a $\frac{3}{4}$ coronal incision and bifrontal craniotomy, with a larger bone opening on the right side. The dura mater was incised with its base on the superior sagittal sinus. Arachnoid dissection facilitated brain relaxation, identifying the callosomarginal artery and pericallosal artery structures (Figure 2A). Subsequent dissection and clipping of the aneurysm ensued, followed by fluorescence examination to confirm clip adequacy and patency (Figures 2B and 2C). Hemostasis and watertight dural closure marked the culmination of a 2.5-h operation.

Follow-up and outcome

Postoperatively, the patient underwent a 2 day intensive care unit stay before being transferred to the general ward, where she received 14 days of care without clinical deterioration. Over a 3 year follow-up period, the patient resumed daily activities without neurological deficits or rebleeding signs, albeit without repeat angiography due to financial constraints.

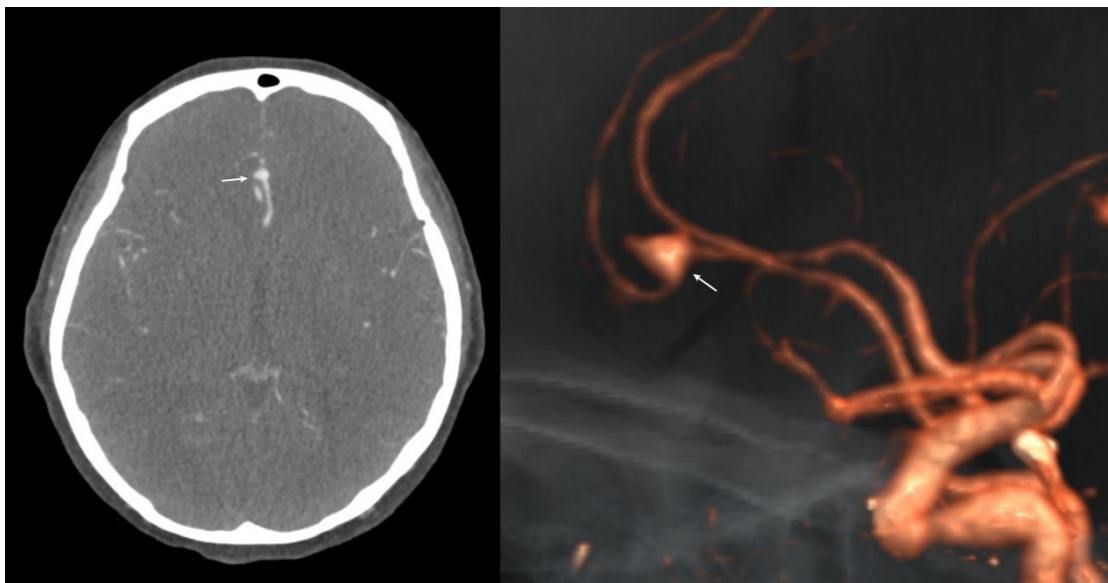


Figure 1. Computerized tomography angiography in axial cross-section (left) and 3D reconstruction (right) revealing a dome-shaped aneurysm in the pericallosal artery

Discussion

PAA is an intracerebral aneurysm in the anterior circulation originating around A2-A5 [4, 7]. This aneurysm is rare, accounting for only 2%-9% of total intracranial aneurysm cases. Among reported cases, only 4% are found to have ruptured [2, 3]. The most common location of these aneurysms is at the bifurcation between the

callosomarginal artery and the pericallosal artery. However, in some specific cases, aneurysms can be found in the proximal area of this region [5]. Typically, PAAs are small saccular formations, although there have been reports of fusiform or giant aneurysms in this area as well [5, 8-10]. The main causes of these aneurysms are related to congenital cases, although trauma, infection, and iatrogenic causes have also been reported [9, 10].

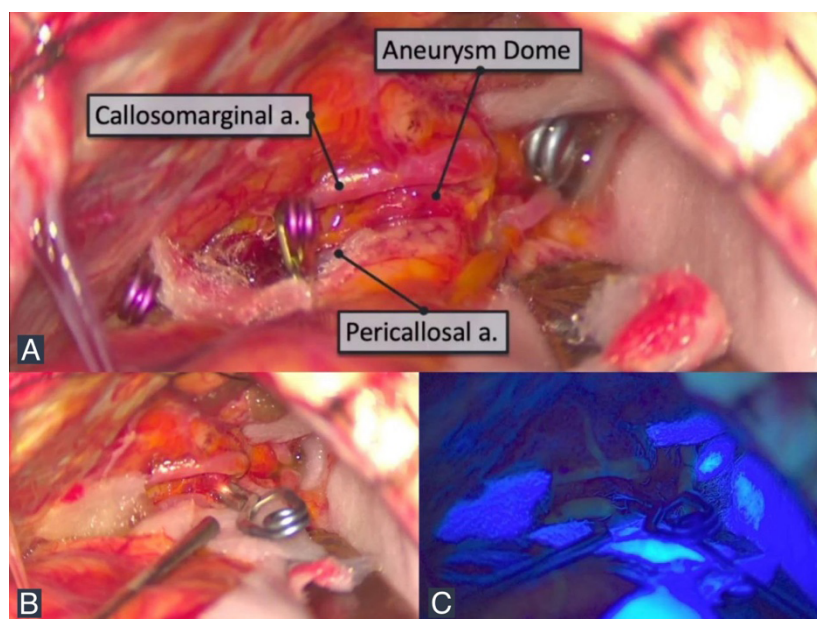


Figure 2. Intraoperative findings

A) The insertion of temporary clipping, B) The permanent clipping at the aneurysm neck, C) The use of fluorescence to evaluate the adequacy of the permanent clip.

Despite their relatively smaller size compared to aneurysms in other locations, they are prone to rupture and hemorrhage, thus carrying a higher risk of morbidity and mortality if not managed properly [5, 6].

PAA typically presents with clinical manifestations of spontaneous intracranial hemorrhage [1]. Ruptured PAAs can manifest as SAH, intracerebral hemorrhage (ICH), or hemorrhage around the corpus callosum. Clinical findings may also include the coexistence of arteriovenous malformations and acute subdural hematomas caused by ruptured PAA [11, 12]. Previous reports have also noted the coexistence of PAA with corpus callosum lipoma [8]. In addition to the typical clinical manifestations of SAH, signs and symptoms may include hemiparesis, paraparesis, sensory abnormalities in the lower extremities, sphincter dysfunction, behavioral disturbances, and seizures [3, 9]. Diagnosis of PAA can be established through angiography, including CT angiography, MR angiography, or digital subtraction angiography [1]. Radiological examinations are crucial for determining the diagnosis, identifying the affected blood vessels, and planning the operation. Additionally, these examinations can detect anomalies or lesions concomitantly with the aneurysm.

The primary goal of managing PAA is identification and intervention to prevent re-rupture of the aneurysm and vasospasm in the patients [6, 9, 13]. Patient management may involve microsurgical or endovascular procedures. Conservative therapy is not recommended for patients with PAA due to the high likelihood of recurrent bleeding in this type of aneurysm, as well as the associated high mortality [5, 9]. Endovascular intervention is not recommended due to the anatomical shape of the lesion, which poses a high risk of complications and a high risk of recanalization. The choice of operative procedure is tailored to the location of the aneurysm along the pericallosal artery and the presence or absence of multiple aneurysms [6]. Microsurgery operative approaches for PAA cases are generally challenging due to the narrow surgical corridor, potential need for sacrificing bridging veins in the surface area, interhemispheric adhesions, difficulty controlling major blood vessels, limited surgical landmarks, and the orientation of the aneurysm dome often facing the operating surgeon, resulting in a high risk of intraoperative bleeding [5, 6, 9]. Some operative approaches for PAA cases may include pterional, anterior interhemispheric (such as in our case), frontobasal interhemispheric, and subfrontal approaches [3, 6, 9, 14]. Some cases may be managed with endovascular therapy, particularly those with small-sized aneurysms and broad bases located more distally [5]. Although endovascular

therapy has been reported in many PAA cases by some case reports, some authors feel that microsurgical management provides optimal results for patients in the short and long term [5, 7].

Several prognostic factors in PAA cases include the severity of SAH determined by initial grading at onset, the presence of ICH in patients, recurrent bleeding before surgical intervention, prolonged time from onset to surgical intervention, the presence of hydrocephalus occurring before surgical intervention, patient age, and the experience of the surgeon [4, 5, 9]. In this case, our patient experienced success and improvement with the operative intervention we performed, with no surgical procedure complications or signs of rebleeding during a 3-year follow-up.

Conclusion

PAA represents a rare anomaly in routine clinical practice, necessitating surgical intervention associated with elevated morbidity and mortality risks compared to other aneurysm types. However, clipping remains a safe and efficacious modality for managing PAA, especially in resource-constrained healthcare settings.

Ethical Considerations

Compliance with ethical guidelines

All study procedures were in compliance with the ethical guidelines of the Declaration of Helsinki 2013.

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Authors contributions

Conceptualization, investigation, review and editing: I Wayan Nirvana, Made Bhuwana Putra, Christopher Lauren, Yosep Mote, and I Gusti Ketut Agung Surya Kencana; Writing the original draft: I Wayan Nirvana, Made Bhuwana Putra and Christopher Lauren; Supervision and resources: I Wayan Nirvana.

Conflict of interest

The authors declared no conflict of interest.

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