

LETTER TO THE EDITOR**To THE EDITOR****Unruptured Posterior Cerebral Artery Aneurysm Presenting with Temporal Lobe Epilepsy**

Keywords: Posterior cerebral artery, Intracranial aneurysm, Epilepsy, Seizure, Microsurgery

The International League Against Epilepsy (ILAE) proposed a new epilepsy classification scheme in 2013.¹ The framework, which was formalized in 2017, builds upon several previous iterations while emphasizing the importance of seizure etiology at each level of classification. However, a recent systematic review reported that “epilepsy of unknown origin” continues to be the most prevalent diagnosis.² The same study found structural/metabolic etiologies account for 40% of cases.²

Unruptured intracranial aneurysms are often asymptomatic or accompany vague symptoms like headaches; however, they may also cause cranial neuropathies or lead to cerebral ischemia.³ Giant aneurysms or those that project into cortical surfaces (i.e., the medial temporal lobe) can certainly lead to seizures. Overall, posterior cerebral artery (PCA) aneurysms are uncommon and hence they are very rarely implicated as the cause for seizures.

A search of the MEDLINE and EMBASE databases was performed with the specific Medical Subject Headings (MeSH) and keywords for (epilepsy or seizures) and (PCA and intracranial aneurysms). A total of 14 studies were initially identified. Titles and abstracts were screened; studies that described PCA aneurysms presenting with seizures were included. Of the seven remaining studies, two were excluded on further review. One did not have full text available and the other described a mycotic aneurysm located in the calcarine sulcus in the setting of metastatic choriocarcinoma.^{4,5} A summary of the cases is presented in Table 1.

Here, we report a patient who experienced stereotypic spells consistent with temporal lobe epilepsy which was caused by an unruptured PCA aneurysm.

A 59-year-old left-handed man with a history of dyslipidemia and hypertension presented with episodes consistent with focal aware seizures. The patient described that these events began

with a sense of panic and feeling like a curtain was coming down upon him with associated cognitive slowing as if he was wading through water. Soon thereafter, he would develop severe nausea with no emesis. These experiences lasted several minutes without loss of awareness, followed by an immediate return to his cognitive baseline. These events occurred two to three times per week with no identifiable triggers. His neurological examination did not yield focal deficits.

The patient was started on carbamazepine 200 mg BID empirically and referred to an epileptologist. A computed tomography angiogram and magnetic resonance imaging revealed a 7 mm aneurysm arising from the P2 segment of the left PCA that was embedded in the medial aspect of the left parahippocampal gyrus with increased signal suggesting inflammation or edema (Figure 1). A cerebral angiogram confirmed the presence of the superolaterally projecting saccular aneurysm (Figure 1).

After considering endovascular and open surgical management options, as well as a conservative approach, microsurgical clip repair through a left subtemporal approach was recommended. This decision was based on the aneurysm size, distal location of the aneurysm, significant proximal vascular tortuosity, and small parent artery diameter. Furthermore, the surgical approach would also allow for resection of any local abnormal tissue. The patient underwent neuropsychological evaluation which suggested left hemisphere language dominance and low risk of significant cognitive decline with the proposed lesionectomy without hippocampal resection. An electroencephalogram showed moderate left temporal dysrhythmia seen maximal over the mid to posterior temporal derivations with a variable centroparietal field. These findings indicated focal cerebral dysfunction arising from the area most indicative of an underlying structural abnormality.

The surgery proceeded as planned with a left subtemporal craniotomy, clipping of the aneurysm base, and resection of gliotic tissue surrounding the aneurysm dome (Supplementary Figure 1). There was no evidence of adjacent hemosiderin deposition. The postoperative imaging confirmed satisfactory clipping, and the patient remains seizure free 5 months after surgery. He remains on carbamazepine which will be reassessed on his 6-month follow-up.

Table 1: Summary of cases with PCA aneurysms presenting with seizures.

Authors and Year	Patient Age	Patient Sex	Aneurysm Location	Seizure Classification	Intervention	Outcome
Yacubian et al., 1994	30y	M	R PCA	Focal unaware	Amygdalohippocampectomy and endovascular occlusion	Seizure free for 15 months
Putty et al., 1991	7w	F	R P2 PCA	Focal awareness unknown	Surgical clipping	Seizure free for 1 year
Peera and LoCurto, 2009	35y	M	L P2 PCA	Focal aware	Endovascular occlusion	No follow-up specified
Lad et al., 2012	34y	M	R PCA	Focal unaware	Partial temporal lobectomy, amygdalohippocampectomy, and surgical clipping	Seizure free for 11 years
Casey and Moore, 1994	24y	M	L P2 PCA	Generalized non-motor and generalized tonic-clonic	Surgical clipping	Seizures controlled with carbamazepine for unspecified duration

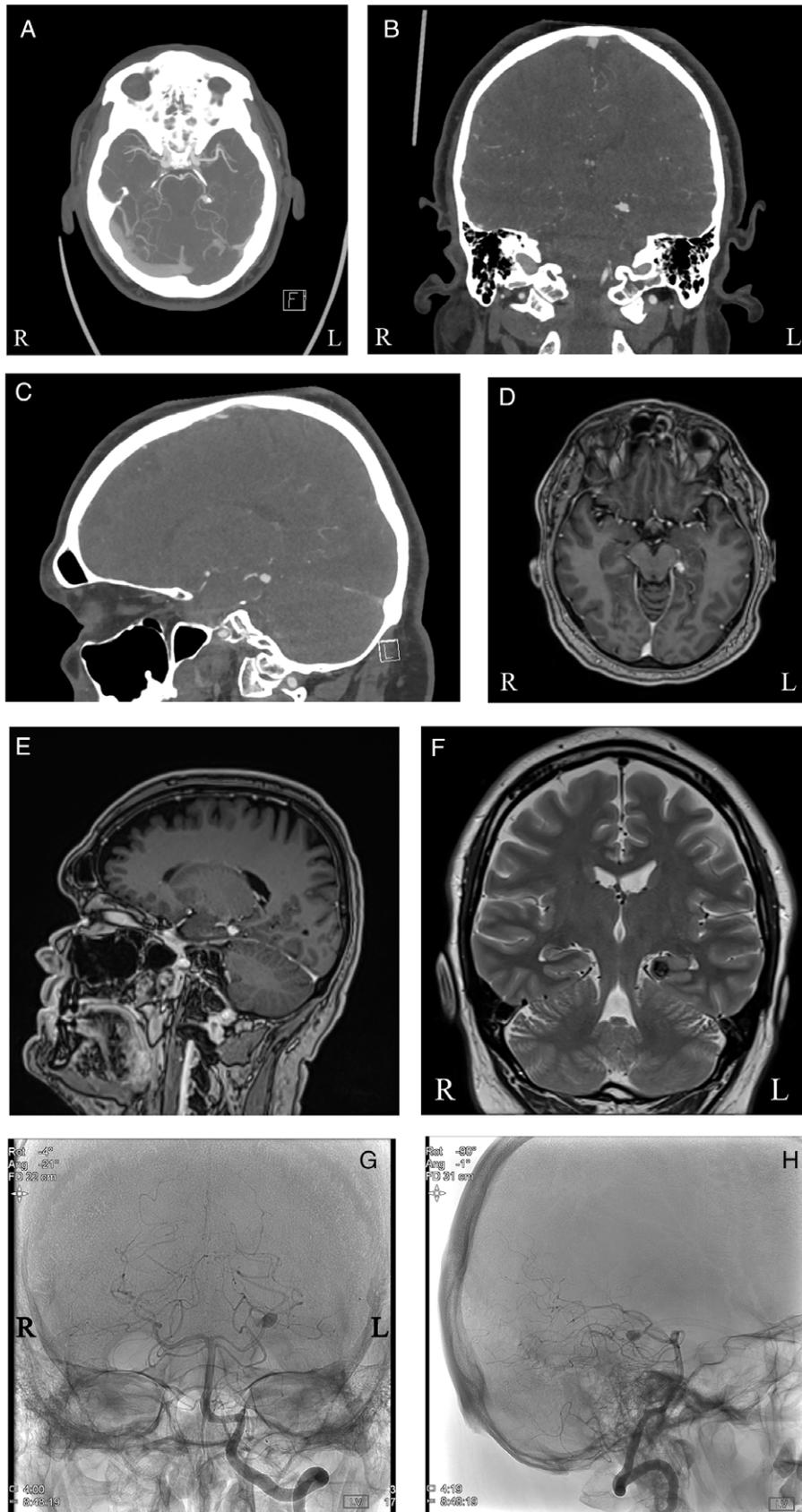


Figure 1: Findings of diagnostic imaging. CTA slices in axial (A), coronal (B), and sagittal (C) views suggest a left PCA aneurysm which protrudes into the left parahippocampal gyrus. MRI slices in axial (D), sagittal (E), and coronal (F) views similarly suggest a left PCA aneurysm projecting into the left parahippocampal gyrus. Cerebral angiography demonstrating a left PCA aneurysm in coronal (G) and sagittal (H) views.

This case contributes to the literature describing PCA aneurysms as an epilepsy etiology. A review of the literature identified five cases of patients with PCA aneurysms presenting with seizures (Table 1).^{6–10} The median age was 30, with range between 7 weeks to 35 years. Unique to the present case, the patient is the oldest reported at 59 years of age. Males were more common in this series (4 males, 1 females), and aneurysms were more frequently present in the right hemisphere (3 right, 2 left). Notably, seizure onset was focal in four cases.^{7–10} Of these, awareness was described in two patients as being impaired and in one patient as intact.

Casey and Moore described a patient manifesting with generalized seizure.⁶ This case was unique in that the 24-year-old male was believed to have developed the aneurysm following a closed head injury. The remaining cases do not identify an explicit etiology, this being consistent with common understanding that cerebral aneurysms are often multifactorial acquired lesions. The etiology of the seizures could be due to several causes including gliosis secondary to subclinical hemorrhage or mass effect and impingement into the adjacent medial temporal cortex.

Two of the five cases identified in the literature underwent endovascular treatment of their aneurysms.^{8,10} Posterior circulation aneurysms are often treated with an endovascular approach due to the challenging surgical exposure and the close proximity of other deep brain structures. Notably, outcomes in these cases were largely comparable to those treated with surgery, with no described follow-up morbidity or mortality in either group.^{6,7,9} One benefit to choosing microsurgical clipping is the direct visualization of the surrounding cortex allowing for concurrent lesionectomy. However, the choice of treatment modality ought to consider factors including patient characteristics, aneurysm morphology and location, and physician expertise.¹¹

This case report adds to the limited literature describing unruptured PCA aneurysms presenting with seizures. This patient was significantly older than previous cases, and he experienced focal aware seizures consistent with temporal lobe epilepsy for some time before seeking medical care. His seizures have not recurred 5-month post-clipping and lesionectomy. Almost all previous cases also presented with focal aware seizures and their seizures were reduced post-intervention. Both endovascular and surgical therapies have demonstrated similar efficacy with no clear morbidity or mortality advantage to either modality in this small group of patients.

DISCLOSURES

The authors have nothing to disclose.

STATEMENT OF AUTHORSHIP

All authors made significant contributions to this manuscript. GR was the most responsible physician for the procedure discussed in this case report. YA was the consultant epileptologist. MF was the resident neurosurgeon involved in this case report and helped obtain and clarify case information. LY wrote the initial draft of the manuscript. MF, YA, and GR reviewed and revised the manuscript.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit <https://doi.org/10.1017/cjn.2020.105>.

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REFERENCES

- Scheffer IE, Berkovic S, Capovilla G, et al. ILAE classification of the epilepsies: position paper of the ILAE Commission for Classification and Terminology. *Epilepsia*. 2017;58:512–521.
- Fiest KM, Sauro KM, Wiebe S, et al. Prevalence and incidence of epilepsy. *Neurology*. 2017;88:296–303.
- Raps EC, Rogers JD, Galetta SL, et al. The clinical spectrum of unruptured intracranial aneurysms. *Arch Neurol*. 1993;50:265–268.
- Huang LT, Shih TY, Lui CC. Posterior cerebral artery aneurysm in a two-year-old girl. *J Formos Med Assoc*. 1996;95:170–172.
- Yeo CJJ, Britz GW, Powell SZ, Smith RG, Zhang YJ. Recurrent cerebral hemorrhage in normal pregnancy secondary to mycotic pseudoaneurysms related to choriocarcinoma. *World Neurosurg*. 2018;109:247–250.
- Casey ATH, Moore AJ. A traumatic giant posterior cerebral artery aneurysm mimicking a tentorial edge meningioma. *Br J Neurosurg*. 1994;8:97–99.
- Lad SP, Shannon L, Byrne RW. Incidental aneurysms in temporal lobe epilepsy surgery: report of three cases and a review of the literature. *Br J Neurosurg*. 2012;26:69–74.
- Peera MA, LoCurto M. Temporal lobe seizures from a posterior cerebral artery aneurysm presenting as memory flashbacks. *CJEM*. 2009;11:389–392.
- Putty TK, Luerssen TG, Campbell RL, Boaz JC, Edwards MK. Magnetic resonance imaging diagnosis of a cerebral aneurysm in an infant. Case report and review of the literature. *Pediatr Neurosurg*. 1990;16:48–51.
- Yacubian EMT, Rosemberg S, Silva HCA da, Jorge CL, Oliveira E de, Assis LM de. Intractable complex partial seizures associated with posterior cerebral artery giant aneurysm: a case report. *Epilepsia*. 1994;35:1317–1320.
- Tsianaka E, Al-Shawish A, Potapov A, Fountas K, Spyrou M, Kononov N. Clipping versus coiling in posterior circulation intracranial aneurysms: a meta-analysis. *Chinese Neurosurg J*. 2019;5:16.