

Case Report

Endovascular glue embolization of the medial posterior choroidal artery aneurysm: A case report and a literature review

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ABSTRACT

Background: The medial posterior choroidal artery (MPCA) aneurysm is extremely uncommon. Thus yet, just a few cases have been reported. Due to the deep position, narrow lumen, fragile walls, and extensive tortuosity, both endovascular and microsurgical procedures are strictly limited. A case study of successful endovascular glue embolization of a left MPCA aneurysm and a literature review is included in this report.

Case Description: A 17-year-old female arrived at our institution 2 days after suffering a major intraventricular hemorrhage with a minor subarachnoid hemorrhage. Digital subtraction angiography revealed a left MPCA aneurysm. The patient underwent a successful endovascular glue embolization and had a favorable functional outcome.

Conclusion: Endovascular glue embolization yielded favorable clinical and angiographic results in MPCA aneurysms where microcatheter access and maneuverability are challenging.

Keywords: Choroidal artery, Endovascular glue embolization, Intraventricular hemorrhage, Medial posterior choroidal artery aneurysm, Subarachnoid hemorrhage

INTRODUCTION

Intraventricular or distal aneurysms are uncommon diseases, with most occurrences being related to moyamoya disease or being idiopathic. Indeed, 22 cases of posterior choroidal artery aneurysms have been reported in clinical practice to date, 16 of which are associated with moyamoya, four of which are idiopathic, and two of which are associated with arteriovenous malformation.^[9,15,21,22] Intraventricular hemorrhage is caused by choroidal artery aneurysms with fragile collateral in the periventricular area. The development and natural history of such aneurysms caused by choroidal collaterals are not thoroughly understood. Moreover, the resulting aneurysm is classified as a pseudoaneurysm.^[11]

Medial posterior choroidal artery (MPCA) aneurysms are rare in clinical practice, having been diagnosed in just five cases;^[1,2,13,16,18] hence, any new report on the topic is anticipated.

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Lateral posterior choroidal artery (LPCA) aneurysms are more prevalent, with over 20 examples documented in the literature.^[3-5,7,10,12,14,17,19,22] The current case report reports an MPCA aneurysm with massive intraventricular hemorrhage and mild subarachnoid hemorrhage that was successfully managed by endovascular glue embolization.

CASE PRESENTATION

A 17-year-old female presented with a sudden onset severe headache followed by a loss of consciousness for the past 2 days. She had left blurring of vision and weakness in the left half of her face for the past 2 days. The patient had no history of seizures or systemic infections. There was no history of substance abuse or any history favoring coagulation disorders. No similar history was present in any of the family members. Normal developmental milestones were met by the patient. On examination, Glasgow Coma Scale was E3V4M5, pulse was 78/min, and blood pressure was 112/72 mmHg. There was no neck rigidity. The tone and deep tendon reflexes were normal. The plantar was an extensor on the left side. Cranial nerve examination revealed the left homonymous hemianopia and upper motor neuron type of the left facial paresis (House-Brackmann grade 2).

A non-contrast computed tomography (CT) scan of the brain revealed a large acute intraventricular with minimal subarachnoid hemorrhage [Figure 1a]. Routine blood investigations were within normal limits. The coagulation profile was reported to be within the normal range. The patient underwent six vessels selective digital subtraction angiography (DSA) on a biplane DSA machine emergency basis and the report revealed a distally placed aneurysm arising from the left MPCA. The neck of the aneurysm was 0.6 mm and the dome sized 1.4 × 1.2 mm was directed upward and medially [Figures 1b and c].

Due to its distal location in the atrium below the splenium, the microsurgical approach may have increased the patient's visual problem and it was technically difficult to localize the aneurysm. Microsurgical dissection may also have more chances of intraoperative rupture so we planned for endovascular embolization. Under general anesthesia, femoral artery access was achieved. For distal access, we used a 5F long femoral sheath (Cook Medical, Bloomington, IN, USA), Navien™ Intracranial Support Catheter (Covidien Vascular Therapies, Mansfield, MA, USA), Marathon™ microcatheter (010) (Medtronic, Minneapolis, Minnesota, USA), and Mirage™ microguidewire, (008) (EV3, Mansfield, MA, USA). Moreover, we performed super-selective angiography to look for the angioarchitecture of the aneurysm and the parent vessel [Figure 2a]. We have to use a Marathon™ flow-guided microcatheter as we could not negotiate a microcatheter of 014 sizes used for coiling. We performed super-selective angiography for better anatomical localization of branching vessels and configuration of the aneurysm. Since coiling was not an option for us in the present case, we performed endovascular glue embolization. N-butyl cyanoacrylate, Histoacryl® (B/Braun, Tuttlingen, Germany), was mixed in a 1:3 ratio with Lipiodol® UltraFluid (Guerbet, Villepinte, France) and used for the embolization of both the aneurysmal sac and the affected portion of the parent artery [Figure 2b]. The patient was kept intubated, closely monitored in the neurosurgical intensive care unit, and extubated on postoperative day 1. Serial check non-contrast CT revealed a resolving hemorrhage with glue cast *in situ* [Figures 2c and d]. Postoperative magnetic resonance imaging brain showed abnormal blooming in the area of the trigone and left occipital horn junction with no infarct or hemorrhage [Figures 3a and b]. Postoperatively, the left homonymous hemianopia improved together with the left facial palsy. The patient was discharged in satisfactory

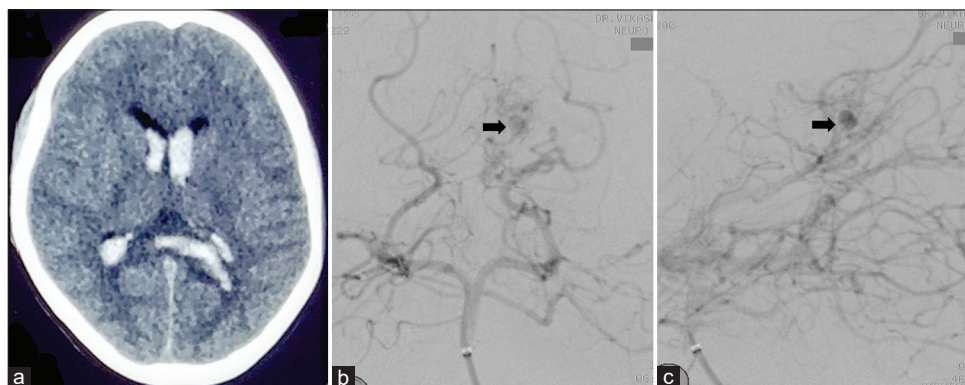


Figure 1: Initial presentation. (a) A non-contrast computed tomography scan of the brain revealed a large acute intraventricular hemorrhage almost filling all the horns of the ventricles with minimal subarachnoid hemorrhage. (b) Anteroposterior and (c) lateral projection digital subtraction angiography after right vertebral artery injection showing distally placed aneurysm arise from the left medial posterior choroidal artery which is directed upward and medially (arrow).

condition on postoperative day 5. On follow-up of 3 months, the patient has no neurological deficit with follow-up CT angiography revealing no residual aneurysm or infarct with resolved intraventricular hemorrhage.

DISCUSSION

The posterior cerebral artery (PCA) gives rise to the medial and lateral posterior choroidal arteries. In 14.3% of cases, the MPCA arises from the P1 segment of the PCA; in 70% of

cases, the artery branches into a single vessel at the beginning of the P2 segment; and much less frequently, the MPCA arises from the distal segment of the PCA. The MPCA envelops the lateral surface of the midbrain and supplies the pineal gland, medial and dorsal sections of the pulvinar, superior colliculus of the quadrigeminal, lateral and medial geniculate bodies, brain stem, tegmentum, and medial and lateral geniculate bodies through a number of small perforators.^[6]

Fusiform aneurysms of the terminal segments of the choroidal arteries are known as intraventricular aneurysms or peripheral aneurysms. They sometimes have no visible neck. Due to their tiny size, deep position, and anatomical structural characteristics, posterior choroidal artery aneurysms are difficult to cure surgically or endovascularly. Few papers specifically address the endovascular treatment of MPCA aneurysms, highlighting its complexity and the difficulties of selective exclusion of the aneurysm.^[11,14,21] The posterior choroidal artery's narrow lumen, fragile walls, and considerable tortuosity severely limit the application of endovascular surgical procedures, in which the majority of instances led to aneurysm exclusion by parent artery occlusion.^[2,3,11,19,21] An equivalent endovascular surgical technique may be an appealing alternative method of management because it avoids manipulation of the brain parenchyma, but catheterization of arteries can be difficult due to their size, numerous loops, or fragile aneurysm walls that are more susceptible to rupture with coils. The therapeutic equivalent of open surgical aneurysm entrapment and parent vascular occlusion is achieved by trans-arterial embolization of the parent artery. Weigle *et al.*^[19] reported an idiopathic LPCA aneurysm with intraventricular and subarachnoid hemorrhage treated with endovascular embolization. Similarly, Fukuda *et al.* reported an idiopathic LPCA pseudoaneurysm that caused a spontaneous thalamic hemorrhage that was surgically managed.^[7] Other reported cases of posterior choroidal artery aneurysms with their presentation and management are shown in Table 1. Although glue embolization is reported in LPCA aneurysms; probably, it is one of the first instances where we used n-butyl cyanoacrylate for controlled obliteration of aneurysm and

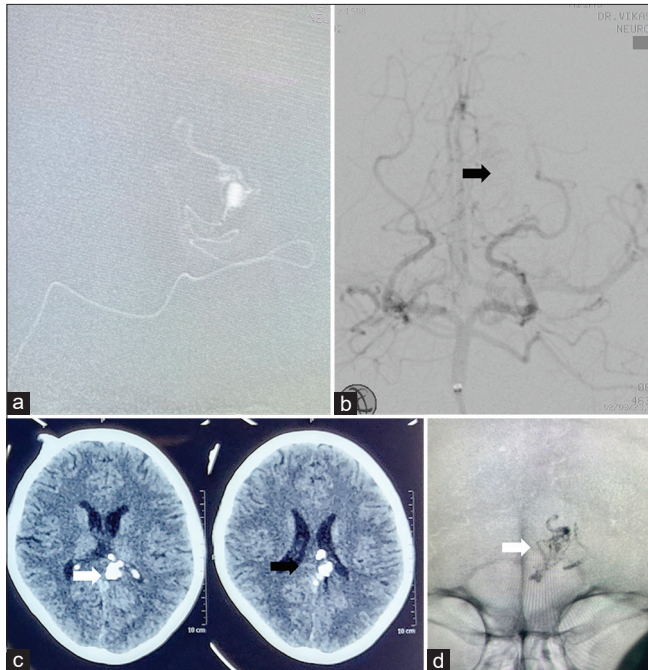


Figure 2: Endovascular Glue embolization. (a) Super-selective digital subtraction angiography (DSA) showing the tortuosity of the parent vessel and the angioarchitecture of the distally placed aneurysm arising from the left medial posterior choroidal artery. (b) Check DSA showing the complete obliteration of the aneurysm with maintained parent vessels and distal flow (black arrow). Postprocedure (c), non-contrast computed tomography head, and (d), skull fluoroscopy showing the glue cast (white arrow).

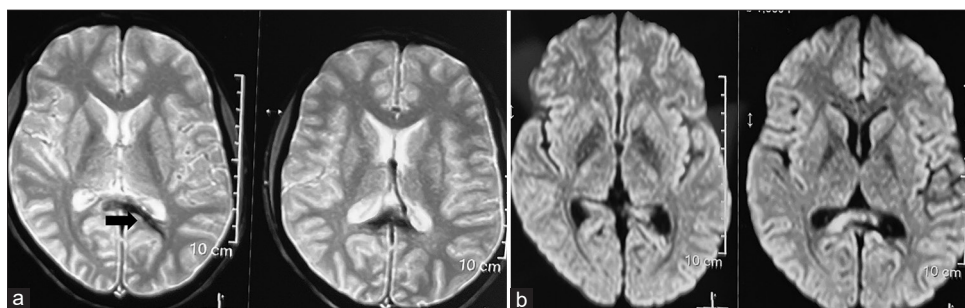


Figure 3: Postoperative magnetic resonance imaging. (a) Axial view susceptibility weighted image showing abnormal blooming (arrow) at the junction of the trigone and left occipital horn of the lateral ventricle likely depicting the glue cast. (b) Diffusion-weighted image showing no evidence of infarct or any abnormal diffusion restriction.

Table 1: Reported cases of ruptured posterior choroidal artery aneurysms and their Management.

Authors/year	Age/sex	Presentation and location of the aneurysm	Treatment	Outcome
Weigele <i>et al.</i> ^[19] /2002	2 cases: 30 yrs/F and 52 yrs/F	IVH and SAH; LPCA	Endovascular glue embolization	Good
Ali <i>et al.</i> ^[11] /2004	26 yrs/M	IVH; posterior choroidal artery	Conventional clipping	Good
Lévêque <i>et al.</i> ^[14] /2011	50 yrs/F	IVH; distal choroidal artery	Endoscopy-assisted surgery	NR
Fukuda <i>et al.</i> ^[7] /2013	60 yrs M	Thalamic ICH; LPCA	Surgical excision	Good
Grigoryan <i>et al.</i> ^[8] /2017	57 yrs/M	IVH and SAH; MPCA	Conventional clipping	Good
Present Case	17 yrs/F	IVH with minimal SAH; MPCA	Endovascular glue embolization	Good

IVH: Intraventricular haemorrhage, SAH: Subarachnoid haemorrhage, ICH: Intracerebral haemorrhage, LPCA: Lateral posterior choroidal artery, MPCA: Medial posterior choroidal artery, F: Female, M: Male, NR: Not reported

diseased segments in MPCA. Preoperative stroke-like features such as left homonymous quadrantanopia and upper motor neuron (UMN) facial palsy have improved which signifies that such lesions can be treated successfully by glue embolization in such distal locations avoiding microsurgery with good results. Such a feature was not observed in any reported case. Controlled glue injection not only occluded aneurysm but also reduced future rebleed, in this patient no features of stroke of the posterior thalamic region postoperatively.

A few studies have documented spontaneous regression of distal choroidal artery aneurysms after 6 weeks–11 months.^[8,20]

CONCLUSION

Symptomatic MPCA aneurysms are highly uncommon and typically present with severe headaches and massive intraventricular hemorrhage. Endovascular glue embolization may be an appealing option since it avoids the complications of craniotomy and dissection while providing superior clinical outcomes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The author(s) confirms that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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