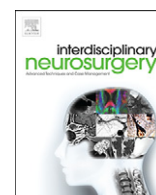




# Interdisciplinary Neurosurgery: Advanced Techniques and Case Management



## Meningioma encased ruptured paraophthalmic aneurysm: case report and review of the literature <sup>☆</sup>



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### ABSTRACT

The association of intracranial aneurysms with meningiomas is rare. We report the first case of a 52-year-old woman in which a ruptured aneurysm was encased within a meningioma and associated with a contralateral extradural aneurysm. A PubMed search of literature using the search words “aneurysm” and “meningioma,” was performed in order to compile previously reported cases. Only 5 cases reported to date of an aneurysm within a meningioma. Although a rare occurrence, this case suggests the possibility of asymptomatic ICA aneurysms located within sphenoid wing meningiomas. Recognition of this possibility may be prudent in order to avoid inadvertent vascular complications during meningioma resection.

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### Introduction

The association of a brain tumor with a cerebral aneurysm is a relatively rare coincidence. Early systematic reviews demonstrated the incidence of this combination to be around 0.5% in all tumor patients, in which meningioma was the most common tumor type (29.3%). Although many reported combinations of meningiomas with aneurysms, there were only 5 patients in whom the aneurysm was encased within the meningioma [1–5]. Of these 5 patients, only 2 presented with SAH [3,4] and only 1 had bilateral aneurysms [5]. We report the unique case of a middle aged woman with bilateral ICA aneurysms, presenting with SAH, and the ruptured ICA aneurysm was found to be encased within a meningioma.

### Case report

#### Clinical presentation and imaging

The patient is a 52-year-old woman who was presented to the emergency room after noting the sudden onset of a progressive

excruciating headache 4 days prior. Her neurological examination was intact, with no visual deficits. Head-CT scan revealed SAH along the left frontoparietal cortex. Cerebral angiography showed a 5.0 mm bi-lobed paraclinoidal ICA aneurysm (Fig. 1a) on the right, and an oblong 3.4 mm paraophthalmic ICA aneurysm on the left (Fig. 1b). A vascular blush was observed in the left sphenoid wing region, suggesting the co-existence of a meningioma (Fig. 1c), and multiple focal regions of distal vasospasm in bilateral ACA, MCA and PCA territories were also detected. The brain-MRI demonstrated a homogeneously-enhancing mass at the left anterior clinoid process measuring 1.6cm × 1.5cm × 1.6cm (Fig. 1d). Despite a broad area of contact between the mass and left ICA, no luminal compromise was noted. There was also minimal medial displacement of the left optic nerve (Fig. 1e).

#### Treatment and clinical course

Microsurgical treatment via a left-sided approach for both the medial sphenoid wing meningioma and the ruptured paraophthalmic artery aneurysm was planned, with a contralateral exploration through the left-sided craniectomy for the right-sided aneurysm for clipping if it was found to be intradural in location. A standard pterional craniotomy was performed with ipsilateral neck dissection in order to obtain proximal control of the left ICA.

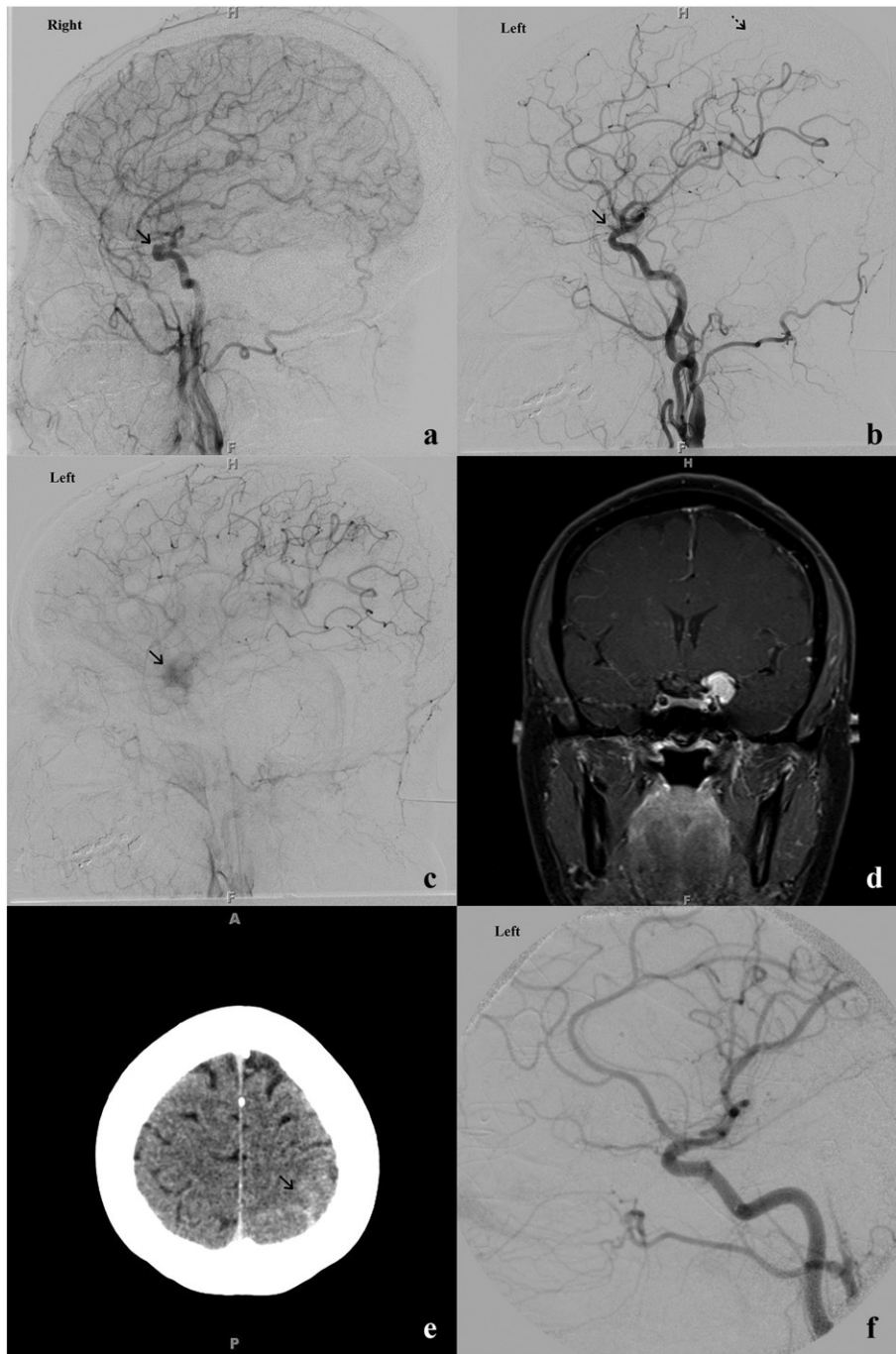
The arachnoid overlying the proximal portion of the Sylvian fissure was divided in order to expose the posterolateral aspect of the tumor with minimal retraction (Fig. 2a). Internal decompression permitted complete delineation of the tumor-brain interface and dissection was accomplished with preservation of the arachnoid

*Abbreviations:* SAH, Subarachnoid hemorrhage; ICA, Internal carotid artery; ACA, Anterior cerebral artery; MCA, Middle cerebral artery; PCA, Posterior cerebral artery; ACoA, Anterior communicating artery; CT, Computed tomography; MRI, Magnetic resonance imaging.

<sup>☆</sup> Conflict of interest: None.

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**Fig. 1.** **a.** Pre-operative lateral cerebral angiogram (right carotid injection) shows a bi-lobed broad based clinoidal aneurysm of the internal carotid artery (arrow). **b.** Pre-operative lateral cerebral angiogram (left carotid injection) shows an oblong paraophthalmic aneurysm (arrow). **Dashed arrow:** Delayed filling of distal middle carotid artery (MCA) branches indicating a diffuse vasospasm. **c.** The late arterial phase of the pre-operative left carotid angiogram reveals a tumor blush (**solid arrow**) and delayed filling of anterior carotid artery (ACA) and MCA perfusion regions. **d.** Pre-operative coronal magnetic resonance imaging (MRI) reveals a left paraclinoidal mass compatible with meningioma, and the encased aneurysm. **e.** Computed tomography (CT) at presentation reveals subarachnoid hemorrhage (**solid arrow**). **f.** Intra-operative angiogram demonstrating no residual aneurysm and intact left ophthalmic artery.

plane separating the tumor from the supraclinoid ICA. After identification of the distal supraclinoid ICA and A1 segment, tumor removal proceeded towards its base at the dura overlying the anterior clinoid process. The last step of the tumor resection involved the portion surrounding the superolateral surfaces of the supraclinoid ICA distal to the dural ring. The medial extent of the tumor was noted to completely surround the proximal neck of the paraophthalmic artery aneurysm and lateral aspect of the left optic nerve. Preserva-

tion of the arachnoid planes allowed removal of the meningioma from the region of the aneurysm neck without difficulty.

After removal of the tumor, the dome of the oblong aneurysm was observed to be embedded in the undersurface of the optic nerve, elevating and rotating the nerve (Fig. 2b). Division of the falciform ligament and intradural anterior clinoidectomy was performed in order to divide the distal dural ring and allow access to the proximal neck of the aneurysm at the proximal ICA. The utilization

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