

# Pure tentorial subdural hematoma from rupture of aneurysm along the transmastoid branches of the occipital artery

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## Abstract

**Background:** Pure subdural hematoma (without subarachnoid, intraventricular, or intraparenchymal hemorrhage) due to a ruptured intracranial aneurysm is rare. Most reported cases involve an aneurysm along the internal carotid artery, posterior communicating artery, or middle cerebral artery. No reports have described an aneurysm along the transmastoid branches of the occipital artery.

**Case Description:** A 70-year-old female presented with sudden-onset, excruciating headaches, associated with dizziness, nausea, and emesis. There was no history of trauma. Computed tomography (CT) head demonstrated a pure tentorial subdural hematoma. Vascular imaging revealed bilateral aneurysms along the transmastoid branches of the intracranial portion of both the occipital arteries. Consequently, these branches were embolized, with no residual filling of the aneurysms. After the procedure, the patient remained neurologically well. The patient was monitored appropriately for vasospasm, and was discharged home 10 days after presentation.

**Conclusion:** Rupture of aneurysms along intracranial branches of the occipital artery can lead to pure subdural hematoma along the tentorium.

**Key Words:** Aneurysmal rupture, occipital artery, subdural hematoma, transmastoid branches, transosseous branches

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## INTRODUCTION

Rupture of an intracranial aneurysm predominantly leads to subarachnoid hemorrhage (SAH), with frequent associations with intraparenchymal hematoma (IPH) or intraventricular hemorrhage (IVH).<sup>[10]</sup> Seldom, an acute subdural hematoma (SDH) can also accompany SAH. According to the literature, the incidence of SDH due to aneurysmal rupture varies up to 10%.<sup>[2,9,10]</sup> On the other hand, pure SDH, without other types of hemorrhage (IVH, IPH, or SAH), from a ruptured aneurysm is rare. Approximately 40 such cases have been reported.<sup>[6,9,10]</sup> Most cases involve an aneurysm along the internal carotid artery, posterior communicating artery, or middle cerebral

artery. No cases have involved aneurysms arising from the intracranial branches of the occipital artery. Here, we describe such a case and review the pertinent anatomy of the occipital artery that would result in a pure tentorial SDH associated with an aneurysmal rupture.

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## CASE PRESENTATION

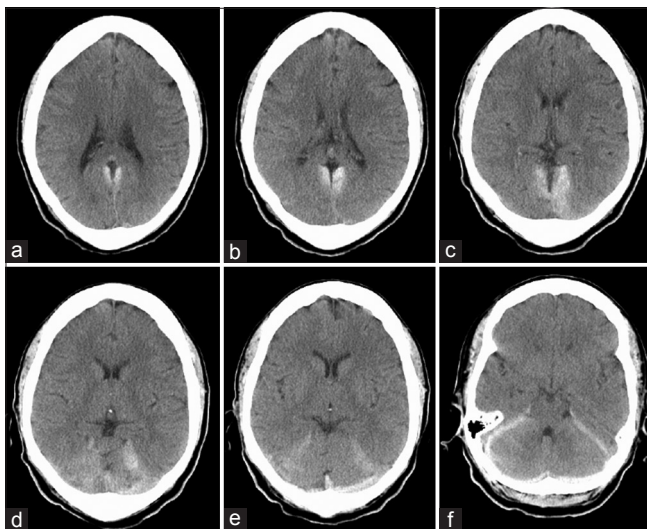
A 70-year-old female, with a history of hypertension, congestive heart failure, renal artery stenosis, and gout, presented with sudden-onset, excruciating headaches, associated with dizziness, nausea, and emesis. There was no history of trauma. Neurological examination was unremarkable. Computed tomography (CT) of the head demonstrated a tentorial SDH [Figure 1]; the hematoma tracked over the superior margins of bilateral cerebellar hemispheres, along the tentorial incisura, and into the posterior interhemispheric fissure. CT angiography of the head revealed a 4 mm hyperdensity along the peripheral left inferior cerebellum and 3 mm hyperdensity adjacent to the right sigmoid sinus, both concerning for aneurysms without clear visualization of the parent vessels [Figure 2]. A diagnostic angiogram divulged bilateral aneurysms, 2.6 × 2.8 mm, along the

transmastoid branches of the intracranial portion of both the occipital arteries [Figures 3 and 4]. Consequently, the transmastoid branches were embolized, with no residual filling of the aneurysms. After the procedure, the patient remained neurologically well. The patient was monitored appropriately for vasospasm, and was discharged home 10 days after presentation.

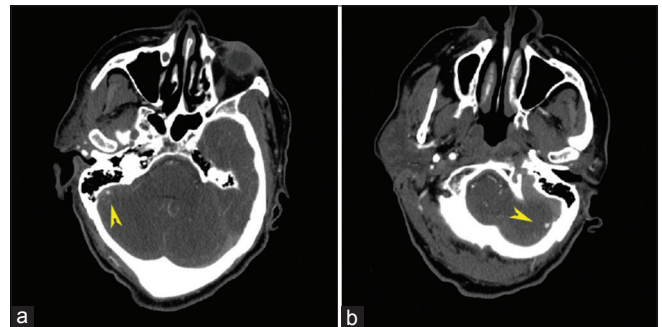
## DISCUSSION

The presence of an acute SDH in addition to SAH from an aneurysmal rupture is associated with a poor prognosis; in particular, acute SDH is an independent predictor for poor outcomes at discharge and at 3 months.<sup>[3]</sup> Old age, sentinel headaches, coexisting intraparenchymal hemorrhage, posterior communicating artery aneurysms, and internal carotid artery aneurysms are features associated with SDH development.<sup>[2]</sup> On the other hand, aneurysms along the vertebral or basilar arteries have been correlated with low risk for SDH development.<sup>[2]</sup> Pure SDH without SAH in the setting of aneurysmal rupture has been linked to better prognosis, perhaps because of the lesser potential for hydrocephalus or vasospasm with the absence of SAH.<sup>[7,9]</sup>

Several mechanisms have been proposed to explain SDH development after aneurysmal rupture. For one, adhesions



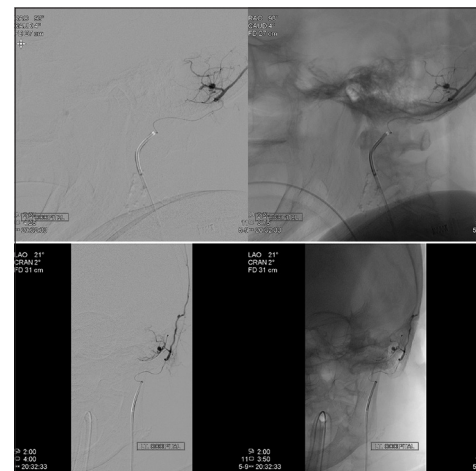
**Figure 1:** (a-f) Serial axial computed tomography demonstrates pure tentorial subdural hematoma without subarachnoid hemorrhage, intraventricular hemorrhage, or intraparenchymal hematoma



**Figure 2:** Axial computed tomography demonstrates right (a) and left (b) hyperdensities concerning for aneurysms



**Figure 3:** Diagnostic angiogram shows aneurysm along the right transmastoid branch



**Figure 4:** Diagnostic angiogram shows aneurysm along the left transmastoid branch

between the aneurysm and the arachnoid membrane could provide a pathway for direct hemorrhage into the subdural space.<sup>[4,10]</sup> Moreover, high systolic blood pressure could provide enough force during rupture to perforate the arachnoid membrane.<sup>[4,10]</sup> Others hypothesize that pure SDH may ensue if the hemorrhaging focus is communicating with the subdural space, permitting the absence of SAH. For example, erosion through a wall of the cavernous sinus by an intracavernous aneurysm can provide direct exposure to the subdural space.<sup>[10]</sup> Furthermore, a distal anterior cerebral artery aneurysm that adheres to the falx may bleed into the subdural space.<sup>[10]</sup>

A significant proportion of the patients with pure SDH involving the tentorium exhibited internal carotid artery—posterior communicating artery aneurysms.<sup>[6,8]</sup> In our patient, there was an aneurysm evident on each of the transmastoid branches emanating from the bilateral occipital arteries. Given no history of trauma and no significant risk factors, the tentorial subdural hematoma was attributed to the rupture of one or both of these aneurysms. The anatomy of the occipital artery and its branches could explain the location of the SDH. The occipital artery originates from the external carotid artery, typically proximal to the facial artery. It has been outlined in three segments; 1) digastric: the vessel travels along a posterior/superior course medial to the posterior belly of the digastric muscle to reach the skull base, 2) horizontal: it tracks medial to the mastoid along the occipital groove and travels superiorly toward the superior nuchal line, and 3) subgaleal: It supplies the occipital muscles and scalp.<sup>[1]</sup> The horizontal segment provides meningeal branches. In particular, the transmastoid branch, promptly after its origin, travels through the mastoid emissary foramen and feeds the dura of the posterior fossa; in addition, it may have a recurrent course. It has been known to supply vascular malformations and tumors of the posterior fossa.<sup>[5]</sup> Conceivably, its close anatomic relationship with the dura can cause a tentorial SDH without SAH. In our patient, aneurysmal rupture likely leads to hematoma along the superior margins of bilateral cerebellar

hemispheres, which could track superiorly through the tentorial incisura to the interhemispheric fissure.

## CONCLUSION

The rupture of aneurysms along intracranial branches of the occipital artery can lead to pure subdural hematoma along the tentorium. For nontraumatic acute subdural hematoma, vigilance should be directed toward a vascular etiology.

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## Conflicts of interest

There are no conflicts of interest.

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