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Case Reports

Rapid, spontaneous obliteration of intracranial arteriovenous malformation

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ABSTRACT

A 35-year-old male presented with headaches and was found to have a Spetzler-Martin grade 2 right occipital arteriovenous malformation (AVM) with single, superficial draining vein. The patient opted to undergo embolization for possible cure with resection scheduled in the event complete obliteration was not achieved. Three weeks later, angiography during his embolization procedure revealed that the AVM had spontaneously obliterated; no treatment was required. In conjunction with prior case reports/series, this patient highlights the need for current imaging prior to proceeding with intervention to confirm that spontaneous obliteration has not occurred between diagnosis and treatment.

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1. Introduction

Intracranial arteriovenous malformations (AVMs) are a rare intracranial pathology with overall prevalence of less than 0.5% [1]. Prophylactic treatment has traditionally been recommended with a historical 1–4% annual hemorrhage rate; although, this approach is now surrounded by great controversy following contemporary natural history studies [2]. On occasion, AVMs have been reported to undergo spontaneous thrombosis — a rare, but clinically significant occurrence. Spontaneous obliteration has been reported to occur in less than 2% of patients [3], usually following a hemorrhage from the AVM [4]. With less than 100 total patients with spontaneous thrombosis reported, the pathophysiology behind this rare occurrence is speculative and wide-ranging [5].

2. Case report

A 35-year-old male presented with a several month history of new onset, right sided, headaches. This prompted MRI of the brain, which showed possible right occipital flow voids (Fig. 1) concerning for AVM. Neither he, nor any family members, had any history of hypercoagulable state.

Given the concern for an AVM, digital subtraction angiography (DSA) was recommended. This revealed a small right occipital AVM with nidus measuring 1.8 cm. The AVM had a single feeding artery, and a single, superficial draining vein (Fig. 2). Immediately following angiography, the patient reported exacerbation of his typical headache. The patient was counseled regarding all treatment options, but given the single feeding vessel and small size of the nidus, endovascular embolization followed by surgical resection should embolization not be curative was recommended and scheduled three weeks later.

In the interim, the patient reported a severe headache 5 days after angiography that lasted for several days. Subsequently, he had cessation of all headaches that initially lead to his MRI. He presented 23 days after his DSA for embolization. Baseline pre-embolization angiography, however, revealed complete obliteration of the AVM without evidence of the previously visualized draining cortical vein (Fig. 3). The patient was subsequently released from the hospital at his neurological baseline. He has since not had any further headaches.

3. Discussion

Spontaneous thrombosis of intracranial AMVs is a rare occurrence, and most often follows a hemorrhage from the AVM [6,3,4]. However, spontaneous obliteration may also occur without an inciting neurological event in up to 40% of patients. Review of all reported patients has shown that a preponderance of AVMs that undergo spontaneous occlusion are small (nidus < 2 cm), have a single draining vein, and have few feeding arteries [5,3]. The mean time to spontaneous thrombosis from diagnosis to documentation of obliteration is approximately 10 months [3].

The cause of spontaneous obliteration of an AVM is unknown. Many have postulated that thrombosis of the draining vein is a common cause. This theory is supported by cases of spontaneous occlusion in patients with hypercoagulable states, as well as by MRI documentation of draining vein thrombosis [7,8]. In these patients, it is not known whether primary venous occlusion occurs and subsequently precipitates hemorrhage, or if hemorrhage subsequently causes mass effect and compression/occlusion of the venous structures. Other theories for spontaneous occlusion

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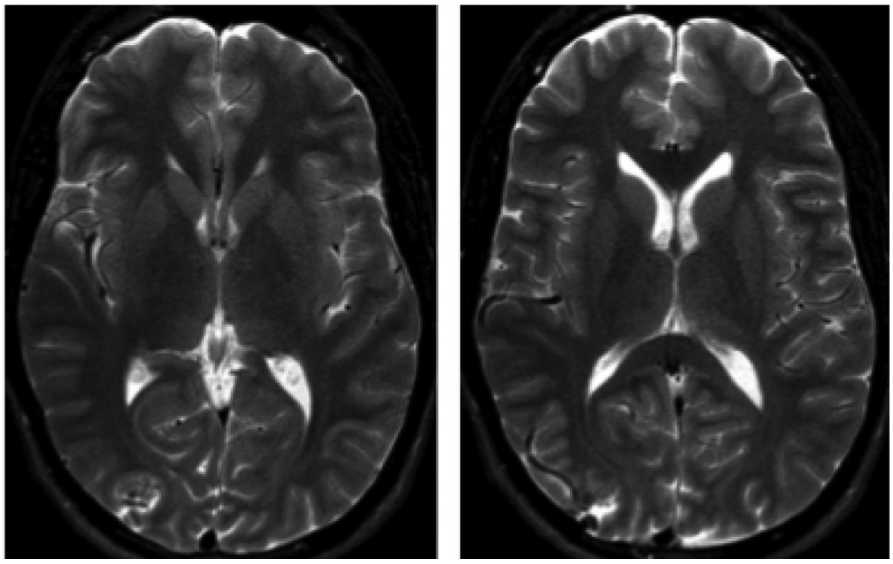

Fig. 1. Axial T2-weighted MRI images with right occipital flow voids suggestive of possible intracranial arteriovenous malformation (AVM).

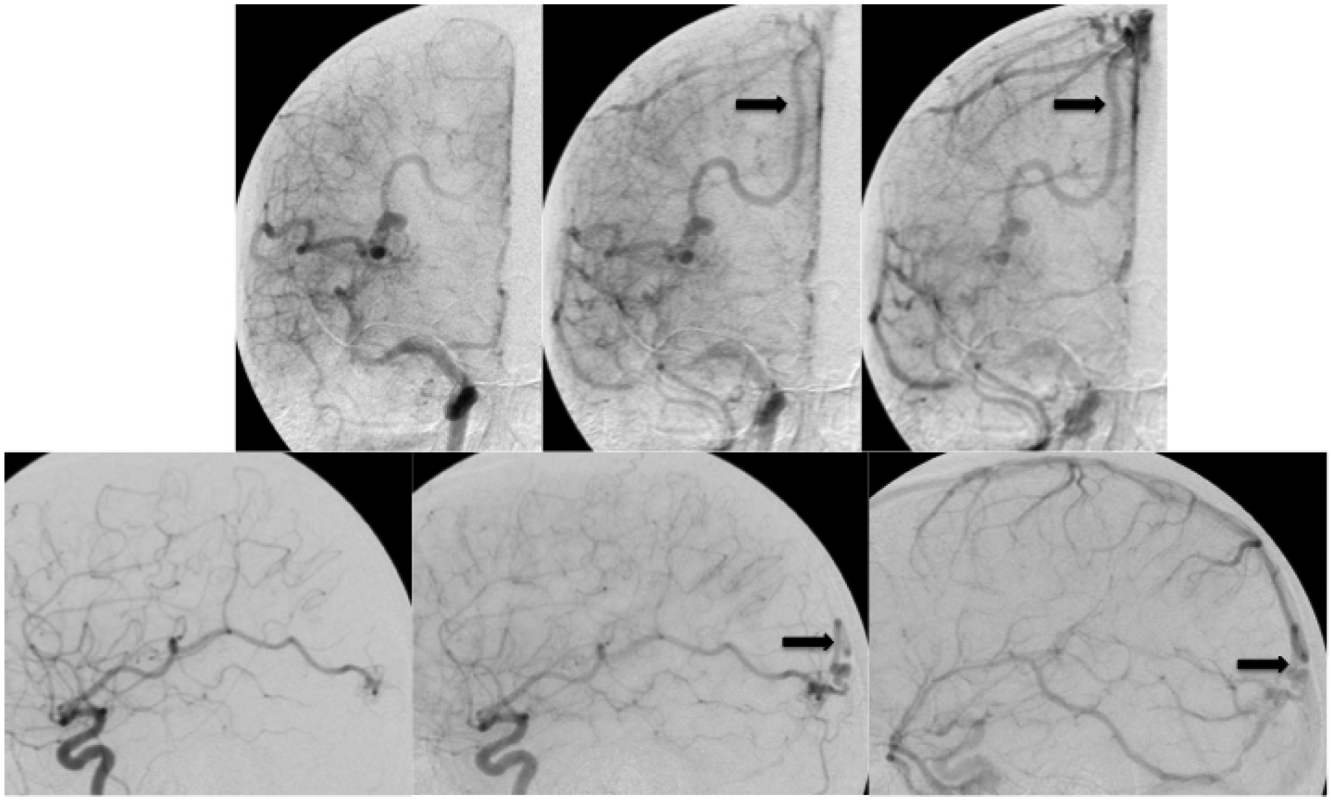

Fig. 2. Anteroposterior (top) and lateral (bottom) initial cerebral angiogram showing Spetzler-Martin grade 2 arteriovenous malformation (AVM) with single arterial feeding vessel, single draining cortical vein (arrows), in eloquent cortex (primary visual).

include feeding vessel atherosclerosis, hemodynamic changes and kinking of feeding vessels [3,4]. Regardless of cause, it is apparent that patients with small AVMs with a single draining vein are the most likely patients to progress towards spontaneous obliteration.

Our patient is unique because the patient had documented thrombosis just 23 days following angiographic diagnosis, making it the earliest spontaneous occlusion that we have found reported in the English language. The next earliest previous documentation reported was at 3 months [3]. We hypothesize that while the angiographic documentation of spontaneous thrombosis was 23 days after diagnosis, that the patient actually experienced occlusion 5 days after angiography when he reported a severe, non-remitting headache for 2 days. It is possible that this represented a venous occlusion with subsequent thrombosis of his AVM. While there has never been a documented link between spontaneous thrombosis of an AVM and angiography, it is hard to ignore the temporal relationship in this patient. Previously, it has been shown that there is a relationship between angiography and migraine headaches [9]. Since migraine headaches are thought to be related to temporary vasoconstriction of cerebral vessels, it is