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Complete spontaneous regression of cerebral arteriovenous malformation: a case report and review of the literature

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ABSTRACT

Spontaneous regression of an arteriovenous malformation (AVM) is the phenomenon of partial or complete obliteration of the vascular anomaly without any therapeutic intervention. Complete spontaneous regression is a rare event with limited previously reported cases in the literature. We present a new case of complete spontaneous regression of a right frontal AVM and report findings from the imaging studies. Furthermore, we present the findings of a detailed literature review and discuss hypotheses regarding the pathophysiology of this rare occurrence.

1. Introduction

Cerebral arteriovenous malformation (AVM) is the presentation of irregular vasculature characterized by the presence of altered arteries, arterialized veins, vessels with intermediate characteristics and arteriovenous shunts, with reduced or absent capillaries [1]. The incidence of cerebral AVMs in the general population ranged between 0.02% to 3.0% [2–5], and are generally considered to be of congenital origin. Common presenting symptoms include hemorrhage, seizures, and headaches [3–5]. Spontaneous regression of an AVM (SRAVM) is a rare event, with limited documentation in the literature [2–8]. Possible underlying mechanisms remain unclear, with hemodynamic alterations considered to be the most important factor [2,4–8].

2. Case report

A 64-year-old male presented with an episode of loss of consciousness. Upon admission, the patient denied headaches, blurred vision, nausea and vomiting. Past medical history was significant for chronic obstructive pulmonary disease, tracheal necrosis, hypertension, congestive heart failure, hyperlipidemia, and diabetes mellitus.

2.1. Imaging studies

Non-contrasted head computed tomography (CT) scan showed a 5 cm right intraparenchymal hematoma centered in the right frontal lobe with intraventricular extent and mild midline shift (Fig. 1A–B). CT angiogram (CTA) demonstrated abnormal vasculature most consistent with an AVM (Fig. 1C–D). Noted in the CTA was a component of superficial drainage via a cortical vein overlying the right frontal lobe and arterial supply predominantly by branches of the right middle cerebral artery (MCA) (Fig. 1C–F). Also noted in the CTA was an incidental finding of a small right posterior fossa dural arteriovenous fistula (DAVF), located at the junction of the right transverse sinus and the vein of Labbe. Digital subtraction angiogram showed a right frontal lobe AVM with a $1.7 \times 1.6 \times 0.6$ cm nidus. There was superficial venous drainage primarily into the right vein of Labbe and superiorly into the superior sagittal sinus via a right frontal cortical vein (Fig. 2). The DAVF had arterial feeders from the right middle meningeal artery and showed venous drainage through both superficial and deep venous system. Decision at the time was to bring the patient back for treatment of the ruptured AVM in a delayed fashion. Repeat cerebral angiogram performed at two months demonstrated complete spontaneous regression of the right frontal AVM (Fig. 3). The right posterior fossa DAVF was treated with Onyx embolization.

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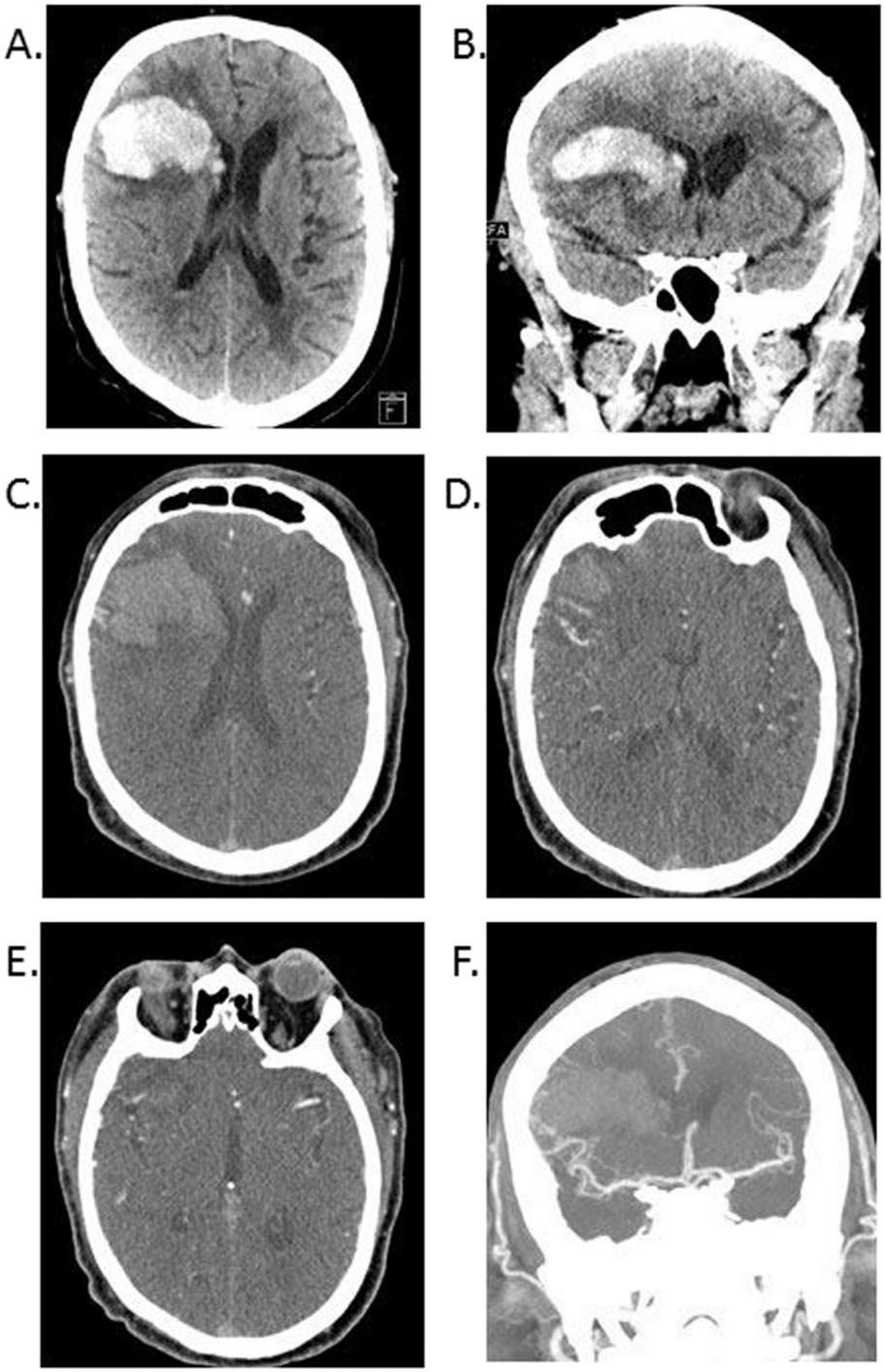

Fig. 1. Axial and coronal unenhanced head CT images (A–B) show a right frontal parenchymal hemorrhage with intraventricular extent, partial effacement of the right lateral ventricle, sulcal effacement and mild leftward shift. Axial head CTA (C–D) shows prominent M2/M3 vessels within the right Sylvian fissure extending to a focus of irregular abnormal enhancement just lateral to the parenchymal hematoma in the peripheral right frontal lobe, most consistent with an AVM. There is a component of superficial drainage via a cortical vein overlying the right frontal lobe (axial CTA image) and arterial supply is predominantly from branches of the MCA (coronal MIP image).

2.2. Follow up

The patient reported persistent wheezing due to his tracheal disorder but no neurologic symptoms. He was instructed to follow up with his otolaryngologist and a repeat imaging study was planned in 3 months for evaluation of possible AVM recanalization. Unfortunately, the patient passed away prior to follow up imaging, secondary to acute respiratory failure.

3. Literature review

A PubMed query using the following keywords was performed: spontaneous regression, spontaneous disappearance, spontaneous obliteration, spontaneous thrombosis, cerebral AVM, brain AVM, and arteriovenous malformation. To identify additional studies, reference lists were screened for eligible articles. We excluded cases of partial regression and cases where treatment was directly targeting the AVM. A