

Primary Intraventricular Hemorrhage Isolated in Cerebral Aqueduct Secondary to Dural Arteriovenous Fistula

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Abstract

Objective—We report a case of dural arteriovenous fistula (dAVF) presenting as isolated cerebral aqueduct hemorrhage.

Result—A 73-year-old man with a history of hypertension and chronic alcoholism presented with altered mental status and gait difficulties, bilateral fronto-occipital headaches, and intermittent dizziness. He had bilateral upward gaze restriction. Computerized tomography scan showed hyperdensity in the cerebral aqueduct and dilation of the lateral and third ventricles. The diagnostic angiogram demonstrated dAVF with arterial feeders from the cavernous segment of the left internal carotid artery and venous drainage into left transverse and sigmoid venous sinus.

Conclusion—Underlying dAVF should be considered in patients with isolated cerebral aqueduct hemorrhage.

Introduction

Dural arteriovenous fistula (dAVF) are considered as an acquired vascular malformation and accounts for approximately 10%–15% of vascular malformations [1]. Clinical manifestation includes intracranial hemorrhage, pulsatile tinnitus, seizures, proptosis, cranial nerve deficits, and transient ischemic attacks [2]. Although subarachnoid, intraparenchymal, subdural, and intraventricular hemorrhage are reported, primary intraventricular hemorrhage is an extremely rare manifestation of dAVF [3–9]. We report a case of dAVF presenting as isolated cerebral aqueduct hemorrhage.

Case Report

A 73-year-old man with a history of hypertension and chronic alcoholism presented with altered mental status and gait difficulties, bilateral fronto-occipital headaches, and intermittent dizziness. Neurological examination was significant only for bilateral up-gaze restriction and inability to consistently follow commands. Computerized tomography (CT) scan showed hyperdensity in the cerebral aqueduct and dilation of the lateral and third ventricles. No abnormalities were identified on CT



Figure 1. (a) the sagittal images of the brain MRI show a T1 hyper intensity centered within the aqueduct with associated magnetic susceptibility on SWI on the axial images on the image 2(b).

angiogram of head and neck. Magnetic resonance imaging (MRI) of the brain demonstrated minor intraventricular hemorrhage in the cerebral aqueduct (Figure 1). The intraventricular catheter was placed for the treatment of hydrocephalus. The diagnostic angiogram demonstrated dAVF with arterial feeders from the cavernous segment of the left internal carotid artery and venous drainage into left transverse and sigmoid venous sinus [Figure 2(a)–(d)]. A repeat CT scan after two days showed inter-

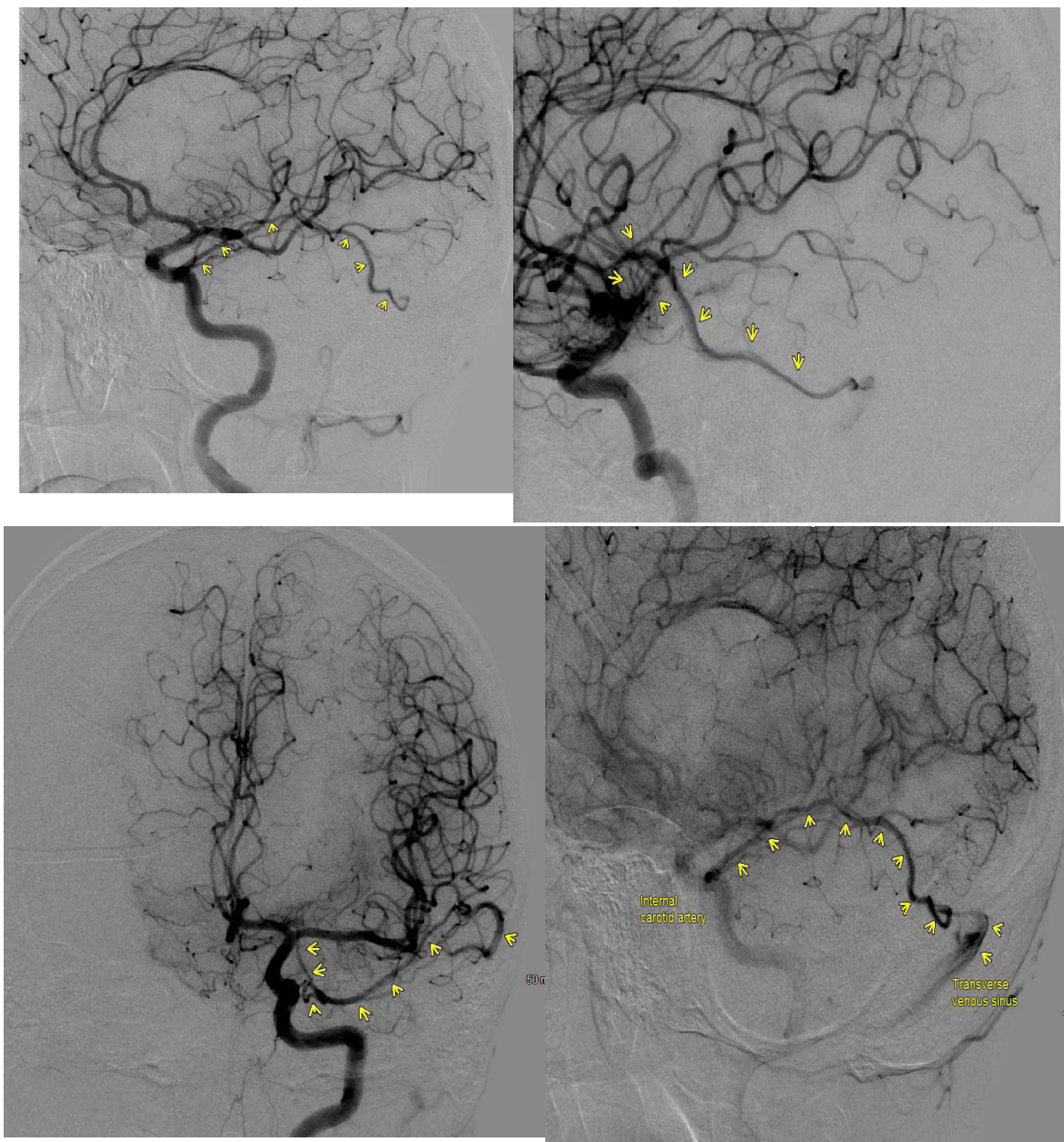


Figure 2. (a)–(d) Diagnostic cerebral angiogram showing the direct communication between the cavernous segment of the left internal carotid artery and junction of the left transverse sigmoid sinus.

val resolution of previously seen hemorrhage in the cerebral aqueduct. The intraventricular catheter was removed after five days and the patient was discharged to home with the continuation of outpatient therapy. After six months of follow-up, he was neurologically stable and had no recurrence of symptoms.

Discussion

The term primary intraventricular hemorrhage (PIVH) was first coined by Sanders *et al.* [9] and defined as when the bleeding is confined within the ventricular system without any involvement of brain parenchyma or extra-axial component. Such hemorrhages account for approximately 2%–4% of all intracranial hemorrhages. The most common etiologies include hypertension,

Table 1.

Cases reports	Clinical symptoms	Arterial feeders	Venous drainage
Padmanabhan <i>et al.</i> [6]	Severe headache	Left External carotid artery—occipital and middlemeningeal branches, Left internal carotid artery tentorial branches	Left transverse and sigmoid sinus
Irie <i>et al.</i> [3]	Headache, pulsatile bruit	Left External carotid artery—occipital brain, Left vertebral artery, Left internal carotid artery—tentorial branches.	Left transverse and sigmoid sinus
Srivastava <i>et al.</i> [5]	Left hemiparesis, left lower motor neuron facial palsy and ataxia	Right internal carotid artery—inferior marginal tentorial artery and Right external carotid artery—middle meningeal artery.	Right transverse and sigmoid sinus
Kawaguchi <i>et al.</i> [7]	Headache and vomiting	Left external carotid artery—occipital and middle meningeal artery.	Left transverse and sigmoid sinus
Halbach <i>et al.</i> [4]	IVH	Not mentioned	Left transverse

aneurysm, AV malformation, dural AV fistula, Moyamoya disease, tumors, coagulation disorders, and choroid plexus cyst [2]. The first case of isolated PIVH due to DVAF was reported by Halbach *et al.* [4]. Since then, there has been a total of five additional (three English literature and two Japanese literature) cases have been reported associated with intracranial dAVF [3–9].

All the reported cases with PIVH due to dAVF had fistula between branches of internal and or external carotid

artery [3–9]. The source of bleeding is probably congested subependymal vessels which usually derive arterial supply from the meningohypophyseal trunk of the internal carotid artery and venous drainage is via transverse and sigmoid venous sinuses.

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