

Symptomatic Ethmoidal Dural Arteriovenous Fistula with a Draining Varix Mimicking a Ruptured Anterior Communicating Artery Aneurysm

José E. Cohen MD^{1,2}, John M. Gomori MD², Sergey Spektor MD PhD¹, Henry Shapiro MD³ and Eyal Itshayek MD¹

Departments of ¹Neurosurgery and ²Radiology, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

³Department of Neurology, Shaare Zedek Medical Center, Jerusalem, Israel

KEY WORDS: anterior cranial fossa, cerebral aneurysm, dural arteriovenous fistula (DAVF), endovascular treatment, subarachnoid hemorrhage

IMAJ 2015; 17: 520–521

anterior fossa midline venous aneurysm mimicked a cerebral aneurysm in that location. To the best of our knowledge, a similar lesion has been reported in only one other case [3]. We present the diagnostic dilemma and therapeutic implications.

PATIENT DESCRIPTION

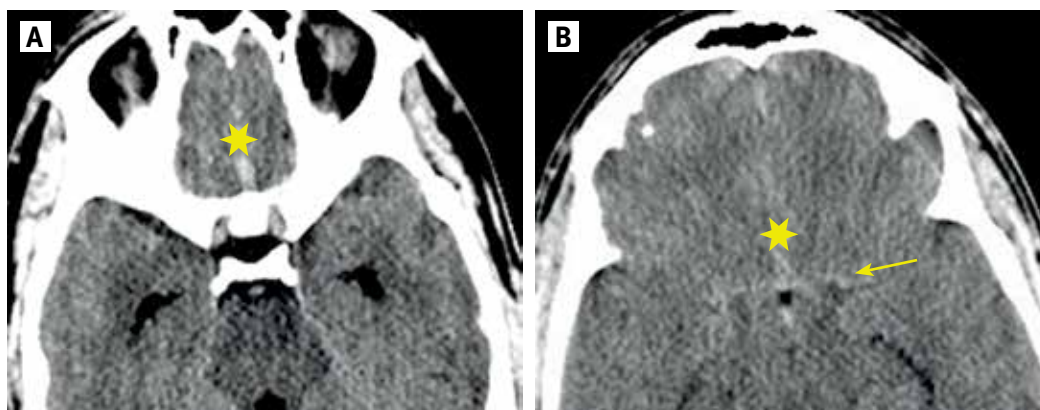
An 18 year old male with an unremarkable past medical history was brought to the emergency room after sudden-onset severe headache and repeated vomiting. The patient was alert and oriented, complained of persistent headache of moderate intensity and nausea, and exhibited significant meningeal signs. Head computed tomography (CT) scan showed subarachnoid hemorrhage focused on the lamina terminalis cistern and a round vascular mass at the anterior fossa midline, compatible in this context with an anterior communicating artery aneurysm [Figure 1 A and B]. Urgent cerebral angi-

ography disclosed an anterior cranial fossa DAVF supplied by the anterior ethmoidal branches of both ophthalmic arteries [Figure 1 C and D]. The fistula drained through a frontal cortical vein into the superficial Sylvian vein; the frontal vein demonstrated an aneurysmal dilatation located at the anterior part of the lamina terminalis cistern over the cribriform plate.

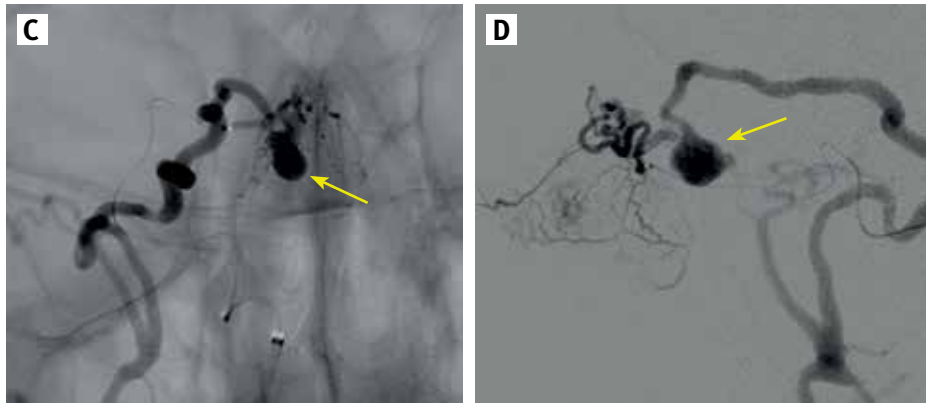
Immediately after the diagnosis was reached, the fistula was completely occluded by staged selective embolizations performed through both ophthalmic arteries. Postoperative cerebral angiography showed complete occlusion of the ethmoidal DAVF. The patient had an uneventful neurological recovery and was discharged after 3 days. Ophthalmological evaluation was normal. Magnetic resonance imaging (MRI) performed 1 month later showed no signs of residual venous aneurysm. Follow-up angiography 2 years later showed complete and persistent occlusion of the anterior cranial fossa dural fistula.

Dural arteriovenous fistulae (DAVF) of the anterior cranial fossa, also known as ethmoidal dural fistulae, are relatively rare and feature particular characteristics [1]. They are usually drained via cortical veins but not sinuses and therefore bear a relatively high risk of intracranial hemorrhage in comparison to dural fistulas located at other locations [1,2]. We report a patient with spontaneous subarachnoid hemorrhage secondary to an anterior cranial fossa DAVF draining via a cortical vein with a midline pseudoaneurysm. The bleeding pattern completely resembled the presentation of hemorrhage due to anterior communicating artery aneurysm, and the

Figure 1. [A and B] Non-contrast head CT in an 18 year old male shows subarachnoid hemorrhage focused on the lamina terminalis (star) and carotid cisterns (arrow). This bleeding pattern is suggestive of an anterior communicating artery aneurysm



[C and D] Selective ophthalmic artery angiography in the same patient, anteroposterior **[C]** and lateral views **[D]** show the anterior cranial fossa dural fistula supplied by anterior ethmoidal branches and drained through a frontal cortical vein. Note the aneurysmal dilatation (arrow) in the frontobasal vein at the anterior part of the lamina terminalis cistern over the cribriform plate, a confounding presentation that is typically associated with an arterial cerebral aneurysm



COMMENT

While dural fistulas of the transverse, sigmoid and cavernous sinuses are more prevalent in women, anterior cranial fossa DAVF shows a male predominance [1,2]. The first group of fistulas has a low incidence of intracranial hemorrhage in comparison to anterior cranial fossa DAVE, which are known to have a high bleeding rate. This is thought to be related to the leptomeningeal venous drainage characteristic of these fistulas, and to variceal or aneurysmal venous dilatations that develop on pial veins [1,2,4,5]. Since there is no dural sinus in the anterior cranial fossa in relation to the cribriform plate, DAVF in this location does not drain directly into a sinus but into frontal cortical veins and only secondarily into a sinus.

Our patient presented with subarachnoid hemorrhage focused on the lamina terminalis cistern, a typical location for symptomatic anterior communicating artery aneurysms. Furthermore, this DAVF demonstrated an aneurysmal venous dilatation in the lamina terminalis cistern that may be confused with an unusual aneurysm of the anterior communicating artery complex on non-invasive studies. This confounding presentation was previously reported by others [4,5]. Aneurysmal venous dilatations

have been reported at the chiasmatic cistern or in a more anterobasal position adjacent to the origin of the superior sagittal sinus. In our patient, the venous aneurysm was seen at a midpoint between these limits. Demonstration of the actual fistula site is usually not possible by either CT or MR; however, visualization of dilated cortical veins without a parenchymal nidus is a key finding that supported the diagnosis of DAVE. Non-invasive examinations usually raise a suspicion of DAVF and orientate the investigation, but cerebral angiography confirms the diagnosis and shows fine details of all elements of the lesion [Figure 1 C and D].

Aneurysmal venous dilatation is seen in a significant proportion of ethmoidal DAVF [2,4,5]. Most aneurysmal dilated veins associated with anterior cranial fossa DAVF are adjacent to the anterior portion of the superior sagittal sinus and drain into it. Our case was unusual in that the aneurysmal venous dilatation lay in the anterior part of the lamina terminalis cistern and resembled an anterior communicating artery aneurysm. However, a careful examination of the neuroradiological examinations revealed a more anterior and basal location of the varix in relation to the anterior communicating artery complex.

Surgical planning and approaches for an anterior communicating artery aneu-

rysm and for an anterior fossa DAVF are radically different. This case reinforces the need for the combination of advanced CT angiogram or MRI as well as digital angiography in the diagnosis and management of unusual cases of subarachnoid hemorrhage.

Correspondence

Dr. J. Cohen

Dept. of Neurosurgery, Hadassah-Hebrew University Medical Center, P.O. Box 12000, Jerusalem 91120, Israel

Phone: (972-2) 677-7092

email: jcohen@s@yahoo.com

References

1. Soderman M, Pavic L, Edner G, Holmin S, Andersson T. Natural history of dural arteriovenous shunts. *Stroke* 2008; 39 (6): 1735-9.
2. Agid R, Terbrugge K, Rodesch G, Andersson T, Soderman M. Management strategies for anterior cranial fossa (ethmoidal) dural arteriovenous fistulas with an emphasis on endovascular treatment. *J Neurosurg* 2009; 110 (1): 79-84.
3. Chen Z, Tang W, Liu Z, Li F, Feng H, Zhu G. A dural arteriovenous fistula of the anterior cranial fossa angiographically mimicking an anterior ethmoidal artery aneurysm. *J Neuroimaging* 2010; 20 (4): 382-5.
4. Machida T, Hayashi N, Sasaki Y, et al. Posterior cranial fossa dural arteriovenous malformation with a varix mimicking a thrombosed aneurysm: case report. *Neuroradiology* 1993; 35 (3): 210-1.
5. Ogawa T, Okudera T, Miyauchi T, Inugami A, Uemura K, Yasui N. Anterior cranial fossa dural arteriovenous fistula with a varix mimicking an anterior communicating artery aneurysm. *Neuroradiology* 1996; 38 (3): 252-3.

“A work of art which did not begin in emotion is not art”

Paul Cezanne (1839-1906) French artist and Post-Impressionist painter whose work is the bridge between late 19th century Impressionism and the early 20th century's new line, Cubism. Both Matisse and Picasso are said to have remarked that Cézanne “is the father of us all”