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## **Fistula of the posterior communicating artery and cavernous sinus.**

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# Fistula of the Posterior Communicating Artery and Cavernous Sinus

Kazushi Kinugasa, Hisato Higashi, and Takashi Ohmoto

**Summary:** A 24-year-old man was admitted with conjunctival hyperemia of the left eye and progressive chemosis and proptosis 1 month after a head injury. An angiogram showed an arterial-cavernous sinus fistula of the posterior communicating artery, which was treated with minicoils. The atypical configuration, transvenous embolization, and unusual nature of the communication suggested that communication developed through a newly generated vessel in granulation tissue.

**Index terms:** Fistula; Head, injuries

Direct carotid-cavernous fistulas usually are solitary connections between the cavernous carotid artery and the cavernous sinus. They most often result from a closed head injury associated with a basal skull fracture (1–3). A supraclinoid carotid-cavernous sinus fistula caused by head trauma is rare (Pelz DM, Deveikis JP, Fox AJ, Lee DH, “An Unusual Supraclinoid Carotid-Cavernous Sinus Fistula,” presented at the 26th Annual Meeting of the American Society of Neuroradiology, May 14–19, 1988). We report a fistula of the posterior communicating artery–cavernous sinus related to head trauma.

## Case Report

A 24-year-old man incurred a head injury with subsequent loss of consciousness for 1 week. One month after the injury, a left pulsating exophthalmos, left conjunctival chemosis, and a retroocular bruit synchronous with the patient's pulse gradually developed. He was admitted to our institution with a suspected carotid-cavernous fistula.

A T1-weighted magnetic resonance image showed flow void in the slightly enlarged, laterally convex left cavernous sinus, left temporal lobe contusion, and the absence of a subarachnoid space around the left cavernous sinus (Fig 1A). Although the radiograms showed no basal skull fracture, left internal carotid and left vertebral angiograms revealed a fistula of the posterior communicating artery–cavernous sinus (Fig 1B–E). The left superior ophthalmic vein and the left superior and inferior petrosal sinuses

drained the fistula. The distal branches of the internal carotid artery filled on later films.

Using the transfemoral route, we placed a Tracker-18 catheter in the cavernous sinus through the ipsilateral inferior petrosal sinus. Several platinum coils (Cook, Bloomington, Ind) were deposited into the cavernous portion near the proximal superior ophthalmic vein and then within the cavernous sinus near the orifice of the fistula. If the posterior drainage is occluded but the fistula is not closed, the patient's ocular symptoms may be aggravated. Care must be taken to ensure that the minicoils are not deposited within the posterior communicating or carotid arteries. Real-time digital subtraction angiography and the careful positioning of the minicoils can avert this potential complication. An angiogram obtained immediately after the embolic procedure showed that the fistula had been occluded (Fig 1F–H).

At clinical follow-up 2 days after the procedure, the patient's exophthalmos and conjunctival chemosis had resolved. There was no filling of the fistula on the follow-up angiogram.

## Discussion

Pelz and colleagues (“An Unusual Supraclinoid”) reported that an unusual fistula of the carotid-cavernous sinus originated from the supraclinoid internal carotid artery near the posterior communicating artery. The fistula could not be obliterated through an endovascular procedure but was easily clipped during surgery.

Based on a study of the anatomic relationship between the posterior communicating artery and its branches, Pedrosa and colleagues (4) determined that dural branches to the cavernous sinus do not originate from the posterior communicating artery; therefore, a fistula of the posterior communicating artery–cavernous sinus would not occur spontaneously.

A traumatic arteriovenous fistula is classically described as a single, well-formed vascular channel between an artery and a vein fash-

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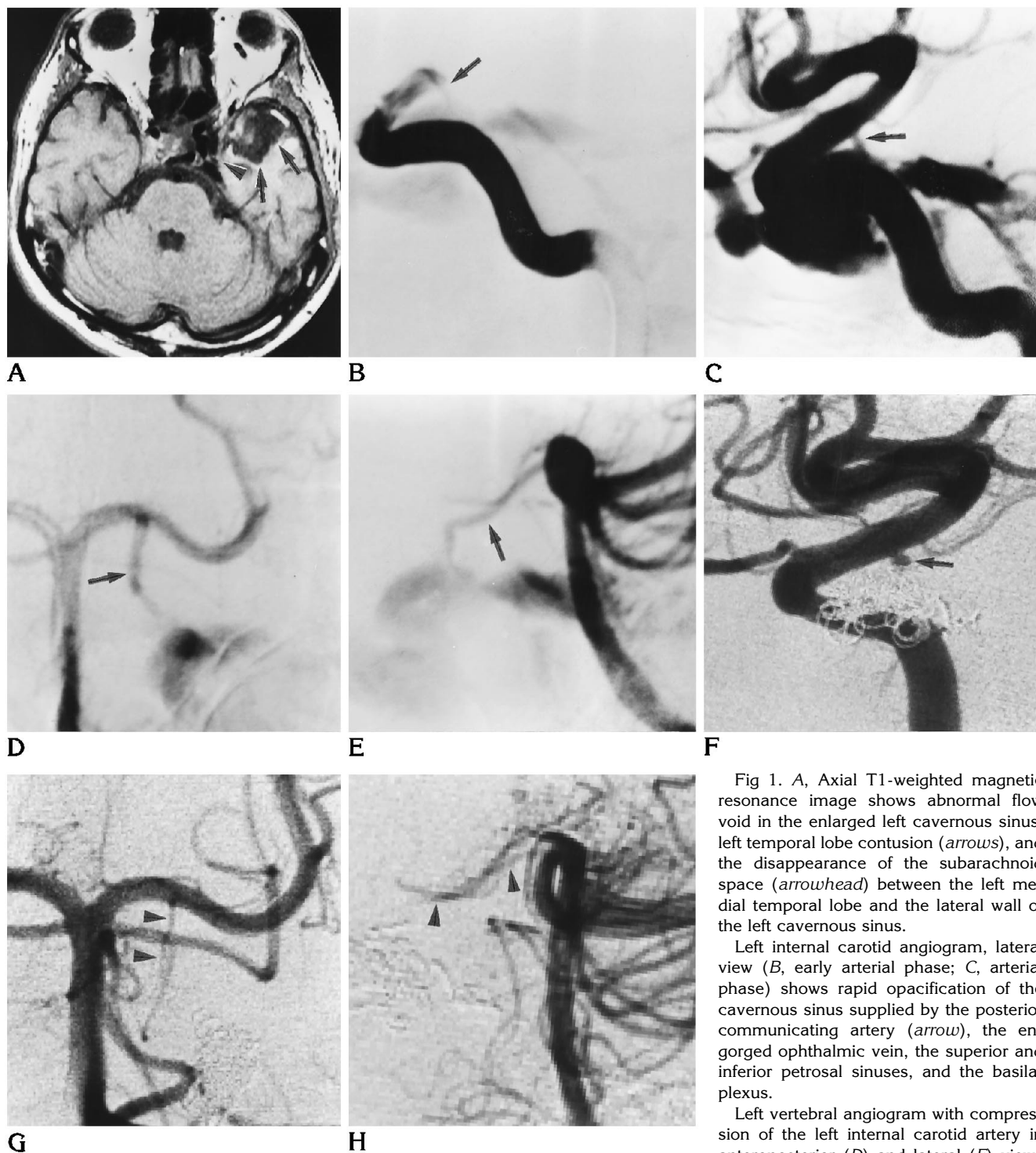


Fig 1. A, Axial T1-weighted magnetic resonance image shows abnormal flow void in the enlarged left cavernous sinus, left temporal lobe contusion (arrows), and the disappearance of the subarachnoid space (arrowhead) between the left medial temporal lobe and the lateral wall of the left cavernous sinus.

Left internal carotid angiogram, lateral view (B, early arterial phase; C, arterial phase) shows rapid opacification of the cavernous sinus supplied by the posterior communicating artery (arrow), the engorged ophthalmic vein, the superior and inferior petrosal sinuses, and the basilar plexus.

Left vertebral angiogram with compression of the left internal carotid artery in anteroposterior (D) and lateral (E) views

shows the cavernous sinus fistula supplied by the posterior communicating artery (arrow).

Carotid (F, lateral view) and vertebral (G, anteroposterior view; H, lateral view) angiograms obtained after embolization show complete occlusion of the fistula, filling only the stump of the origin of the posterior communicating artery (arrow) and marked reduction of the caliber of the left posterior communicating artery (arrowheads) from the posterior cerebral artery.

ioned by canalization of a thrombus or through an aneurysmal sac (5, 6). We believe that a new vessel from the granulation tissue or a direct connection between the posterior communicating artery and the cavernous sinus might have developed in the month after the head injury.

Whereas most of direct fistulas of the carotid-cavernous sinus can be obliterated through transarterial embolization (7), the transarterial pathway through the posterior communicating artery is too small for balloon navigation. The vascular anatomy in this patient made this route hazardous or impossible. Because a safe transarterial route was not available, we chose a transvenous approach through the inferior petrosal sinus, using a small-caliber catheter (8).

### Acknowledgment

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