

Posttraumatic Pseudoaneurysm of the Posterior Meningeal Artery Associated with Intraventricular Hemorrhage

Victor E. Toro,¹ Jonathan F. Fravel,¹ Thomas A. Weidman,¹ Ramon E. Figueroa,¹ Ann Flannery,² and Eugene F. Binet¹

Summary: A 22-year-old man sustained a severe head injury and had a torn posterior meningeal artery that caused massive intraventricular hemorrhage. Traumatic pseudoaneurysm of the posterior meningeal artery should be considered in cases where intraventricular hemorrhage occurs in the presence of occipital bone fracture and contiguous epidural hematoma; vertebral angiography is of value in this regard.

Index terms: Cerebral hemorrhage; Arteries, meningeal; Aneurysm, arteriovenous; Head, trauma

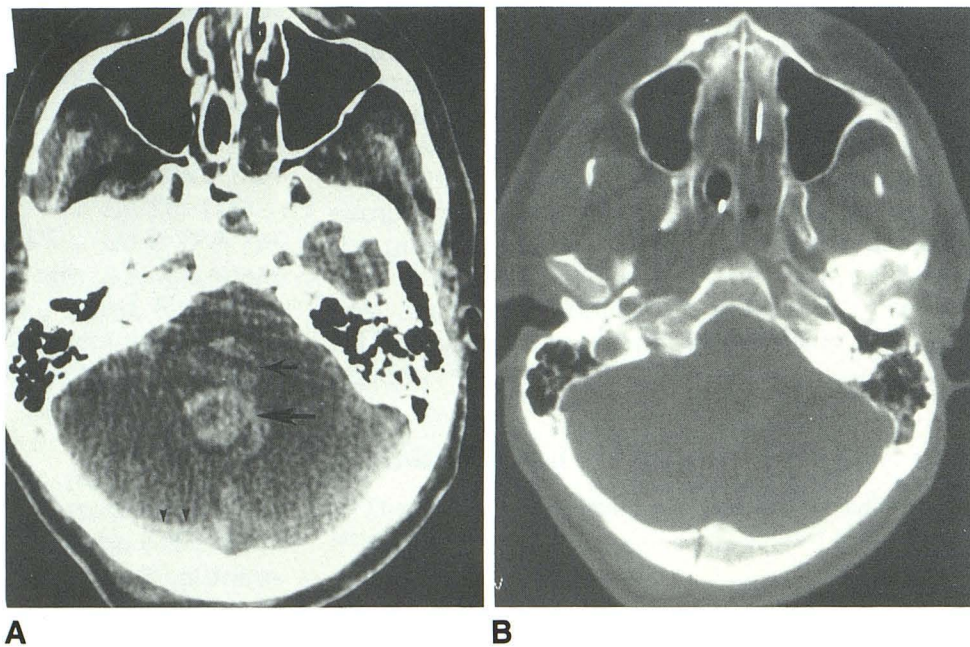
We present a case of posttraumatic pseudoaneurysm of the posterior meningeal artery (PMA) and describe its unusual presentation with massive intraventricular hemorrhage.

Case Report

A 22-year-old man was found unconscious in a parking lot. Initial physical examination showed contusions over the right eyebrow, right patella, and left hand, as well as an occipital subgaleal hematoma. The patient was unresponsive with constricted nonreactive pupils. By the time he reached the emergency room, his Glasgow coma scale level had risen from 7 to 10. He had a blood alcohol level of .49 mg/dL. An emergency brain computed tomography (CT) scan revealed massive intraventricular hemorrhage involving the fourth ventricle, the third ventricle, and the lateral ventricles (Fig. 1A). A pontine hemorrhage was also identified. A small posterior fossa epidural hematoma and a right occipital skull fracture were also observed (Fig. 1B). Because of the unusual amount of blood within the valle-

Fig. 1. A, Axial brain CT shows intraventricular and pontine hemorrhage (arrows). A posterior epidural hematoma is also present (arrowheads).

B, Axial brain CT with bone windows shows an occipital bone fracture adjacent to the internal occipital protuberance.



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¹Department of Radiology, and ²Division of Neurosurgery, Department of Surgery, Medical College of Georgia, 1120 15th Street, Augusta, GA 30912.

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cula and ventricles, a cerebral angiogram was performed to exclude a vascular lesion of the posterior circulation. A left vertebral study demonstrated a pseudoaneurysm of the PMA (Fig. 2). At surgery, a large dural laceration was identified and an actively bleeding dural vessel was cauterized.

Postsurgically, the patient continued to deteriorate and was pronounced dead approximately 30 hours after admission. A postoperative CT scan still showed evidence of intraventricular hemorrhage, but failed to show hemorrhage within the pons or the cerebellar vermis. The cause of death was presumed to be secondary to the brain-stem injury. An autopsy was not performed.

Discussion

The posterior fossa cranial dura is supplied by vessels that arise from both the carotid and vertebral circulations. When the posterior fossa circulation dominates hemodynamically, the vertebral artery may give rise to the anterior and posterior meningeal arteries (1). PMA arises from the vertebral artery just below the foramen magnum. Having a diameter of less than .5 mm, it is visualized on only 30%–40% of normal vertebral angiograms (2). The initial segment of the PMA extends posteriorly and superiorly to reach the posterior rim of the foramen magnum, where it

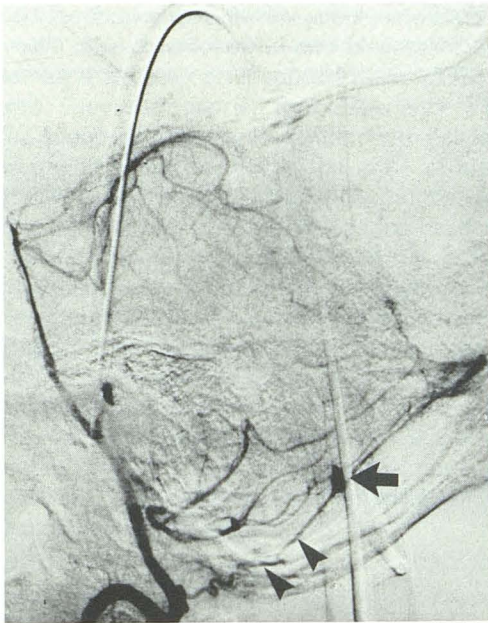
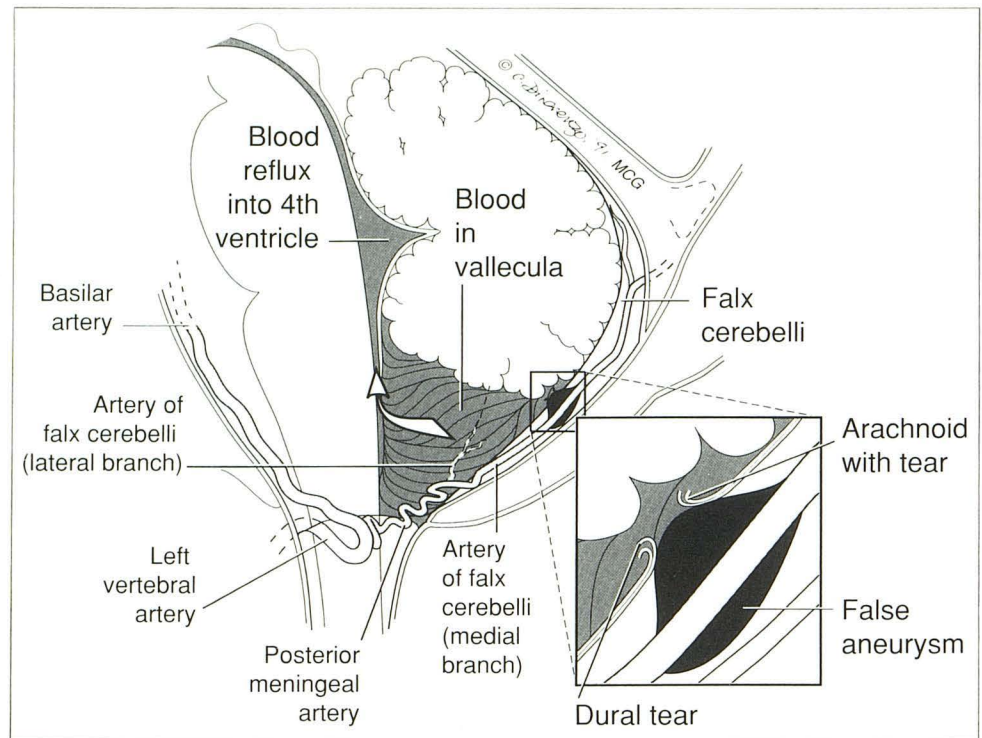


Fig. 2. Selective left vertebral angiogram subtraction print show a pseudoaneurysm (arrow) of the posterior meningeal artery in the segment of the artery referred to as the artery of the falx cerebelli (arrowheads).

branches into two rami within the dura. The lateral branch of the PMA supplies the medial aspect of the dura in the posterior fossa (3). The medial branch courses superiorly in the falx cerebelli (artery of the falx cerebelli) parallel to the occipital bone, frequently entering the posterior portion of the falx cerebelli. Here the artery courses along the free edge of the falx cerebelli, assuming a straighter course and extends superiorly paralleling the occipital bone. It may be separated from the inner table of the occipital bone by up to 1 cm. It is from the medial branch of the PMA that this patient's pseudoaneurysm arose.

Twenty-six traumatic pseudoaneurysms of the meningeal vessels have been reported (4–7). All of these have occurred on branches of the middle meningeal artery, most of them as the vessel courses beneath a fractured squamous temporal bone or greater sphenoid wing. When bleeding is associated with a meningeal pseudoaneurysm, it usually occurs into the epidural space (70%) (7). Subdural bleeding has been reported in 10% and primary intracerebral hemorrhage in 5% (7). The remaining 15% were mixed presentations with subdural and intracerebral components. Intraventricular hemorrhage from a meningeal laceration has not been reported. The association of intraventricular hemorrhage with a pseudoaneurysm of the PMA is undoubtedly related to proximity of the lesion to the foramen of Magendie (Fig. 3). It is postulated that, in this case, a traumatic laceration of the posterior fossa dura caused by the occipital skull fracture disrupted the medial branch of the PMA. The vessel bled into the extradural space, causing a small epidural hematoma. With the initial injury there was also a tear in the arachnoid that resulted in a subarachnoid and intraventricular hemorrhage. Even in the presence of petechial hemorrhage into the pons, it is felt that the massive third ventricular hemorrhage and the significant lateral ventricular hemorrhage could not have been caused by the pontine hemorrhage. This contention is supported by the absence of hemorrhage seen on the postoperative scan that was performed 5 hours after the patients initial scan. A traumatic pseudoaneurysm of the PMA should be considered in cases where intraventricular hemorrhage occurs in the presence of an occipital bone fracture and adjacent epidural hematoma. A selective vertebral angiogram will confirm or exclude that diagnosis.

Fig. 3. Sagittal drawing demonstrates the course of the posterior meningeal artery and appearance of the pseudoaneurysm. Note the normal separation of the posterior meningeal artery from the inner table of the skull.



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