Dural arteriovenous malformation in the posterior fossa associated with intracerebellar hematoma

Case report

SABURO SAKAKI, M.D., HITOSHI FUJITA, M.D., KANEHISA KOHNO, M.D., AND KENZO MATSUOKA, M.D.
Department of Neurological Surgery, Ehime University Medical School, Ehime, Japan

A case of an infratentorial dural arteriovenous malformation associated with an intracerebellar hematoma is reported. This malformation was fed by meningeal branches of the right vertebral artery and was drained exclusively by pial veins in the posterior fossa.

KEY WORDS • dural arteriovenous malformation • posterior fossa • pial vein • cerebellar hematoma

ALTHOUGH arteriovenous malformations (AVM's) involving the dura mater in the posterior fossa are not uncommon, a dural AVM causing an intracerebellar hematoma is extremely rare.1,4,9 We are reporting such a case, and discuss the pathogenesis of the associated intracerebellar hematoma.

Case Report

This 58-year-old woman was admitted to Ehime University Hospital on March 18, 1982, for evaluation of the sudden onset of headache, nausea, and vomiting. Disturbance of consciousness was noted, beginning 1 day prior to admission. She had been healthy until the present illness.

Examination. On admission, the patient was drowsy and disoriented. Both eyes were divergent and the pupillary light reflex was slightly sluggish on both sides. There were no motor or sensory disturbances, Blood pressure was 158/92 mm Hg. Mild neck stiffness was noted. Lumbar puncture yielded bloody cerebrospinal fluid under high pressure.

Computerized tomography (CT) performed 1 day after the onset of symptoms revealed two high-density lesions compatible with a hematoma, 3.0 × 1.5 cm in diameter, in the right cerebellum and a small amount of hematoma in the fourth ventricle (Fig. 1 left). The lateral ventricles were noted to be markedly dilated. A CT scan with contrast enhancement showed no additional abnormalities. Angiography demonstrated an AVM in the region of the torcular Herophili. Successive films showed enlarged meningeal branches of the right vertebral artery running straight upward, shunting directly into a fine vascular network in the region of the torcular Herophili. There was early filling of the enlarged tortuous inferior vermian veins and the right inferior hemispheric vein. The right retrotonsillar vein, the vein of the lateral recess of the fourth ventricle, and the right petrosal vein were sequentially shown as a further reversal of blood flow in a late arterial phase (Fig. 2). The transverse sigmoid sinus was not visualized in the arterial phase, but marked stenosis of the transverse sinus for about 5 cm to the left of the torcular Herophili was demonstrated in the venous phase (Fig. 3).

Emergency ventricular drainage was performed, and the patient's condition gradually improved. She re-

FIG. 1. Computerized tomography scans. Left: Plain scan showing an intracerebellar hematoma (single arrow) and a hematoma in the fourth ventricle (double arrow). Right: Contrast-enhanced scan taken 3 weeks after the onset of intracerebellar hematoma showing the abnormal high-density area suggestive of a distended vessel (arrow).
S. Sakaki, et al.

Fig. 2. Serial angiograms, anteroposterior views (upper) and lateral views (lower). Left: Early arterial phase. Enlarged meningeal branches of the right vertebral artery (arrow) can be seen running straight upward with shunting directly into a fine vascular network (double arrow). Enlarged inferior vermian veins (crossed arrow) and the right inferior hemispheric vein (double-crossed arrow) are also visualized. Center and Right: The right retrotonsillar vein (two crossed arrows), the vein of the right lateral recess of the fourth ventricle (arrowhead), and the right petrosal vein (two arrowheads) are shown sequentially.

gained her normal state of consciousness 4 days after the ventricular drainage. Disturbed extraocular movements persisted for 7 days. An enhanced CT scan performed 3 weeks after the onset of symptoms revealed that the cerebellar hematoma had completely resolved, and an area of abnormal high density suggestive of a distended vessel was shown in the vicinity of the fourth ventricle where the hematoma had been (Fig. 1 right).

Operation. Suboccipital craniectomy was performed on April 22. Upon removal of the bone, the meningeal branches of the right vertebral artery were found on the dura mater, which was markedly distended, and ran straight toward the region of the torcular Herophili. These feeding arteries were clipped and cut, and the dura mater was opened. The right inferior vermian vein was identified as a red vein about 3 cm caudal from the torcular Herophili, suggesting the existence of further feeding arteries. This red vein was markedly diminished in size by extensive coagulation of small arteries of the dura mater. The nidus of the AVM could not be verified at operation.

Postoperative Course. On angiography no feeding arteries were shown; however, the right inferior vermian vein was faintly visualized. The patient's postoperative course was uneventful. Her cerebellar signs and symptoms improved gradually, and she was able to walk without assistance within 10 days after operation. She was discharged 2 months after admission with mild ataxia. There has been no recurrence of intracranial hemorrhage during the year since her operation.

Discussion

Dural AVM's occur most frequently in the posterior fossa. In these AVM's, the arterial supply is always provided by various meningeal branches from the carotid and vertebral arteries. Venous drainage, in contrast to the arterial supply, can be through dural, pial, or a combination of dural and pial channels, and the transverse sigmoid sinus is commonly involved in cases with dural AVM's in the posterior fossa. According to Houser, et al., the dural venous system alone received the venous discharge in 19 of 29 cases, superficial veins of the brain participated in six cases,
Dural AVM with cerebellar hematoma

They stressed that rupture of this vein, probably due to highly elevated venous pressure, was responsible for developing an intracerebral hematoma. Enker\(^2\) described a case of dural AVM resulting in a right temporal hematoma, and he has suggested that the source of the intracerebral hematoma was one of the cerebral veins draining into the transverse sinus. Solis, \textit{et al.}\(^{11}\) also reported a case with a dural AVM, which was associated with a right frontal subdural hematoma and a right occipital intracerebral hematoma from rupture of an occipital varix with dilated venous channels.

In the present case, the origin of hemorrhage was assumed to be the distended vein in the vicinity of the fourth ventricle which was demonstrated by CT scanning 3 weeks after the intracerebellar hematoma.

In our case, the definitive diagnosis of the dural AVM associated with this particular complication was made on angiography, although there were no signs and symptoms suggesting a vascular malformation as a cause of the intracranial hemorrhage. Angiographic study, in addition to CT scanning, may be helpful for more precise diagnosis of cerebrovascular disorders, if there is enough time to perform the test, especially in younger or normotensive patients.

References


Manuscript received July 28, 1983.

Address reprint requests to: Saburo Sakaki, M.D., Department of Neurological Surgery, Ehime University Medical School, Shigenobu-cho, Onsen-gun, Ehime, 791-02, Japan.