



Dural arteriovenous fistula on the convexity presenting with pure acute subdural hematoma

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Abstract

Non-traumatic dural arteriovenous fistula/malformation (dural AVF/AVM) presenting with pure subdural hematoma (SDH) is relatively rare. We report on a male patient who showed pure acute SDH and was diagnosed as having dural AVF on the convexity near the superior sagittal sinus (SSS), based on angiographic findings. A 27-year-old man was admitted to our hospital due to headache with acute onset. The patient did not have a history of head trauma or injury. Head CT showed an abnormal high-density area on the surface of the cerebral hemisphere on the left side, indicating acute SDH. Angiography during the arterial phase demonstrated that an abnormal artery originating from the left occipital artery was connected with a dural vein and a diploic vein on the convexity near the SSS. We concluded that a dural AVF existed at this area, and that the dural AVF had caused the acute SDH. Dural AVF/AVM which causes non-traumatic SDH is usually accompanied by intracerebral hemorrhage (ICH) and/or subarachnoid hemorrhage (SAH). In contrast, non-traumatic dural AVF/AVM presenting with pure SDH is rare, and our patient represents such a rare case. We should consider dural AVF/AVM and perform angiography if necessary when we encounter a patient showing non-traumatic SDH without ICH and/or SAH.

Key words: dural arteriovenous fistula; acute subdural hematoma; angiography; convexity near the superior sagittal sinus; headache.

Introduction

Subdural hematoma (SDH) caused by non-traumatic dural arteriovenous fistula/malformation (dural AVF/AVM) is usually accompanied by intracerebral hemorrhage (ICH) and/or subarachnoid hemorrhage (SAH) (Kohyama *et al.*, 2009). In contrast, dural AVF/AVM presenting with pure SDH, not

accompanying ICH or SAH, is relatively rare (Kohyama *et al.*, 2009; Ito *et al.*, 1983; Halbach *et al.*, 1988; Kominato *et al.*, 2004). We report a patient who showed a pure acute SDH caused by non-traumatic dural AVF on the convexity near the superior sagittal sinus (SSS).

Case report

A 27-year-old man complained of headache with acute onset, and was admitted to our hospital 4 days after onset because the headache persisted. There was no head trauma or other disease in his history. Body temperature and blood pressure were within the normal range. Neurological examination showed that cranial nerves were normal. Muscle strength and tone of the four extremities were normal. Head CT showed an abnormal high-density area, which indicated acute SDH, on the surface of the left cerebral hemisphere (Fig. 1). Blood analysis, including blood cell counts and coagulation cascades, was normal. The patient was admitted to the neurosurgery department of our hospital. After hospitalization, cranial angiography of the 4 vessels was performed in order to examine the cause of acute SDH. Left external carotid angiography showed an abnormal artery originating from the left occipital artery (Fig. 2A, B). This abnormal artery reached the convexity near the SSS on the left side (Fig. 2A, B). The angiography of the arterial phase also showed a dural vein (Fig. 2A) as well as a diploic vein (Fig. 2B). These 2 veins were connected with the abnormal artery originating from the left occipital artery at the convexity near the SSS (Fig. 2A, B), while a nidus was not shown. Evacuation of the hematoma and resection of the dural AVF were performed on the same day. After operation, the patient no longer complained of headache, and was discharged without any complication.

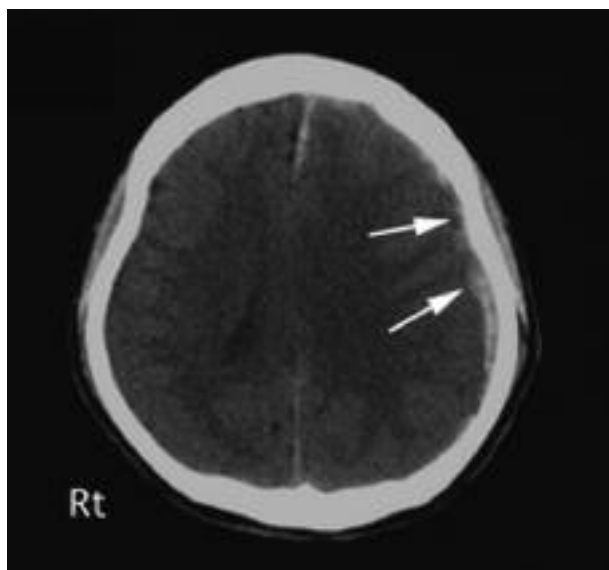


Fig. 1. — Head CT showing an acute subdural hematoma on the left side (arrows).

Discussion

Dural AVF is an acquired lesion between the meningeal arteries and their associated draining veins, and usually presents with intracranial hemorrhage or progressive neurological deficits (Wilson *et al.*, 2008). In our patient, angiography of arterial

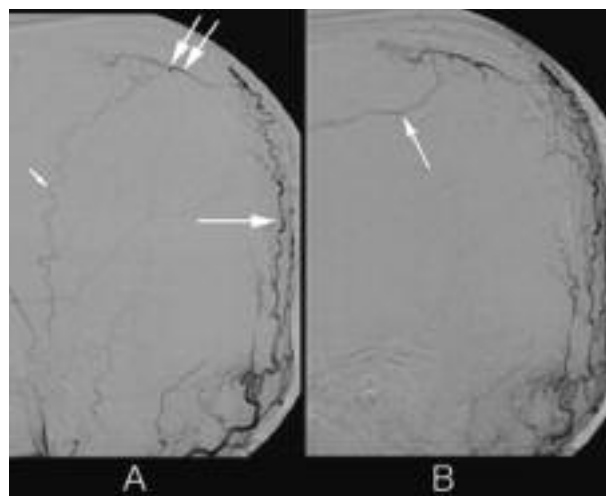


Fig. 2. — Left external carotid angiography of the arterial phase (left anterior oblique position)

A: An abnormal artery originating from the left occipital artery and reaching the convexity near the superior sagittal sinus (arrow). This abnormal artery is connected with a dural vein (small arrow), and a dural arteriovenous fistula is formed between these 2 vessels (double arrows).

B: A diploic vein (arrow) is also connected with the dural arteriovenous fistula.

phase showed an abnormal artery originating from the left occipital artery, and also showed dural and diploic veins that were connected to the abnormal artery. This finding suggested the presence of an

Table 1

Non-traumatic dural arteriovenous fistula/malformation presenting with pure subdural hematoma

Author (years)	Age/sex	Type of SDH	Initial symptom	Findings on angiography		
				Location of dural AVF/AVM	Feeder artery	Draining vein
Ito <i>et al.</i> (1983)	64/male	Acute SDH in the right frontal area	Unconsciousness	Midline of the base of the anterior fossa	Right ophthalmic artery, anterior and posterior ethmoidal arteries	SSS
Halbach <i>et al.</i> (1988)	48/female	SDH on the right side (not indicated acute or chronic)	Weakness (details were not reported)	Walls of the middle third of the SSS near the Rolandic inflow	Bilateral middle meningeal arteries	SSS
Kominato <i>et al.</i> (2004)	42/female	Acute SDH on the right side	Headache	Parieto-sagittal part of the falx cerebri (autopsy)		
Kohyama <i>et al.</i> (2009)	60/male	Acute SDH on the left side	Headache	Left convexity adjacent to the SSS	Bilateral middle meningeal arteries	SSS and pterygoid venous plexus
Our patient	27/male	Acute SDH on the left side	Headache	Left convexity near the SSS	Left occipital artery	Dural vein and diploic vein

AVF, arteriovenous fistula; AVM, arteriovenous malformation; SDH, subdural hematoma; SSS, superior sagittal sinus.

arteriovenous shunt between these 2 veins (draining veins) and the artery (a feeder artery) at the convexity near the SSS. Therefore, we diagnosed the patient as having a dural AVF due to the presence of an arteriovenous shunt, and concluded that the acute SDH was caused by the dural AVF.

Non-traumatic SDH caused by dural AVF is usually accompanied by ICH and/or SAH (Kohyama *et al.*, 2009). Non-traumatic dural AVF/AVM presenting with pure SDH is rare (Kohyama *et al.*, 2009; Ito *et al.*, 1983; Halbach *et al.*, 1988; Kominato *et al.*, 2004). There have been only 4 reported patients with non-traumatic dural AVF/AVM presenting with pure SDH (Kohyama *et al.*, 2009; Ito *et al.*, 1983; Halbach *et al.*, 1988; Kominato *et al.*, 2004) (Table 1). Dural AVF/AVM was detected by angiography in 3 previously reported patients (Kohyama *et al.*, 2009; Ito *et al.*, 1983; Halbach *et al.*, 1988) and in our patient. In the other patient reported by Kominato *et al.*, dural AVM was detected at autopsy (Kominato *et al.*, 2004). The initial symptom was headache in 2 reported patients (Kohyama *et al.*, 2009; Kominato *et al.*, 2004) and in our patient. Dural AVF/AVM was located at the SSS or in an area near the SSS such as the falx cerebri in all reported patients (Kohyama *et al.*, 2009; Ito *et al.*, 1983; Halbach *et al.*, 1988; Kominato *et al.*, 2004). In our patient, dural AVF was also located on the convexity near the SSS. On angiography, SSS was visualized as the draining vein in 3 of the reported patients (Kohyama *et al.*, 2009; Ito *et al.*, 1983; Halbach *et al.*, 1988), however, angiography did show a patent SSS in our patient.

Although dual AVF/AVM presenting with non-traumatic, pure acute SDH is rare, we should consider dural AVF/AVM in patients with acute SDH without ICH and/or SAH.

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