Acute Spontaneous Subdural Hematoma of Arterial Origin

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Acute spontaneous subdural hematoma (SDH) of arterial origin is very rare. We report a case of acute spontaneous SDH that showed contrast media extravasation from cortical artery on angiograms. A 58-year-old male patient developed sudden onset headache and right hemiparesis. Brain CT scan demonstrated acute SDH at left convexity. The patient was drowsy mentality on admission. He had no history of head trauma. Cerebral angiography was performed and revealed a localized extravasation of the contrast media from distal cortical MCA branch. After angiography, the patient deteriorated to comatose mentality. Decompressive craniectomy for removal of SDH was performed. We verified the arterial origin of the bleeding and coagulated the bleeding focus. The histological diagnosis was aneurysmal artery. He recovered after surgery with mild disability. In a case of acute spontaneous SDH, the possibility of a cortical artery origin should be considered.

Key Words: Acute subdural hematoma · Spontaneous · Cortical artery.

INTRODUCTION

An acute subdural hematoma (SDH) is regarded as a complication of a head injury, and bleeding is commonly associated with laceration of the bridging vein in the subdural space. However, acute SDH, without any history of trauma, are uncommonly reported. Acute spontaneous SDH due to ruptured cortical artery aneurysm is very rare, and only 3 cases of it have been reported2-4). We experienced a case of acute spontaneous SDH with contrast media extravasation from cortical artery that was demonstrated on angiograms. The bleeding focus was pathologically proved to be an aneurysmal artery.

CASE REPORT

A 58-year-old male patient developed sudden onset headache and right hemiparesis. The patient was drowsy mentality on admission. He had no history of head trauma. The coagulation profile was normal.

Brain computed tomography scan demonstrated acute SDH along left cerebral convexity with mild midline shift (Fig. 1A). There were no associated brain contusions or subarachnoid hemorrhage. Cerebral angiography was performed and revealed a localized extravasation of the contrast media from distal cortical MCA branch. No other vascular abnormality responsible for the acute SDH lesion was found (Fig. 2). After angiography, the patient deteriorated to comatose mentality. On neurological examination, Glasgow Coma Scale was 6, light reflex of both pupil was no response. Brain CT showed increase of thickness of hematoma and shifting of midline structures (Fig. 1B). Decompressive craniectomy for removal of SDH was performed and the patient recovered with mild disability.
Simultaneous SDH have been reported and cortical branch laceration was thought to be a principal causative factor. Several authors have reported mechanisms of the formation of this acute SDH. Vance\textsuperscript{10} found that acute SDH was caused by rupture of cortical arteries. In his autopsies, small twigs connecting to the dura mater were identified that branched perpendicularly from the cortical arteries. These twigs were torn by the shearing force present in head injury, bleeding occurred, and acute SDH was formed. According to Drake’s report\textsuperscript{3}, there were adhesions between the dura mater and cortical arteries. Laceration of the adhesive arterial wall was caused even by trivial trauma, resulting in bleeding. The points of rupture were always located at branches in the territory of the middle cerebral artery, since middle cerebral arteries branch into many arteries and supply a wide territory of the cerebral hemisphere. Tallala and McKissock\textsuperscript{9} reported the causative mechanism of rupture of arteries was based on connection between the dura mater and arteries. According to him, the preceding head injury forms subdural clots, and adhesions of the dura and the cortex of the brain involving the cortical arteries are formed. The involved artery is lacerated by friction force and bleeding occurs. McDermott et al.\textsuperscript{6} described the presence of a rete mirabile connecting a cortical artery and the dura mater, and found that the disruption of this connection by trauma caused acute SDH.

The incidence of subarachnoid hemorrhage associated with an acute SDH either as a result of direct bleeding into the subdural space or as an extension from an intracerebral hemorrhage : ruptured intracranial aneurysms, ruptured cortical artery, hypertensive cerebral hemorrhage, neoplasms, hematologic disorders, anticoagulant and thrombolytic therapy, cerebral amyloid angiopathy, dural arteriovenous fistulas, and acquired immune deficiency syndrome\textsuperscript{1}.

Since the first report by Munro\textsuperscript{7} in 1934, many cases of spontaneous SDH have been reported and cortical branch laceration was thought to be a principal causative factor. Several authors have reported mechanisms of the formation of this acute SDH. Vance\textsuperscript{10} found that acute SDH was caused by rupture of cortical arteries. In his autopsies, small twigs connecting to the dura mater were identified that branched perpendicularly from the cortical arteries. These twigs were torn by the shearing force present in head injury, bleeding occurred, and acute SDH was formed. According to Drake’s report\textsuperscript{3}, there were adhesions between the dura mater and cortical arteries. Laceration of the adhesive arterial wall was caused even by trivial trauma, resulting in bleeding. The points of rupture were always located at branches in the territory of the middle cerebral artery, since middle cerebral arteries branch into many arteries and supply a wide territory of the cerebral hemisphere. Tallala and McKissock\textsuperscript{9} reported the causative mechanism of rupture of arteries was based on connection between the dura mater and arteries. According to him, the preceding head injury forms subdural clots, and adhesions of the dura and the cortex of the brain involving the cortical arteries are formed. The involved artery is lacerated by friction force and bleeding occurs. McDermott et al.\textsuperscript{6} described the presence of a rete mirabile connecting a cortical artery and the dura mater, and found that the disruption of this connection by trauma caused acute SDH.

The incidence of subarachnoid hemorrhage associated with an acute SDH either as a result of direct bleeding into the subdural space or as an extension from an intracerebral hemorrhage : ruptured intracranial aneurysms varies from 0.5% to 7.9\textsuperscript{2}, but a pure SDH without subarachnoid hemorrhage due to ruptured aneurysm is extremely rare. There are only 3 cases involved in ruptured distal middle cerebral artery aneurysms\textsuperscript{3,4,8}. Several mechanisms have been proposed to explain the occurrence of acute SDH after aneurysm rupture. Previous minor hemorrhages may fix an aneurysm to local arachnoid adhesions, resulting in bleeding directly into the sub-

**DISCUSSION**

At operation, we evacuated the subdural clotted blood and found bleeding point at a cortical middle cerebral artery located near the sylvian fissure. There was a small round hole at the cortical artery, which projected out through the arachnoid and the bleeding directly spouted into the subdural space (Fig. 3). We controlled the bleeding with electrocoagulation and diseased artery was excised for pathology. Histological examination of the arterial wall revealed thinning of tunica media and degenerative change of tunica intima. There was no atherosclerotic or inflammatory change. The histological diagnosis was aneurysmal artery (Fig. 4).

He showed progressive improvement and had mild hemiparesis at the time of discharge.

**Fig. 2.** Left carotid angiography, an extravasation of contrast medium from a branch of distal middle cerebral artery in noted (arrow).

**Fig. 3.** Operative magnified view showing a small round shape hole at cortical artery, which projects out blood (arrow).

**Fig. 4.** Photomicrographs of the cortical arterial wall shows thinning of tunica media and degenerative change of tunica intima. HE stain, original magnification ×100 (A) and ×400 (B).
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source of bleeding, complementary post-operative arteriography is required.

CONCLUSION

We report a rare case of acute spontaneous SDH that showed contrast media extravasation from cortical artery on angiograms. Patient with spontaneous acute SDH should undergo angiography to seek the cause of bleeding. However, even when no vascular abnormality is recognized, the possibility of angiographically unvisualized lesion should be considered, and during operation, the brain surface beneath the hematoma should be carefully examined.

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References