Ruptured Traumatic Aneurysm After Trivial Injury Mimicking Acute Spontaneous Subdural Hematoma
—Case Report—

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Abstract

A 75-year-old man suffered acute subdural hematoma shortly after trivial head trauma. Thirteen hours after a trivial brow to the occipital region, caused by contact with a mat, he suddenly deteriorated to the level of a Glasgow Coma Scale score of 6. Computed tomography demonstrated an acute subdural hematoma on the left and angiography revealed an aneurysm of the distal middle cerebral artery. An emergent craniotomy disclosed no skull fracture and exposed a thick subdural hematoma with no brain contusions. After evacuation of the hematoma, an aneurysm was found on the distal portion of posterior temporal artery, which was compatible with the angiographical findings. The neck of aneurysm was so fragile that neck clipping could not be successfully performed. Therefore, the aneurysm was extirpated, and the bleeding site coagulated with oxidized cellulose reinforcement. Histological examination of the aneurysm indicated a pseudoaneurysm during the early phase of clot formation. The acute subdural hematoma resulted from rupture of this pseudoaneurysm which was formed shortly after the minor head trauma. Rupture of a pseudoaneurysm caused by trivial trauma might be one of the origins for so-called acute “spontaneous” subdural hematoma.

Key words: traumatic aneurysm, acute spontaneous subdural hematoma, middle cerebral artery

Introduction

Traumatic aneurysm caused by closed-head injury is rare. Traumatic aneurysms usually involve the basal arteries, but may occur on the distal cerebral arteries, and rarely on the distal middle cerebral artery (MCA).1–7,10,17–20,22) Traumatic aneurysms are commonly associated with major head injury, and more rarely with minor head injury.2,18) Acute spontaneous subdural hematoma due to an arterial bleeding, typically in the sylvian area involving a cortical branch of the MCA, has been reported.9,11,13,14,16,21,23–26) We treated a patient who presented with a condition mimicking acute spontaneous subdural hematoma due to a ruptured pseudoaneurysm of the MCA which occurred 13 hours after trivial head trauma.

Case Report

A 75-year-old man had been treated as an outpatient for diabetes mellitus and hepatocellular carcinoma at the Department of Internal Medicine of our institute. Laboratory data and coagulation studies on August 1 showed slight liver dysfunction and normal coagulation characteristics. He was not an alcoholic and showed no bleeding tendencies such as purpura or nasal bleeding. He had not suffered any major head trauma until he hit his occipital region against a mat at home at 6 a.m. on August 8. He showed no consciousness loss and complained of neither headache nor nausea after this trivial injury. He showed no consciousness loss and immediately became drowsy at 7 p.m. on August 8, and he was transferred to our institute. On admission, he presented with disturbance of consciousness with a Glasgow Coma Scale score of 6 with hemiparesis on the right and dilated pupil on the left. Both laboratory and coagulation tests showed no remarkable changes compared to those on August 1. Radiography revealed no skull fracture.
Computed tomography disclosed a thick acute subdural hematoma and a small amount of subarachnoid hemorrhage (SAH) on the left (Fig. 1). Since SAH was detected without major head injury, angiography was performed, which showed an aneurysm of the left posterior temporal artery (Fig. 2). A left frontotemporoparietal craniotomy was performed, but no skull fracture was noted. After evacuation of the thick subdural hematoma, an aneurysm at the posterior temporal artery was revealed. This artery was covered with the arachnoid membrane, but the dome of this aneurysm protruded into the epi-arachnoid space. Slight SAH was encountered around the sylvian region, but no underlying brain contusion was observed. The neck of aneurysm was so fragile that neck clipping could not be successfully performed. Therefore, the aneurysm was extirpated, and the bleeding site coagulated with oxidized cellulose reinforcement (Fig. 3). The patient made a satisfactory recovery after postoperative therapy for the increased intracranial pressure and rehabilitation.

Histological examination of the aneurysm detected no vessel wall layers, so the diagnosis was pseudoaneurysm. The extirpated tissue consisted of fibrin networks and massive infiltration of neutrophils without accumulations of macrophages or fibroblastic proliferation which are characteristics of the early phase of clot formation (Fig. 4).

**Discussion**

Traumatic aneurysm is very common in the skull base, usually involving the internal carotid artery. Peripheral traumatic aneurysms usually occur on the distal anterior cerebral artery secondary to an impact against the falxine edge, or as a distal cortical aneurysm that is often associated with an overlying skull fracture. Several traumatic aneurysms of the distal MCA were associated with major trauma, but only three traumatic aneurysms on the MCA have been caused by trivial trauma. A 56-year-old female fell down a flight of
stairs, and a 40-year-old female struck her head, but neither patient had skull fractures, and both immediately deteriorated due to subdural hematoma caused by rupture of a pseudoaneurysm. Another 73-year-old female fell down a flight of stairs without immediate loss of consciousness, but deteriorated 2 hours later due to rupture of a pseudoaneurysm. This case showed a fairly similar clinical course to our case, with an interval of less than 24 hours between the traumatic episode and the diagnosis of the aneurysm. Such trivial trauma is unlikely to cause an aneurysm, but the histological study detected no accumulation of macrophages or fibroblastic proliferation, which indicates an early phase of clot formation. We ascertained that the interval from injury to the occurrence of this aneurysm was 13 hours.

Subdural hematoma is mainly caused by damage to the bridging venous structures due to an abrupt translational force, but subdural hematoma with cortical arterial bleeding has often been reported. The majority of these cases were associated with lacerations or contusions of the brain, or less frequently with an underlying aneurysm or vascular malformation, whereas trivial injury rarely causes acute subdural hematoma of arterial origin. Four types of spontaneous bleeding of the cortical artery are known: Spontaneous rupture of a cortical artery at the point of origin of a fragile arterial twig, a particularly potential location of weakness; rupture of a small artery traversing the subdural space and connecting a cortical artery to the dura mater (a “bridging” artery); adhesions between a cortical artery and the arachnoid membrane or dura mater; and a loop of a cortical artery protruding through the arachnoid membrane and adherent to the dura mater. In this case, a small hemorrhage could have occurred after the trivial head trauma, causing a similar situation to spontaneous rupture of a cortical artery, resulting in a pseudoaneurysm which adhered to the arachnoid membrane and/or dura mater. Preoperative computed tomography showed less subdural hematoma in the temporoparietal region than in the frontal region. Subdural hematoma might have easily flowed into the frontal space because of adhesion between the pseudoaneurysm and the dura mater in the temporoparietal region, but this could not be ascertained because of the thick subdural hematoma present around the aneurysm due to the increase of the hematoma before the operation. Rupture of this aneurysm 13 hours after the trauma then caused a similar situation to that of acute spontaneous subdural hematoma. The interval between the traumatic episode and the diagnosis of the aneurysm varied between a few hours and 10 years, so that of 13 hours in this case was not particularly short in comparison with the previous cases.

Fig. 4 Photomicrographs of the aneurysm showing fibrin networks and massive infiltration of neutrophils without accumulations of macrophages or fibroblastic proliferation. The cavity (asterisk) was surrounded by a clot in the early stage of coagulation, and no vessel wall layers were detected. HE stain, original magnification × 20 (A) and × 100 (B).
The pseudoaneurysm in the present case could not have been detected without careful evacuation of the subdural hematoma based on the angiographical findings. Since many cases of so-called “spontaneous” subdural hematoma are simply evacuated, traumatic pseudoaneurysms around the sylvian area would remain undetected. Operative findings of a hole in the arterial wall might indicate the site of such aneurysms. Angiography of acute spontaneous subdural hematoma usually shows an extracerebral avascular mass over the cerebral convexity, sometimes with extravasation of contrast medium. Some cases of acute spontaneous subdural hematoma may be due to a small pseudoaneurysm which ruptured and disappeared during the occurrence of the subdural hematoma despite the absence of angiographical evidence.

References


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