Acute Subdural Hematoma of Arterial Origin in a Patient with a Lumboperitoneal Shunt

Nobuhiko AOKI

Department of Neurosurgery, Tokyo Metropolitan Fuchu Hospital, Fuchu, Tokyo

Abstract

A patient who developed a subdural hygroma following emplacement of a lumboperitoneal shunt was found to have an acute subdural hematoma following a minor head trauma. At surgery, a ruptured cortical artery was identified as the source of bleeding. The pathoetiology of the acute subdural hematoma appeared to be rupture of the cortical artery, which protruded into the subdural hygroma through a defect in the arachnoid. The potential risk of acute subdural hematoma, even after minor head trauma, in a patient with cerebrospinal fluid diversion via a lumboperitoneal shunt, is discussed.

Key words: acute subdural hematoma, arachnoid tear, cortical artery rupture, subdural hygroma

Introduction

It is known that patients with craniocerebral disproportion are apt to suffer from acute subdural hematoma even after minor head trauma. Although the most common source of bleeding in subdural hematoma is a ruptured bridging vein, in the patient described here the acute subdural hematoma was found, at surgery, to have been caused by a ruptured cortical artery. Such a finding is worth noting in the context of the pathoetiology of acute subdural hematoma, since reports of an arterial origin have recently increased.

Case Report

A 44-year-old female underwent subtotal removal of an epidermoid in the posterior fossa via a posterior fossa craniectomy on September 25, 1984. Her neurological symptoms, which included diplopia, difficulty in swallowing, right hemiparesis, cerebellar signs, and mild dementia, did not improve after surgery. Moreover, her postoperative course was complicated by persistent subcutaneous accumulation of cerebrospinal fluid (CSF). Repeat aspiration with local compression failed to eliminate this problem, and a lumboperitoneal (LP) shunt was installed on October 16. Thereafter the CSF accumulation ceased. However, shrinkage of the ventricles and development of bilateral low-density lesions, indicative of subdural hygroma, were noted on a follow-up computed tomography (CT) scan (Fig. 1).

Fig. 1 CT scan following insertion of a LP shunt, showing low-density areas over the bilateral convexities, indicating subdural hygromas.
The patient's neurological status remained unchanged until November 8, when she fell out of her wheelchair in the ward and struck the left parietal region of her head on the floor. Although she did not immediately lose consciousness, within 15 minutes she was found to have a mild left hemiparesis. A CT scan obtained 30 minutes after the accident disclosed a hyperdense hematoma with some low-density regions over the right cerebral convexity (Fig. 2). The patient then began to vomit frequently and rapidly lapsed into a coma, with dilation of the right pupil. Forty minutes after the traumatic incident she was taken to the operating room.

**Operation:** The patient was given general anesthesia and placed in a supine position with her head turned to the left. A right temporoparietal craniotomy disclosed a massive, clotted subdural hematoma approximately 3 cm in thickness. Its appearance suggested that hemorrhaging had continued after the CT scan had been obtained. Evacuation of the hematoma failed to reveal cerebral contusion or subarachnoid hemorrhage but demonstrated a spurtting hemorrhage from a cortical artery in the parietal region adjacent to the sylvian fissure. The bleeding was easily controlled with bipolar coagulation. No capsule was found inside the dura mater.

Postoperatively the patient rapidly regained consciousness and returned to her preoperative state.

**Discussion**

The remarkable feature of this case is that the patient was suffering from a subdural hygroma after installation of a LP shunt and then developed an acute subdural hematoma caused by rupture of a cortical artery. Although it is not uncommon for a subdural hematoma to follow a CSF shunting procedure, particularly in patients with chronic processes, reports of massive, acute subdural hematoma are scarce. According to the author's experience, it is not rare for a patient who has undergone a CSF shunting procedure to develop a subdural hematoma due to rupture of a cortical artery.
procedure to develop a massive, acute subdural hematoma, either spontaneously or following minor head trauma. This should be borne in mind as a serious potential complication in patients subjected to CSF diversion procedures.

Recently, reports of acute subdural hematoma having an arterial origin have increased.\textsuperscript{3,5,6,8,12} Regarding the mechanism, Drake\textsuperscript{4} has suggested that arterial hemorrhage results from movement of the brain during trauma and simultaneous rupture of an artery or arterial twig attached to the dura. His theory is supported by other investigators,\textsuperscript{5,12} and the mechanism he proposed is concordant with the author's observations. Adhesion of the arachnoid to the inner aspect of the dura in a bell-shaped configuration, coupled with protrusion of an arterial twig into the subdural space through a defect in the arachnoid, were found at surgery in another patient with an acute subdural hematoma that occurred after a LP shunt (Fig. 3).

The etiology of the arterial bleed in the patient presented here, however, does not entirely correspond to the theory described above. Because of the considerable distance between the arachnoid and the inner surface of the dura seen on the preoperative CT scan, it is inconceivable that the dura could have been attached to the arachnoid at the bleeding site. There was no intraoperative evidence of subarachnoid hemorrhage in this patient; therefore, it is certain that the acute subdural hematoma originated from rupture of a cortical artery that protruded into the subdural hygroma.

Development of subdural hygroma has generally been attributed to tearing of the arachnoid.\textsuperscript{9,10} Therefore, the etiology of the acute subdural hematoma in this patient is most likely as follows. Installation of the LP shunt produced an arachnoid tear, which induced the development of the subdural hygroma.\textsuperscript{7} Also, a cortical artery protruded into the subdural space through the torn arachnoid. Subsequently, a minor head trauma caused rupture of the artery in the subdural hygroma, resulting in the acute subdural hematoma.

Although in this patient the purpose of the LP shunt was to eliminate subcutaneous CSF accumulation, the procedure unfortunately contributed to the development of the subdural hygroma and the subsequent occurrence of the acute subdural hematoma. Thus, the shunt should have been withdrawn as soon as it had become unnecessary. The clinician should be aware that a patient subjected to a CSF shunting procedure is at risk for serious complications, as illustrated by this case.

References

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\textit{Address reprint requests to: N. Aoki, M.D., Department of Neurosurgery, Tokyo Metropolitan Fuchu Hospital, 2-9-2 Musashidai, Fuchu, Tokyo 183, Japan.}

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