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Fatal Subependymal Hemorrhage Following Drainage of Intracranial Chronic Subdural Hematoma

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Abstract **Case Report**

***Introduction*:** Intracranial chronic subdural hematomas are frequently encountered in neurosurgical practice. Surgical drainage of this type of hematoma has been used for many years with good results. Nevertheless, with chronic subdural hematomas draining, unexpected neurological complications may occasionally happen. An intracerebral or intraventricular hemorrhage following such an evacuation is very rarely observed. We report a rare case of fulminant subependymal hemorrhage after the evacuation of intracranial chronic subdural hematomas. ***Case Report*:** We report the findings regarding 75-year-old male presented with complaints of severe headache for 5 days, with mental confusion, disorientation, and slight right hemiparesis. Past history revealed a road accident with head and pelvis trauma three months ago. Computed tomography of the head showed a left acute on chronic subdural hematomas with mass effect and midline shift. We proceeded with the surgical evacuation of the left subdural hematoma via two burr-hole craniotomy, complicated later with subependymal intraventricular hemorrhage, subsequently operated on for external ventricular drainage. Unfortunately, the patient died one week later of a pulmonary infection. ***Discussion and Conclusion*:** Our case demonstrated a subependymal bleed following surgical drainage. We hypothesize that the sudden decompression of the brain could lead to mechanical stress at the interface between the solid (brain) and liquid (cerebrospinal fluid) components within the cranium. This stress might cause rupture of the engorged subependymal veins, which were likely swollen due to prolonged compression. This mechanism could account for the post-operative CT findings in our case. This postoperative complication could be avoided if slow and gradual decompression is performed during surgical drainage.

Keywords: Surgical Draining, Chronic Subdural Hematoma, Intraventricular Bleeding, Postoperative Complication.

INTRODUCTION

Chronic subdural hematomas (CSDH) are frequently encountered in neurosurgical practice. Head trauma, advanced age, coagulopathies, recurrent falls, and therapeutic anticoagulation are risk factors [1, 2]. Nevertheless, with CSDH draining, unexpected neurological complications may occasionally happen. Acute subdural hematomas, tension pneumocephalus, infection, seizure, and cerebral edema observed after CSDH is removed have been documented as uncommon but severe surgical consequences [3]. An intracerebral or intraventricular hemorrhage following such an evacuation is very rarely observed [3-5]. We report a rare case of fatal fulminant subependymal hemorrhage after the evacuation of a CSDH.

REPORT

In our case, we report the findings regarding a 75-years-old male presented with complaints of severe headache for 5 days, with mental confusion, and disorientation. Past history revealed road accident with head and pelvis trauma, operated on for femoral neck fracture three months ago. The neurologic examination confirmed mental confusion and spatial disorientation with a slight right hemiparesis. The biological check-up was normal. CT (computed tomography) of the head showed a left acute on CSDH with mass effect and midline shift **(Fig. 1A)**. Consequently, we proceeded with the surgical evacuation of the left subdural hematoma via two burr-hole fronto-parietal craniotomy under local anaesthetic. At the end of the operation, two drainage tubes were positioned in extracranial space, open to gravity. One hour later, the patient presented neurological deterioration with convulsive seizures and arterial hypertension (190/110 mm Hg). A cerebral CT

scan was performed, showing intraventricular hemorrhage without pneumocephalus or subdural hematoma **(Fig. 1B).** The patient was then transported to the operative room for external ventricular drainage. Evolution was marked by clinical improvement. A control CT scan was performed three days after, showing subtotal resorption of the intraventricular hematoma **(Fig. 1C).** Unfortunately**,** the patient died one week later in the intensive care unit of pulmonary infection.

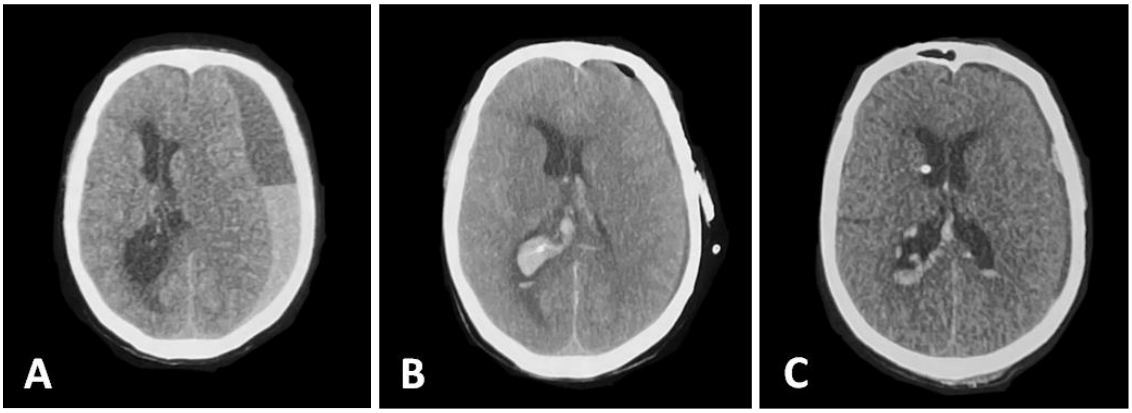

Figure 1: (A): CT scan showing a large left acute on CSDH with mass effect and midline shift. (B): Post-operative CT head showing subependymal bleed in the lateral ventricle. (C):Post-operative CT head three days after external drainage showing subtotal resorption of the subependymal bleed.

DISCUSSION

The first report of intracerebral hemorrhage (ICH) following surgical decompression of a chronic subdural hematoma (CSDH) was by McKissock *et al*., in 1960. In their study of 500 CSDH cases, Mori and Maeda noted a postoperative ICH incidence of 0.2% in the putamen [6-8].

Several pathological events might contribute to the onset of an intracranial hemorrhage (ICH) after the removal of a chronic subdural hematoma. For instance, potential factors include damage to cerebral blood vessels due to perioperative shifts in brain tissue, a sudden increase in blood flow coupled with impaired vascular autoregulation, and bleeding into an undetected contusion. These factors have been suggested as possible explanations for the occurrence of delayed intracranial hematomas or additional subdural hematomas [9-11].

In support of this hypothesis, the authors carried out a convincing study in which PET scans were performed in the immediate pre- and postoperative periods in 22 patients with HSDC. The results confirmed the existence of this postoperative hyperemia in 40 % of patients. To explain the discrepancy between the low incidence of cerebral hemorrhage and the relatively high incidence of hyperhaemia, these authors suggested the intervention of other favoring factors such as hypertension, degenerative angiopathies, and advanced age. The probable role of postoperative convulsions in the genesis of this complication through increased cerebral blood flow has been suggested [12].

Cohen-Gadol reported a contralateral intraparenchymal hemorrhage associated with intraventricular bleeding in a recent publication. Based on the patient's rapid improvement after stopping subdural drainage, the author feels that overdrainage of CSF and subdural fluid was most likely the source of the bleeding. The contralateral bridging veins were put under tension as a result of the likely severe cerebral hypotension caused by CSF overdrainage. This collapse of the veins ultimately resulted in venous insufficiency and hemorrhagicinfarction [13]. Our case demonstrated a subependymal bleed following drainage. We hypothesize that the sudden decompression of the brain could lead to mechanical stress at the interface between the solid (brain) and liquid (CSF) components within the cranium. This stress might cause rupture of the engorged subependymal veins, which were likely swollen due to prolonged compression.

CONCLUSION

Neurosurgeons need to be aware of these uncommon but well-known side effects, even though CSDH draining is considered as a simple surgery. Many hypotheses have been suggested as the overdrainage of CSF and subdural fluid, perioperative shifts, postoperative hyperemia. To avoid such complications, blood pressure control, the correction of coagulopathies, and the management of associated drugs are crucial. Since meticulous irrigation of the hematoma cavity reduces the risk of a quick shift of intracranial contents, it is advised to carefully and gently evacuate the subdural hematoma during surgery without excessive head movement.

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