ABSTRACT

Despite its benign nature, chronic subdural hematoma (SDH) can be fatal if surgical intervention is delayed. Here, we report on bilateral chronic SDH in an 84-year-old man who died of duret hemorrhage in the brain stem and ischemia in the occipital and temporal lobes. We discuss the necessity for urgent surgical intervention to treat bilateral chronic SDH, and provide a review of the relevant literature.

Keywords: Subdural hematoma; Brain; Edema

INTRODUCTION

Chronic subdural hematoma (SDH) is a well-known disease encountered in the neurosurgical field and usually occurs in elderly patients after minor head trauma. The number of affected patients is increasing due to an aging society. Patients usually show a good prognosis with a simple trephination procedure, even under local anesthesia, with low complication rates. However, unexpected neurological deterioration should not be overlooked, despite the well-known benign clinical course of chronic SDH.

Many reports have analyzed the risk factors for technical complications, postoperative hemorrhage, or recurrence after a simple trephination procedure in chronic SDH; however, few have focused on poor clinical outcomes as a result of delayed surgical intervention.

Here, we report a fatal case of chronic SDH due to error in judgement. We should be mindful of the possibility that the condition of the patient with bilateral chronic SDH might deteriorate rapidly, and emergent surgical intervention should have been considered for bilateral chronic SDH.

CASE REPORT

An 84-year-old man was admitted to our outpatient clinic without any history of trivial head injury or spine procedure with a complaint of severe headache that had worsened 3 days prior. He was alert, and neurological examination revealed no specific abnormalities except for severe

Fatal Brain Herniation in Bilateral Chronic Subdural Hematoma

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Case Report

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headache. He had no underlying disease and was not taking antiplatelets or anticoagulants and had no symptoms of spontaneous intracranial hypotension such as orthostatic headache, neck stiffness, nausea and vomiting. Laboratory results, including blood examination, revealed normal liver function and coagulation profile, including platelet count.

Computed tomography (CT) scan of the brain revealed bilateral chronic SDH without significant midline shifting or brain herniation (FIGURE 1). Owing to his alert mentation and no neurologic deficits except severe headache, elective surgery was planned, and he was hospitalized for conservative treatment before surgery. However, 8 hours after admission, he sustained a rapid decline in consciousness, which worsened into a semicomatose mentation. A follow-up brain CT scan showed bilateral chronic SDH with severe bilateral uncal and central herniations (FIGURE 2). Urgent bilateral trephination and hematoma drainage were performed to decrease intracranial pressure (ICP) within an hour of mental deterioration under local anesthesia. Postoperative CT scan showed complete resolution of the hematoma, also duret hemorrhage on brainstem and posterior cerebral artery territory infarction (FIGURE 3). The patient eventually died of diffuse brain ischemia after 7 days post admission, despite aggressive treatment to lower the increased ICP.
**DISCUSSION**

Chronic SDH is a relatively common disease that tends to occur in elderly patients. Burr hole trephination under local anesthesia is the simplest and most commonly performed procedure for the initial treatment of symptomatic chronic SDH.\(^8\)

Nevertheless, neurosurgeons may experience devastating surgical complications, such as acute hemorrhage or brainstem infarction, at a frequency that occur even in rare cases. The risks of poor clinical outcomes have been mainly focused on the recurrence of hematoma, infection, and liver or renal dysfunction after surgical intervention.\(^4,8,9\) Fatal brain herniation in bilateral chronic SDH caused by delayed surgical intervention has rarely been reported but may have important implications.

Our patient showed rapid duret hemorrhage on brain stem and downward herniation after emergent surgical intervention, which led to death despite an effort to decrease ICP. Several non-operative treatments have been described including mannitol, corticosteroid or tranexamic acid. Among them, mannitol is often used for the treatment of increased ICP. However, on the basis of available data, recommendations cannot be made in spite of its possible role in the conservative treatment of chronic SDH.\(^10\)

Bilateral chronic SDH has been reported to be associated with the use of antiplatelet agents or malignancy. Therefore, if patients who take antiplatelet agents or have a history of malignancy experience severe headache or neurological deterioration, attention should be paid to the presence of bilateral chronic SDH.\(^3\) Rapid decline of consciousness is known to be related to a poor clinical outcome. The diagnosis of bilateral chronic SDH can be delayed by a lack of prominent symptoms that occur due to midline shifting, except headache. Tsai et al.\(^12\) reported that patients with bilateral chronic SDH were more prone to showing symptoms related to increased ICP, such as severe headache, but fewer symptoms related to brain shift, such as hemiparesis. Hemiparesis is more frequently observed in patients with unilateral chronic SDH, and severe headache or acute mental deterioration is more frequent in patients with bilateral chronic SDH. Clinical indicators of rapid progression were reported to be
fluid level on CT images, which indicates the possibility of fresh bleeding. Taken together, bilateral involvement or chronic SDH with radiological findings of fresh bleeding should be treated immediately after diagnosis. Recently, some reports suggest that spontaneous intracranial hypotension (SIH) may be related to bilateral development of chronic SDH. \(^1\) SIH is characterized by orthostatic headache with neck stiffness, nausea, vomiting and vertigo and it is defined by a cerebrospinal fluid opening pressure less than 60 mmH\(\text{O}\). In cases of clinical signs suggesting intracranial hypotension, CT myelography and epidural blood patch at the leakage site should be considered, otherwise patients who have received trephination procedure may develop tension pneumocephalus or intracranial hematoma.\(^7\)

Our patient did not show clinical signs of SIH, and he had no medical history of malignancy or taking antiplatelet agents. He showed rapid mental deterioration induced by brain herniation in bilateral chronic SDH within 8 hours after post admission.

Even in patients without significant neurologic deficits except severe headache, immediate surgical evacuation of the hematoma is warranted to prevent poor clinical outcomes caused by brain herniation.

**CONCLUSION**

Despite the well-known benign nature of chronic SDH, bilateral chronic SDH may have a higher risk of brain herniation, resulting in fatality. Emergency surgical intervention should be considered even in cases with no neurological deficits to prevent brain herniation, especially in patients with bilateral chronic SDH.

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