

## Original Article

# Bilateral large chronic ossified epidural hematoma after ventriculoperitoneal shunt: a special case report and treatment management

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**Abstract:** Chronic ossified epidural hematoma is an uncommon complication of ventricular shunt operation, and bilateral chronic ossified epidural hematoma was rare to reported in the literature. We report a 35-year-old man with triventricular hydrocephalus was treated with a ventriculoperitoneal shunt but presenting with chronic epidural hematoma at 3 days reexamination after operation. At that time, the doctors did not pay much attention and surgery for it. With 19 years severe headache, the epidural hematoma increasing gradually and calcification constantly, the chronic ossified epidural hematoma was removed after he arrived in our department. Although the use of high or medium pressure valves, valves with an antisiphon device, adjustable pressure valves or flow control valves have been recommended to prevent this complication in previous reports, it was seen that our case had been treated with a medium pressure flow control valve.

**Keywords:** Chronic epidural hematoma, calcification, ventriculoperitoneal shunt

## Introduction

Epidural hematoma can be widely found in patients victims of head trauma, Subdural hematomas after ventricular drainage or Ventriculoperitoneal Shunt (VP shunt) because shunting or intracranial surgery are usual and may undergo calcification and ossification. However, epidural hematoma after VP shunt is unusual, and bilateral large chronic ossified epidural hematoma after Ventriculoperitoneal Shunt is extremely rare disease. There is few correlative literature been found, just 3 old literature reported the chronic ossified epidural hematoma after VP shunt [1-3].

We reported a 35-year-old male with a bifrontal large chronic ossified epidural hematoma detected 19 years after ventriculoperitoneal shunt operation.

## Case report

### Clinical data

A 35-year-old male was admitted to our outpatient clinic with 19 years severe headache and

ambulation dysfunction for two weeks. The past medical history was very important that he suffered from communicating hydrocephalus 19 years ago and then he accepted a ventriculoperitoneal shunt with a medium pressure flow control valve inserted from right temporooccipital burr-hole (no Imaging data available due to the long time). Reexamination by computerized tomography (CT) scanning after operation showed bilateral epidural hematoma (**Figure 1A**). Since his symptom of hydrocephalus was improved and the headache was not serious, the bilateral epidural hematoma was not removed but just followed up by CT (**Figure 1B1** and **1B2**). This hospitalization neurological examination revealed normal findings except ambulation dysfunction and two-sided hemiparesis. CT-imaging in our hospital revealed bilateral mass with ossification, which was interpreted as a calcified chronic epidural hematoma (**Figure 1C**).

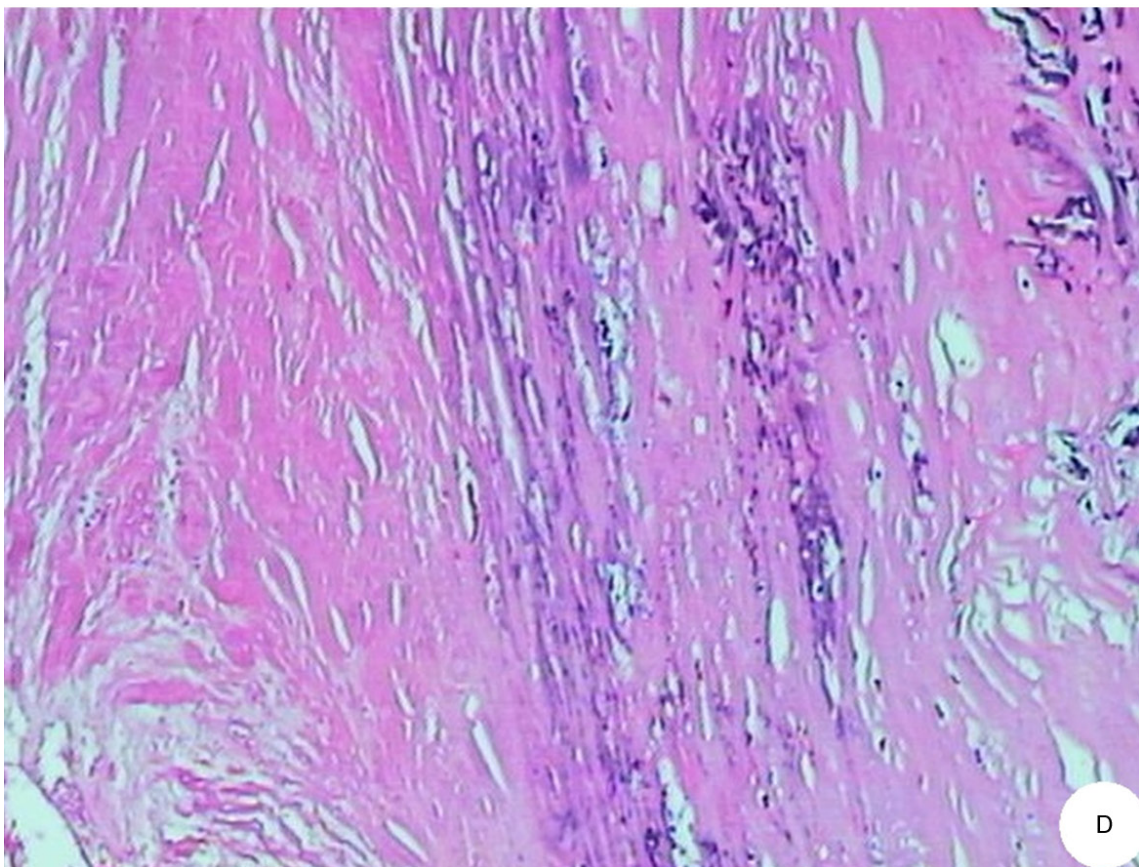
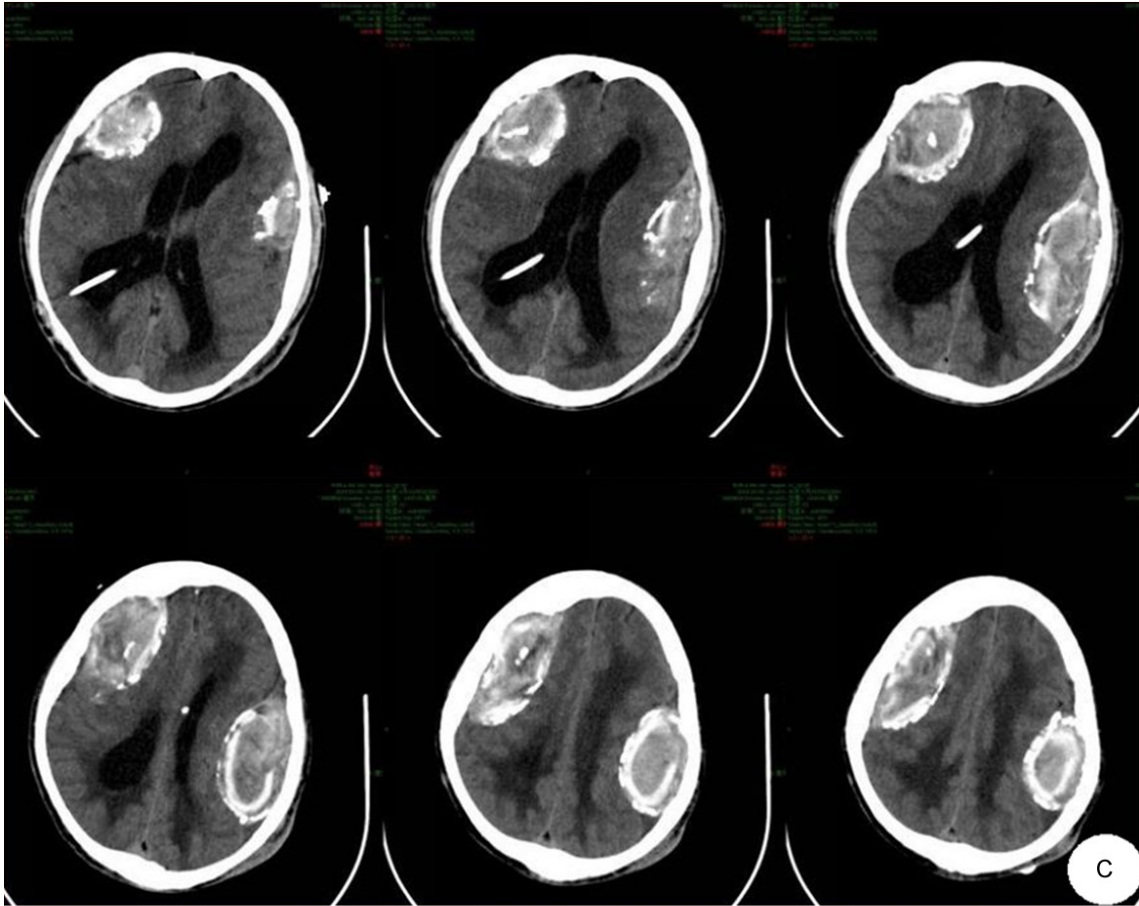
### Surgical strategy and operative findings

The following day he underwent a right and left pterional craniotomy. The mass was located extradurally and adhered to the overlying bone

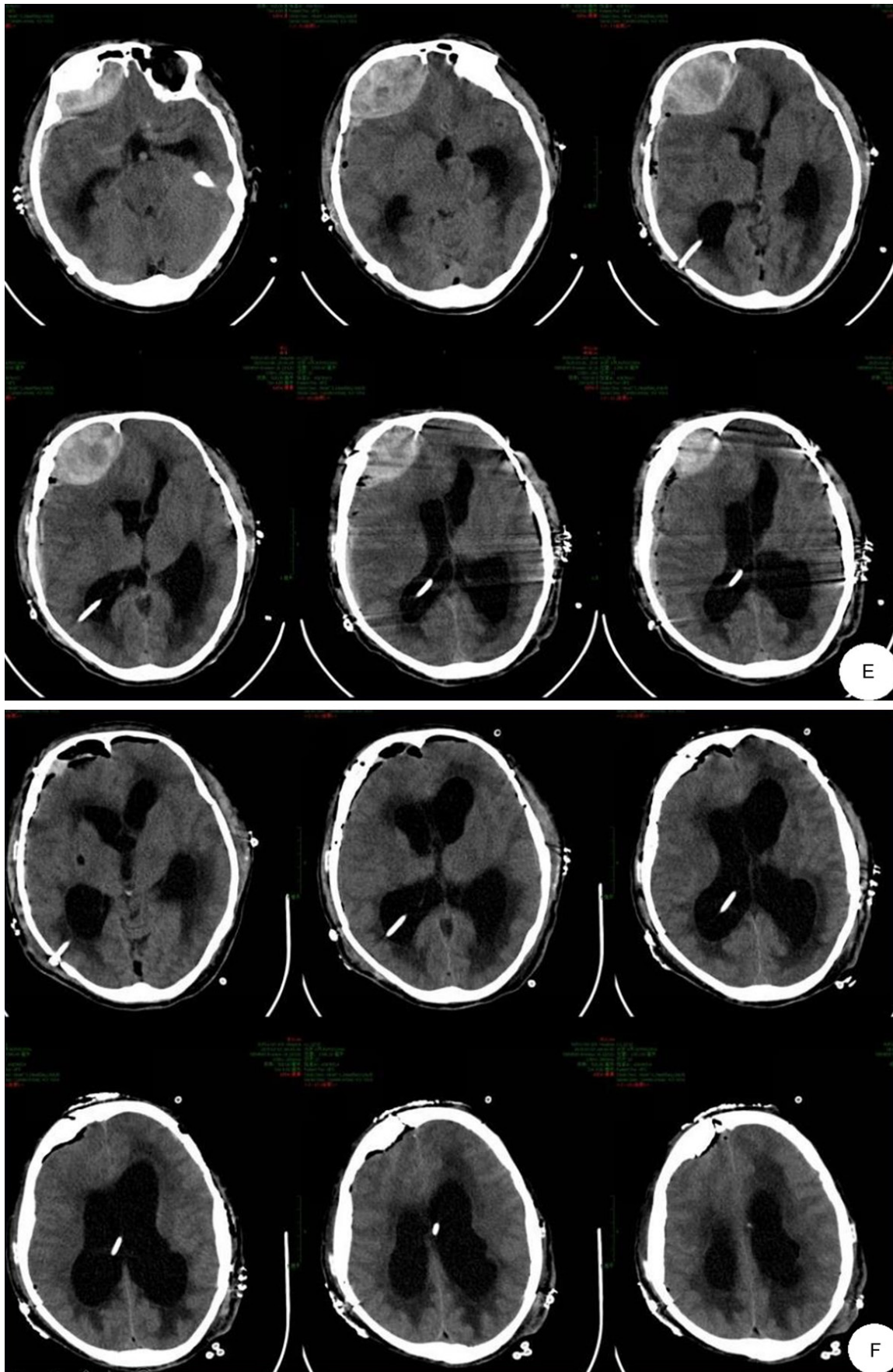




## Chronic ossified epidural hematoma

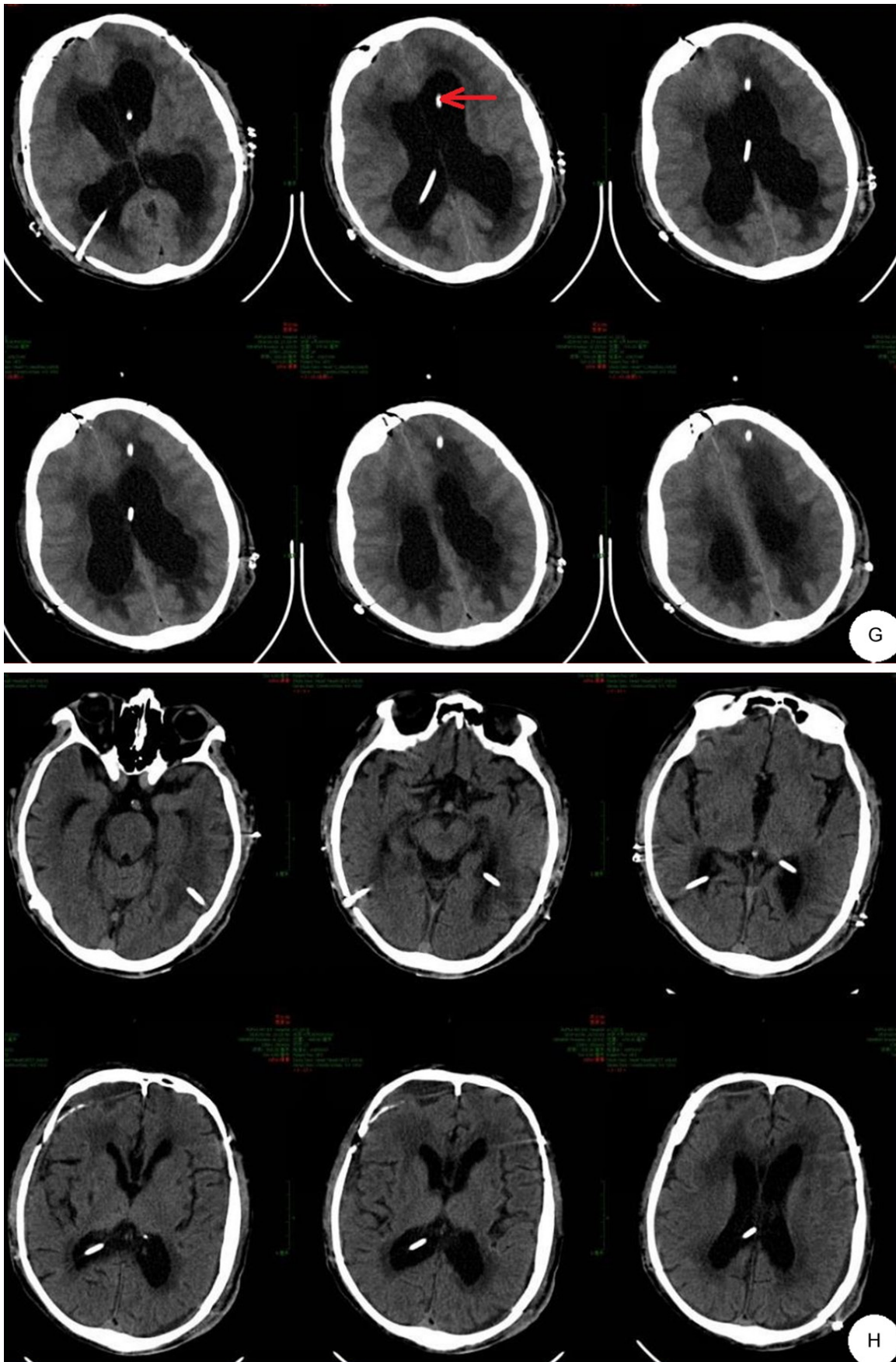


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**Figure 1.** (A) CT imaging demonstrated bilateral large epidural hematoma after Ventriculoperitoneal Shunt operation, red arrow points hematoma (A). (B) Follow up by CT. Two years after VP shunt operation, CT imaging demonstrated the hematoma volume increase than before and showed clear boundary with partly calcification (B1). Sixteen years after VP shunt operation, the hematoma volume significant increase and more calcification than before (B2). (C) Seventeen years after VP shunt operation, CT imaging demonstrated bilateral chronic ossified epidural hematoma and ventriculi being pressed moving, brain edema. (D) Postoperation Histopathology Examination showed a complete envelope made up of collagenous fibers, contained calcareous deposits and hemosiderin (D). (E) Postoperation CT imaging demonstrated a acute epidural hematoma, ventriculi being pressed moving and obvious deviation of central line structure (E). (F) Postoperation CT imaging demonstrated hematoma was removed successfully, but the average volume of lateral ventricle was enlarged manifestly. (G) 48 hours after hematoma was removed, red arrow points extraventricular drainage tube. (H) After second VP shunt, CT imaging demonstrated that the average volume of lateral ventricle was normal, brain tissue edema located at the paraventricular was lighter than before.

as a tortoise shell. The cerebral skeleton bore a fairly strict relationship to the mass of the lesions which was attached to it. It contained a thick organized calcareous sediments and fibrocollagenous mass. Then it was dissected away from the dura and skull and completely removed. Bilateral large chronic ossified epidural hematoma was removed completely.

Pathologically, a thick fibrotic hematoma capsule and a small hematoma cavity were identified. Ossification, calcification and fibrocollagenous areas were seen in the ossified epidural hematoma (**Figure 1D**).

The postoperative course was a chequered history, and postoperative CT showed that complete removal of the bilateral hematoma with the associated ossification had been achieved. But, delayed intracerebral hematoma and acute hydrocephalus appeared after surgical removal of epidural hematoma (**Figure 1E**). Then he underwent reoperation for remove the intracerebral hematoma. Hematoma was removed successfully, but hydrocephalus was aggravating gradually after operation (**Figure 1F**). The patient fell in unconsciousness after 48 hours, then he underwent extraventricular drainage surgery once again (**Figure 1G**). 23 days later, he accepted a Ventriculoperitoneal Shunt surgery for hydrocephalus (**Figure 1H**). His clinical symptoms had improved and his shunt was functioning 10 months later by follow-up.

### Discussion

Subdural collection is a well-known complication of ventricular drainage as rapid lowering of intracranial pressure. Epidural hematoma after VP shunt is unusual, because the dura is generally adhered to the inner surface of the skull [4]. Sengupta [5] reported that the main reason of

epidural hematoma may be cerebrospinal fluid (CSF) over-flow after VP shunt and either the evidence of chronic hydrocephalus or the age less than 20 years was the most important risk to bleeding in EDH (4, 5).

Most literature reported that usage of valve-regulated shunt systems can decrease the incidence of subdural collections after ventricular drainage [4-9]. And most of these cases have acute hematoma, but less of them have chronic calcified/ossified hematomas [4, 7]. Calcification is found in 0.3-2.7% of cases of chronic subdural hematomas, which is generally found in children and young adults, especially after a shunt operation [10, 11]. But chronic ossified epidural hematoma is rarely. Seyithanoglu H [6] reported that the interval between shunt placement and detection of hematoma is 5 weeks to 3 years in chronic EDH cases after shunt insertion. But the mechanism of the calcification is still unclear. Munro D [12] reported that an inherent metabolic tendency to calcification is necessary for the development of calcified chronic subdural hematoma. But McLaurin RL [13] reported that local factors could play a part in calcification as he presented a case report that a bilateral subdural hematoma in which calcification occurred only on one side. However, in our case report the bilateral epidural hematoma in which calcification occurred on both two sides.

Although the mechanisms involved in the development of chronic ossified epidural hematoma are not clear, it is different from chronic subdural hematoma [14]. Some literatures reported that venous origin and later accumulation of the hemorrhage, the adherence of dura in particular regions causing smaller hematomas or the accumulation of subgaleal hematoma in the epidural space through a skull fracture have all been claimed to be responsible for

chronic EDH [15, 16]. Leonardo Bonilha [17] also reported that the mechanism of re-expansion of the hematoma is possibly due to re-bleeding, and this may be taken into account for the decision-making to treat VEDH patients conservatively.

Surgical resection of cephalhematoma is needed either for the above reasons or for cosmetic purposes. Treatment is generally surgery but conservative management may be employed occasionally. Tuncer et al [18] advised conservative management to be appropriate for patients with haematomas measuring less than 3×1.5 cm on CT scan. As re-expansion of the hematoma is possibly due to re-bleeding [17], the outcome of the surgical management is excellent. Zuccarello [19] reported that just one patient died and an overall mortality of 1.2% in 83 cases by surgically managed. In the present paper, we reported a case of a chronic VEDH was cut successfully in one operation. But, delayed intracerebral hematoma and acute hydrocephalus appeared after surgical removal of epidural hematoma. We speculated that the reason for rebleeding maybe normal perfusion pressure breakthrough (NPPB). And we considered that operation including two times may reduce the risk of postoperative rebleeding as Intracranial pressure (ICP) would release slowly. This is a question which is worth thoroughly pondering.

Because the patient had longer history, with incomplete and unclear image information, as well as accepting treatment in many hospital, this patient's medical records was not very comprehensive.

We reported an extremely rare case of bilateral large chronic ossified epidural hematoma after ventriculoperitoneal Shunt. When the hematoma is not seen to be naturally absorbed during serial follow-up, treatment is generally surgery, but conservative management may be employed occasionally. The outcome of the surgical management is excellent. If bilateral large chronic ossified epidural hematoma was found, operation for two times may be more beneficial than one time.

## Disclosure of conflict of interest

None.

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