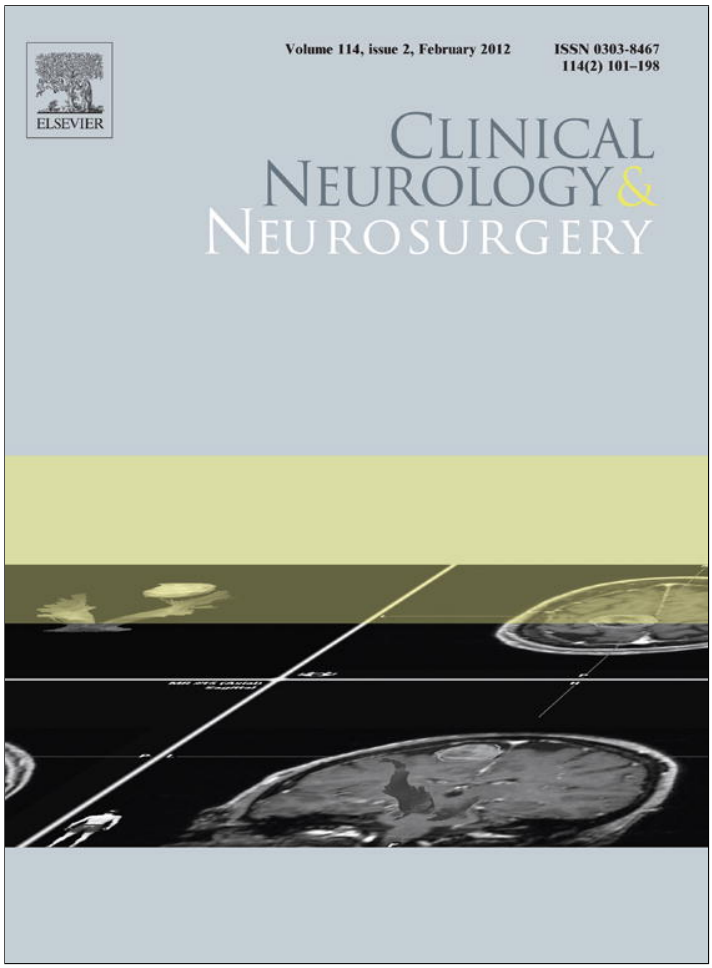

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Case report

Shunt overdrainage after mild head trauma

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1. Introduction

Shunt overdrainage leading to subdural hematoma (SDH) formation is known to be one of the major complications of ventriculoperitoneal (V-P) shunt implantation [1]. Shunt overdrainage after mild head trauma is rare.

Here, we present a case of shunt overdrainage causing bilateral subdural hematoma, which developed after mild head trauma in a patient who had a history of V-P shunt surgery 6 years previously for normal-pressure hydrocephalus.

2. Case report

A 65-year-old woman, with a history of V-P shunt placement 6 years ago for the treatment of normal-pressure hydrocephalus was admitted to our emergency room because of mild head trauma after a traffic accident. She had not undergone any shunt revision; on follow-up, she was symptomless and was doing well with her shunt.

Upon presentation, the patient was awake and her initial neurological examination was completely normal. Her head computed tomography (CT) revealed no acute changes due to trauma (Fig. 1). She had been followed for 12 h. She was later discharged without any symptoms.

Seventy-two hours after trauma, the patient became unconscious and was rushed to the emergency room. Emergent head CT revealed a bilateral subdural hematoma that caused a serious mass effect (Fig. 2). The initial diagnosis was subdural hematoma due to shunt overdrainage. The patient underwent a bilateral burr-hole exploration for subdural hematoma drainage, and revision of the V-P shunt with the Codman Hakim Programmable Valve (Codman, Raynham, MA) was performed. We switched the shunt-opening pressure to 150 mmH_2O.

After surgery, the patient was awake without any neurological deficit. She remained asymptomatic during the postoperative period and was discharged without symptoms.

3. Discussion

The diversion cerebrospinal fluid (CSF) from the ventricles to another body cavity (such as the peritoneum) by CSF shunts is used widely to treat hydrocephalus. Many patients with a CSF shunt may experience device malfunction [2]. The most common of these malfunctions are infection and shunt obstruction, which lead to under-drainage and consequent elevation of intracranial pressure [3]. Shunt malfunction may also cause overdrainage, leading to intracranial hypotension, subdural hematoma and slit ventricle syndrome [1]. The incidence of overdrainage related to subdural hematoma is 4–5% [3].

In 1970, Illingworth reported that SDH had developed in two patients with ventriculocaval shunt after mild head trauma [4]. Sternbach reported a case of SDH in a shunted patient, in whom subdural hematoma occurred two days after mild head trauma [5].

As in our case, mild head trauma may trigger shunt overdrainage and induce the formation of a subdural hematoma. The mechanism of this rare condition is unknown. We hypothesized that the hydrocephalic status with V-P shunt alters the intracranial pressure dynamics. Mild head trauma may cause pressure changes due to parenchymal swelling and lead to a rapid rise in intracranial

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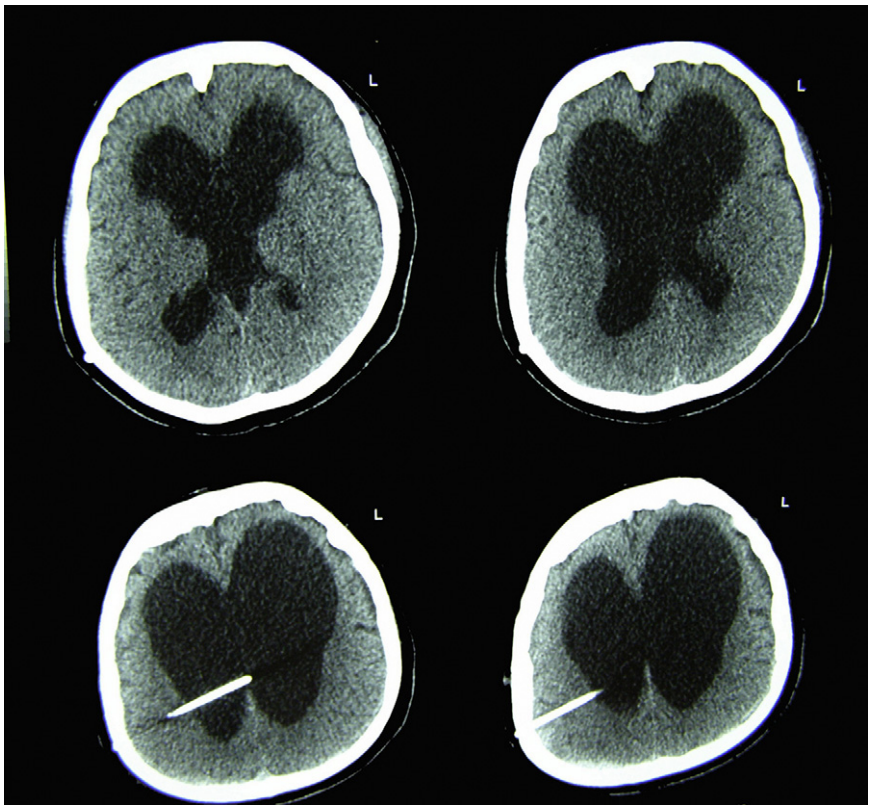

Fig. 1. Head CT after initial trauma revealed no acute changes.

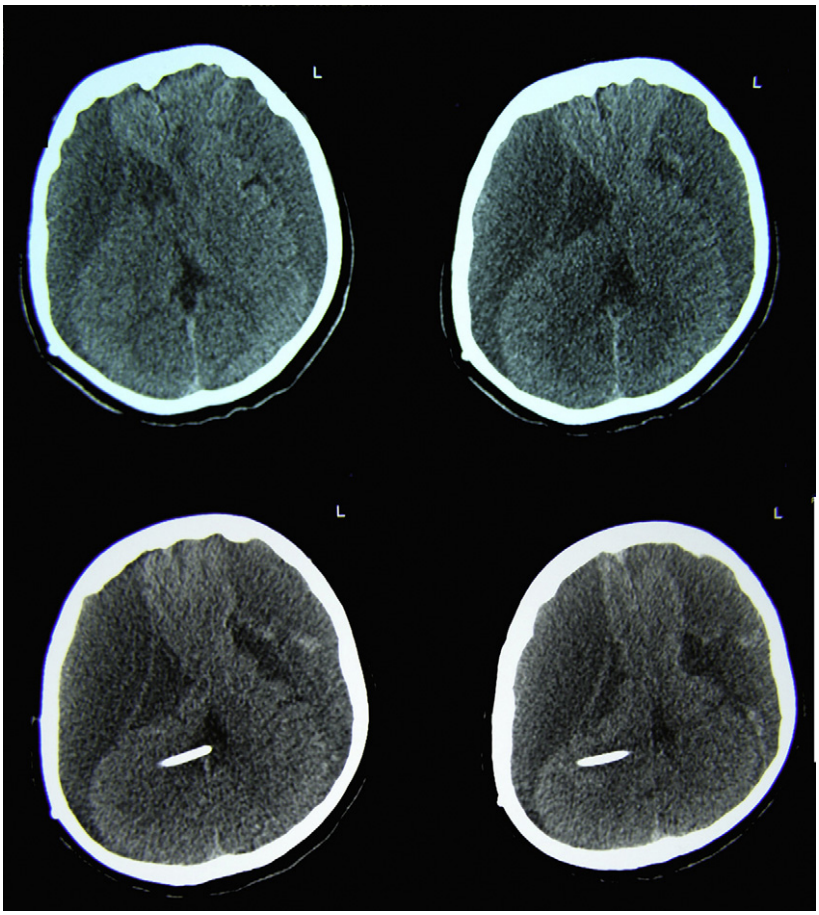

Fig. 2. Head CT, 72 h after trauma, revealed a bilateral subdural hematoma, causing a serious mass effect.

pressure; these changes in pressure dynamics may cause shunt overdrainage. Furthermore, it has been shown that, following ventricle drainage, the risk of rupture of the bridging veins has increased [6]. After a mild head trauma, the intracranial pressure dynamics may change, resulting in shunt overdrainage; this may lead to the rupture of bridging veins and SDH. An osmotic mechanism also appears to play a part in growth of the subdural collection. A major reduction in CSF volume and intraventricular pressure caused by over-shunting may lead to separation of the brain from the dura, thereby increasing tension on the bridging veins and predisposing them to rupture. Over-shunting also produces more space for the accumulation of subdural fluid [5].

The implantation of a pressure-programmable shunt system has proven to be useful in treating the overdrainage of CSF and shunt-induced SDH [7]. These programmable shunt systems provide adjustments in opening pressure, ranging from 30 to 200 mmH_2O, corresponding to the desired CSF pressure in each patient.

4. Conclusion

Head trauma in a shunted patient is a challenge for neurosurgeons. There are no guidelines to provide proper information on managing this condition. Shunt overdrainage after mild head trauma causing subdural hematoma is rare; neurosurgeons must be aware of this condition. Subdural hematoma after shunt overdrainage has a good outcome and can easily be managed by pressure-programmable shunt systems.

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