Case Report

Acute agitated delirium and death after burr hole drainage for chronic subdural hematoma: a case report

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Received December 27, 2017; Accepted January 20, 2018; Epub March 15, 2018; Published March 30, 2018

Abstract: Chronic subdural hematoma (CSDH) is one of the most common neurological disorders, which is often treated with Surgical evacuation via burr hole drainage which often induces complications such as temporary acute agitated delirium (AAD). Currently, the mechanisms that lead to AAD after CSDH treatment are not fully known. Here, we report a case of CSDH in a patient who died of acute agitated delirium (AAD) after the treatment with burr hole drainage, which showed that AAD is a rare but fatal complication following burr hole evacuation of CSDH, hoping our report would contribute to the treatment of CSDH and prevent AAD after burr hole evacuation.

Keywords: Chronic subdural hematoma, acute agitated delirium, complications

Background

Chronic subdural hematoma (CSDH) is one of the most common neurological disorders and tends to be more popular in the elderly population [1]. The earliest report of CSDH described the condition as pachymeningitis haemorrhagica interna [2]. CSDH comprises approximately 10% of cases with intracranial hematomas and 25% of cases with subdural hematomas and its pathophysiology is often directly associated with the malfunctions of the nervous system induced by the increased intracranial pressure on surrounding brain tissue, therefore, CSDH often results in brain injury and may lead to death [3]. Surgical evacuation via burr hole drainage is the mainstay of management and an effective method for CSDH [4]. Here, we report a case of CSDH in a patient who died of acute agitated delirium (AAD) after the treatment with burr hole drainage.

Case introduction

On April 25th, 2017, a 48-year-old male was admitted to our department with one-week history of headache accompanied by nausea and vomiting. The patient walked to the hospital and appeared in clear consciousness with a Glasgow coma scale (GCS) score of 15. On admission, his blood pressure (BP) was 120/70 mmHg. Pupils were normal, round and equally reactive to light. The muscle strength and tension were normal and the pyramidal sign was negative. The head computed tomography (CT) scan revealed a subdural hematoma in the right frontotemporal region (Figure 1). There were no obvious abnormalities in the routine blood test, coagulation test or liver and kidney function tests. The patient had experienced a head injury 11-days before admission (April 14th, 2017), and at that time, he had no headache, vomiting, coma, convulsion, mouth, nose, or ear effusion, or urinary or fecal incontinence. Therefore, he didn't go to hospital for treatment. The patient claimed that he was in good health condition before admission.

Treatment procedure

After admission, the patient had persistent headache with paroxysmal exacerbation and on April 30th, 2017 (the fifth day after admission), the patient still had intermittent headache with a GCS score of 15. The CT scan indicated a subdural hematoma in the right frontotemporal region with a slight midline shift (Figure 2). On May 8th, 2017 (the thirteenth day...
after admission), the headache was exacerbated and persistent resulted in difficulty in falling asleep. The CT scan revealed a CSDH change in the right frontotemporal region with a significant midline shift and compression of the lateral ventricle (Figure 3).

On the morning of May 9th, 2017, the patient agreed to receive procedure of burr hole drainage with local anesthesia by 1% lidocaine. After opening the dura, a dark red-colored liquid-type hematoma was removed under relatively low pressure. A subdural drainage catheter (10F) was placed to wash the hematoma cavity by saline solution until the fluid became clear. The patient claimed an immediate improvement of the headache after surgery. In the afternoon, the patient felt much better, therefore he didn’t obey the prescribed bed rest, got off the bed and walked around.

On the morning of May 10th, 2017, around 1:30, the patient had a severe headache accompanied by dysphoria with a GCS score of
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Figure 3. The CT scan revealed a CSDH change in the right frontotemporal region with a significant midline shift and compression of the lateral ventricle.

Figure 4. The CT scan indicated a midline shift with brain swelling after the treatment of CSDH with burr hole drainage.

12 and normal pupils. The patient was immediately given mannitol for dehydration and phenobarbital for sedation. The CT scan indicated a midline shift with brain swelling after the treatment of CSDH with burr hole drainage (Figure 4). At 13:30, May 10th, 2017, the patient had a gradual deterioration in conscious level accompanied by vomiting, with a GCS score of 8 and still normal pupils. The CT scan revealed a significant midline shift with brain swelling after the treatment of CSDH with burr hole drainage (Figure 5). The decompressive craniectomy was performed with tracheal intubation under general anesthesia after we had consent from the family. The craniectomy resulted in a bone window of 10 cm*12 cm. The moderate dural tension was detected. After opening the dura, brain tissue collapse was observed. Brain pulse was normal and there was no active bleeding or cortical contusion. After the procedure, the
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Figure 5. The CT scan revealed a significant midline shift with brain swelling after the treatment of CSDH with burr hole drainage.

Figure 6. The CT scan showed a significant midline shift with brain swelling.

patient had a GCS score of 8. After surgery, the patient received Edaravone 20 mg I.V. qd in addition to the dehydration treatment with Mannitol.

Around 8:40, on May 11th, 2017, the patient presented with a dilated right pupil and loss of pupillary light reflex. The brain was significantly distended at the bone window with high tension. The patient was immediately given mannitol for dehydration. The CT scan showed a significant midline shift with brain swelling (Figure 6). The family members refused a second operation and gave up further treatment. After 6 hours, the patient was discharged against medical advice.

Discussion

CSDH is a common neurosurgical condition most likely caused by mild to moderate traumatic brain injuries, which has an estimated
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incidence of 3-15.5 per 100,000 people, with significantly higher rates in the elderly population [5]. Surgical evacuation via burr hole drainage is the main treatment for CSDH and is considered as a minimally invasive procedure, however there are also some common complications of burr hole drainage include brain injury, intracranial hematoma, seizure, stroke, infection, tension pneumocephalus etc. [6]. Among them, temporary acute agitated delirium (AAD) is a rare but fatal complication after surgery for CSDH [7-10].

Agitated delirium is a kind of syndrome caused by organic disorder, and its incidence in traumatic brain injury and craniocerebral patients is very high. Currently, the mechanisms that lead to AAD after CSDH treatment are not fully known, but scholars believe that the underlying reasons may be cerebral reperfusion syndrome, cerebral hyperperfusion syndrome, cerebral venous sinus thrombosis, intracranial hypotension syndrome, post-traumatic cerebral infarction, cerebral venous sinus thrombosis [11-19].

In this case, the patient’s condition corresponded to the third edition of the Chinese classification and diagnostic criteria of mental disorders and the fifth edition of The Diagnostic and Statistical Manual for delirium. Meanwhile, in the first thirteen days after admission, as the general condition of the patient was well, so the patients only received usual medicine care. Since then, the disease worsened, so except dehydration treatment with 20% mannitol, we recommended the burr hole drainage as the medicine treatment only did not work well [20]. The operation result showed that the effect for relieving symptoms was remarkable. But in the afternoon, the patients did not follow the doctor’s advice to rest on bed, which caused the condition deteriorated again. We suspect that the excessive drainage within a relatively short period of time, combined with dehydration and improper body position, resulted in a dramatic drop in the intracranial pressure, a rapid increase in cerebral blood flow, and fast re-expansion of brain tissue. A series of pathophysiological reactions, therefore, erupted to induce the failure of self-regulation and eventually led to the diffuse brain swelling which is fatal for the patient [21, 22]. What’s more, the obviously pain relief might lead to a too strong mood changes which might also worsen the condition by too active brain activities. To treat the worsen condition, we recommended to perform decompressive craniectomy but unfortunately, it was refused by the patient’s family members until 12 hours later when the patient presented severe symptoms, which may lead to the miss of the best treatment timing and death of the patient [23].

Although the burr hole drainage for CSDH is not a major surgical procedure, we cannot take it lightly. We need to minimize the risk of AAD by paying very close attention to the perioperative examination and management, especially the following details: (1) increase awareness of potential CSDH postoperative accidents; (2) give moderate postoperative sedation and keep blood pressure steady; (3) avoid excessive drainage that induces obvious pressure gradient; simply wash and rinse the hematoma cavity without drainage [24]; perform the single-needle transcranial drainage to easily control the intracranial pressure and the drainage volume and speed; perform the double-needle transcranial drainage which is safer and more comfortable [25]; (4) strictly watch the signs of dehydration under the intracranial pressure monitoring [26]; (5) make self-regulation assessment if conditions permit.

In conclusion, AAD is a rare but fatal complication following burr hole evacuation of CSDH, hoping our report would contribute to the treatment of CSDH and prevent AAD after burr hole evacuation.

Disclosure of conflict of interest

None.

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