Anesthetic management of a case of armored brain

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ABSTRACT

Armored brain is condition, which occurs due to calcification in a chronic subdural hematoma (SDH). Here, we are reporting a case of armored brain due to chronic SDH as a complication of ventriculoperitoneal shunt (VP shunt). Patient had undergone major surgery for removal of calcified hematoma. VP shunt is a simple surgery, but can lead to catastrophic complications like this. In this report, we had described this condition and its aspects.

Key words: Armored brain, ventriculo peritoneal shunt, Subdural hematoma

INTRODUCTION

Ventriculoperitoneal shunt (VP shunt) for the treatment of hydrocephalus is a commonly performed surgery in neurosurgical patients. VP shunt is a short surgical procedure. Various complications can occur following VP shunt surgery. Armored brain is a rare complication of VP shunt first reported by Goldhen in 1930, and only few cases of armored brain are reported in the literature.[1] Calcified chronic subdural hematoma (SDH) is rare, but if occurs bilaterally, it gives the appearance of an armored brain, so-called because the calcified subdural collection appears as “bone under bone” or “double skull.”[2] On computerized tomographic scan (CT scan) if a shell carapace is encasing the brain, it also known as “Matroska head”[2]

Here, we describe the anesthetic management of a case of armored brain who underwent bifrontal craniotomy and removal of calcified mass under general anesthesia.

CASE REPORT

A 30-year old male patient weighing 70 kg was presented with diminution of vision for last 7 years. He was having history of polyuria and polydipsia for last 10 years for which he was on vasopressin spray. At 7 years back, he was having diminution of vision and underwent CT scanning. He was diagnosed as hydrocephalus for which VP shunt was inserted. There was no sign of raised intracranial pressure and no history of any other systemic illness. On examination, he was conscious cooperative with a Glasgow coma scale (GCS) of 15. Cranial nerves were normal except optic nerve. Visual acuity was decreased in both eyes. Brain imaging revealed bilateral calcified SDH more on the left side [Figure 1]. Investigations such as electrocardiogram (ECG), biochemical parameters, and hemogram were normal. Patient was posted for craniotomy and removal of hematoma. On the day of surgery patient was taken inside operation theatre and all standard monitors, including ECG, noninvasive blood pressure cuff, and pulse oximetry were attached.

Figure 1: Magnetic resonance imaging pictures showing large subdural hematoma
Induction was done with 150 mcg of fentanyl and 225 mg of thiopentone. Rocuronium 50 mg intravenously was given to facilitate tracheal intubation. Right dorsalis pedis artery and right internal juglar was cannulated for invasive monitoring. Two large bore (16 gauge) peripheral cannulas were inserted. Bilateral fronto-parietotemporal craniotomy was done to remove the calcified mass. There was grayish white solid hard mass on both sides in subdural space consisting of calcification specs. The bony flap was adhered to the underlying mass. Profuse bleeding occurred at the time of raising the flap on left side. Surgery was lasted about 10 h. Total blood loss during the procedure was 2.8 L for which patient was transfused 4 units each of packed red cell, fresh frozen plasma and platelets. Patient was not extubated and shifted to Intensive Care Unit (ICU) for elective ventilation. Later that night in ICU, he had two episodes of generalized tonic clonic seizures which subsided with 2 mg of injection midazolam. Electrolyte abnormalities, hypoxia, hypercarbia, hyperthermia, and hypoglycemia were ruled out as a cause of seizures. Injection phenytoin and injection levatiracetum was added as antiepileptics. Patient remained unresponsive for the first 3 postoperative days with GCS between 12 and 14. Postoperative CT scan did not reveal any abnormality. Patient gradually improved after 4 days of mechanical ventilation and extubated on the 5th postoperative day, when he was fully conscious. Subsequent hospital stay was uneventful, and the patient was discharged home.

**DISCUSSION**

Over drainage of cerebrospinal fluid (CSF) by the VP shunt lead to occurrence of the armored brain in this patient. Chronic SDH is one of the late and unusual complications of VP shunt. Over-drainage of CSF is considered the probable mechanism of occurrence of this complication. Excessive drainage of CSF results in sagging of dura, which increases tension on the bridging veins resulting their rupture and formation of subdural hematoma. The sagging of dura also creates a potential space for accumulation of subdural fluid.[3] Early evacuation of SDH prevents the occurrence of armored brain. It is difficult to evacuate once the calcification had started. Poor circulation and delayed resorption of hematoma fluid are believed to be responsible for calcification.[4] Surgical management is generally reserved for patients having neurological deficit or raised intracranial pressure.

We kept the patient on elective ventilation after surgery because of prolonged surgery, major blood loss and large blood and fluid transfusion. The patient remained unconscious for the first 3 postoperative days and had episodes of seizures in the postoperative period, which was most likely because of subtle brain tissue trauma from the prolonged cranial surgery because other causes of such possibilities were ruled out.

Evacuation of hematoma in a patient with armored brain is a major intracranial surgery and the various anesthetic concern for major intracranial surgeries includes: Prolonged surgery, major bleeding, major fluid shift, chances for electrolyte imbalances, hypothermia, multiple transfusions, delayed recovery, postoperative seizures and need for postoperative ventilation.[5]

Our case highlights the important anesthetic concerns for evacuation of hematoma in patients with armored brain, and they are prolonged surgery, major blood loss, need for multiple blood transfusion, need for elective ventilation, postoperative seizures, and delayed recovery. Anesthesiologist should be more vigilant at the time of raising of bony flap because of chances for major bleeding due to adherence of dura with the overlying skull.

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