Unusual Penetrating Head Injury- A Rare Case Report

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ABSTRACT

Background: Foreign body invasion of the brain can cause traumatic brain injury with severe complications. In most cases, it can be a late diagnosis. We reported here a case of traumatic brain injury from a foreign body invasion and, after being invested patient was taken for emergency craniotomy with successfully removal of foreign body.

Case Report: A 12 yr. old boy developed a headache and vomiting for 2 days after his head was hit on a bundle of sticks 2 days back while riding a cycle. On examination, the patient was conscious oriented. No deficit. Diagnosis was confirmed after an emergency CT was taken that showed a right temporal bone fracture with a piercing foreign body into the right temporal lobe. Right temporal craniotomy and removal of a foreign wooden body was done. The patient was managed with IV antibiotics and anticonvulsants. Post-op brain CT was done and showed no evidence of foreign body. The patient was hospitalized for days and recovered with no sequelae.

Conclusion: Penetrating brain injuries are very serious and have life-threatening complications. Precautionary action should be taken as soon as possible with investigations and imaging. Prognosis depends on severity of injury and involvement of brain structures. Early diagnosis with immediate procedure always has favorable outcomes.

Keywords: Brain penetration, cranial penetration injury, craniotomy foreign body.

I. INTRODUCTION

Traumatic brain injury occurs due to physical trauma to the brain. TBI can be open or penetrating. Every penetrating head injury occurs due to any object, usually sharp, which usually penetrates and pierces the skull into the deep brain layer. TBI can cause severe complications and in some cases can cause long-term disability also. As compared to closed head injuries, penetrating injuries are less common. But when a penetrating injury occurs, it has a late diagnosis with worse prognosis and higher morbidity and mortality rates [1].

Cranial penetrating injuries mostly end up causing severe brain damage and CNS structure injuries. Traumatic brain injury causing penetration of deep layers of the brain and foreign body penetration of the cranial is very rare [2].

Imaging should be done as soon as possible after arrival of the patient. Emergency procedures with complete removal of foreign bodies should be done. All brain structure vascularity should be repaired and double checked before closure.

II. CASE REPORT

A 12 year. old boy presented with a h/o headache and vomiting x 2 days, there was a h/o head hit to bundle of sticks 2 days back while riding cycle following which there was no loc/fall/seizures, he sustained a 1.5 cm cut lacerated wound over upper aspect of right eyebrow on lateral side.

The patient was apparently well for 1 day, after which he started complaining of a headache and 2 episodes of vomiting.

On examination, the patient was conscious oriented. GCS was E4V5M6, bilateral pupils were reacting 2+, vitals were stable. BP – 101/70, P-76, SPo2 – 100 % on room air. Motor and sensory systems were intact, moving all 4 limbs power 5/5 in all 4 limbs. No deficit

The emergency CT was taken that showed a right temporal bone fracture with a piercing foreign body into the right temporal lobe with right temporal contusion and thin EDH with pneumocephalus (Fig 2).

Routine blood investigations were done. The patient was taken up for emergency surgery. During the procedure, it was found that a foreign body pierced the dura in the right temporal region after elevation of the skin flap and bone flap (Fig 4).

Right temporal craniotomy and removal of wooden foreign body with removal of EDH and duroplasty with G Patch. Foreign bodies were sent for culture and sensitivity.

The post-operative period was uneventful. The patient was managed with IV antibiotics and anticonvulsants. Post-op brain CT was done and showed no evidence of foreign bodies. The patient was discharged after suture removal and is now on regular follow-up.
Fig. 1. Plain CT brain showing right temporal contusion, thin EDH with pneumocephalus.

Fig. 2. Plain CT brain bone cut showing right temporal bone fracture with pneumocephalus and piercing foreign body.

Fig. 3. 3D skull with defect in right temporal region.

Fig. 4. 3D skull inside cut right temporal region.

Fig. 5. Intra op image showing piercing foreign body piercing the dura in right temporal region after elevation of skin flap and bone flap.

Fig. 6. Evacuated foreign body (wooden stick) with bone fragment.

Fig. 7. 2.5 cm foreign body (wooden stick).
III. DISCUSSION

Penetrating brain injury caused by non-missile low velocity objects represents an uncommon pathology among civilians, with better prognosis due to more localized primary injury and is usually related to violence, accidents, or suicide [3]. Depends on the involvement of brain tissues, TBI can be mild, moderate, or severe. At the time of admission, patients' Glasgow coma score (GCS) score is always checked to see the severity of penetration injury. Before starting treatment, proper evaluation, and pathophysiology of PBI should be understood. Computed tomography scanning is the first choice to understand and know the extent of brain injury. If vascular involvement is suspected, then cerebral angiography is recommended.

In an emergency, immediate steps should be taken with regards to airway, breathing, and circulation. After resuscitation is achieved, there should be a brief inspection of injury the cervical spine and any external hemorrhage. Detailed examination of the wound should be done with regards to checking presence of powder burns if there is firearm injury, to check the entry and exit wound, to identified location of wound and how deep the scalp is inured, involvement of brain structure, and presence of any foreign body.

Any CSF, bleeding, or brain parenchyma oozing from the wound should be noted; the size of the deficit should also be documented. To examine the head and neck thoroughly, the cervical collar should be removed, but strict spine precautions must be employed [4].

Craniotomy should be done if there is involvement of vascular structure causing intracranial hematoma and if it is causing necrosis of brain tissue. Necrotic brain tissues should be debrided, and removal of safely accessible bone fragments should be done. Intracranial hematomas should be evacuated [5]. If there is involvement of the eloquent area with involvement of deep brain tissue, surgery should be avoided. Although theoretically the removal of these foreign bodies from the eloquent cortex may decrease the risk of posttraumatic convulsions, it has been found that it may worsen the outcomes with possibly higher morbidity, and a conservative approach in those cases has been recommended [6].

To reduce the infectious complications, it is advised to remove foreign bodies with in 12 hours of trauma and injury. Nevertheless, debris removal in eloquent areas distant from the entry point exposes patients to a worse outcome. In these cases, primary treatment should focus on intracranial hypertension prevention [7].

When an air sinus has been injured or violated in the route of the non-missile, a water tight closure of the dura should be performed aiming to decrease the risk of abscess formation and CSF fistulas [8]. PBI can lead to infectious complications like infection with foreign objects, i.e., iron, wood, hair, skin or other foreign bodies. These complications can lead to severe morbidity and mortalities. PBI can also cause inflammation of brain tissues and may lead to headaches with meningitis, ventriculitis and ischemia of brain tissue. The presence of cerebrospinal fluid leaks, air sinus wounds, trans ventricular injuries, or injuries crossing the midline will harbor the infectious complications [9].

One of the dangerous complications with craniocerebral PBI is posttraumatic epilepsy. Incidence of seizures can be increased with the extent of brain damage and can reach 30–50% of patients suffering a PBI. In 10% of patients, seizures appear early (first 7 days after the trauma), and 80% during the first 2 years, while about 10% may not have their first seizure until 5 or more years after injury [2].

In initial studies there was no confirmation of any beneficial effect of prophylactic anticonvulsants administration, but recently, for prophylaxis treatment, it is recommended to use prophylactic anticonvulsants. When penetration is due to a foreign body, the prognosis is mostly poor. If there is involvement of the frontal lobe, prognosis is good, but prognosis is poor if there is involvement of the posterior fossa and it even causes high mortality. PBI affecting CNS flow is more prone to intracranial sepsis and post-op infections.

IV. CONCLUSION

Every penetration brain injury has different pathophysiology and treatment is followed depending on the nature of PBI. If there is any vascular involvement, CT Angiography is very important. Management of PBI has been altered dramatically with time. There has been a paradigm shift toward a less aggressive debridement of deep-seated fragments and more aggressive antibiotic prophylaxis in an effort to improve outcomes. However, there is still a need for large scale multicenter randomized controlled trials to evaluate the current guidelines. Research in this area is highly warranted as PBI patients still present a significant challenge to practicing neurosurgeons worldwide [4].

REFERENCES


