

A Rare Cause of Penetrating Head Trauma; Shovel Handle in Brain

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Abstract

The most severe and fatal causes of traumatic brain injuries are penetrating head injuries. In this report, we describe a rare case of a 37-year-old male who presented with brain injury caused by a shovel handle which penetrated the infra orbital region, passed through the right hemisphere and exited from the occipital region. Our aim in reporting this rare case was to underline the importance of early imaging studies and to remind the emergency physicians of management of patients with head trauma. (*JAEM 2014; 13: 33-5*)

Key words: Penetrating head injuries, shovel stick, emergency

Introduction

The most severe and fatal causes of traumatic brain injuries are penetrating head injuries. Although intracranial injuries most frequently encountered in the adult population are caused by armed weapons; knives, nails, spikes, iron rods, pencils, scissors, fan blades, screwdrivers, glass and metal fragments have also been reported as objects causing stab wounds (1-4). In this report, we describe a rare case of a 37-year-old male who presented with brain injury caused by a shovel handle which penetrated the infra orbital region, passed through the right hemisphere and exited from the occipital region.

Case Presentation

A 37-year-old lumberman presented at our emergency department (ED) with a penetrating head injury. While sawing a shovel handle with a gang saw, the handle accidentally speared up and pierced the worker's head.

One and a half hour after the incident, the patient was transferred to our ED from a local hospital. A shovel handle of about 60 centimeters which had lodged in the patient's head was observed (Figure 1). On arrival, the patient's Glasgow Coma Scale (GCS) was 13. The patient was hyper alert with active four extremities. He was agitated and he refused to obey commands. His vital signs were normal. The right eyelid was edematous, globe integrity was deformed and the globe was protruded. The handle had caused a fracture in the occipital bone and a part of it was visible from behind.

Blood samples were taken for cross-match, complete blood count and biochemistry analysis. An intravenous fluid was administered. A foley catheter was inserted for urine monitorization. The patient was sedated with thiopental 3 mg/kg IV and then intubated. Oxygen support was given via bag-valve mask. Antibiotherapy (vancomycin 1 g IV and ceftazidime 1 g IV), antiepileptics (pentobarbital 10 mg/kg over 30 minutes), antiedema therapy (mannitol 0.5 g/kg) and tetanus prophylaxis was given.

For brain damage assessment, a computerized tomography (CT) was planned. However, because of the handle, the patient couldn't be positioned in the CT machine. A carpenter was called and a 40 centimeter portion of the handle was cut. The CT scan then was performed. Also a X-ray of the cervical spine was obtained for a probable concomitant injury. Computerized Tomography was evaluated by the Department of Radiodiagnostics and a foreign body extending to the occipital region passing through the right orbita was determined. Also, a fracture in the occipital cranium and focal hemorrhagic regions were observed (Figure 2). The cervical X-ray evaluation was normal. Complete blood count revealed leukocytosis with white blood cell count of 16.1 thousand/UL. Neurosurgery and ophthalmology consultations were performed. The patient was then transferred to an advanced center for surgery.

Discussion

Non-missile intracranial foreign body injuries rarely occur (5). Injuries caused by objects with an impact velocity of less than 100 m/s

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are known as non-missile injuries. The main difference between missile and non-missile injuries are that, in the first group shock waves and cavitations contribute to additional tissue damage, while in the second group the primary pathology is tissue damage (6). In our case, death probably did not occur initially due to the nature of the foreign body. Gonul et al. (3) analyzed 35 patients who had penetrating orbitocranial gunshot injuries. They reported that the wounds were associated with a high mortality rate because of the close proximity to the brain stem, basal vessels and multiple compartments of the brain. They also reported that the extent and localization of traumatic brain injury and GCS on admission were the most important indicators for good neurological outcome. In conclusion, they recommended an extensive preoperative evaluation of penetrating orbital trauma and a combined ophthalmic and neurosurgical approach to minimize the morbidity of the patients. High GCS of our patient on admission may be a predictor of good neurological outcome. CT of the brain usually gives detailed information about the injury in penetrating wooden objects. However, it may fall short in the diagnosis of retained wooden foreign bodies as they have a density similar to



Figure 1. A shovel handle of about 60 centimeters that lodged in the patient's head

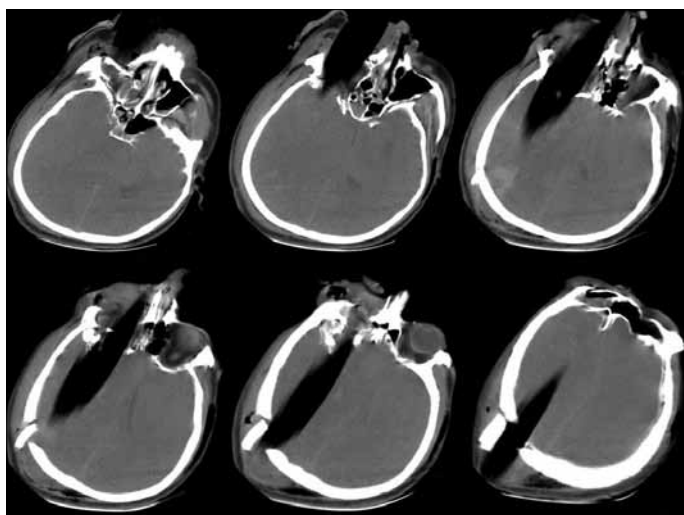


Figure 2. Brain CT: A fracture in the occipital cranium and focal hemorrhagic regions

that of intracranial and orbital soft tissues (4, 7). The coronal CT scan provides a good view of the orbital floor, roof and cribriform plate and allows detection of intracranial or sinus cavity penetration. The CT scan also permits detection of vegetative matters like dry wood that could not be seen by other means (8). Further CT scanings are also recommended in follow-up (3). We considered the importance of accurate imaging and decided to cut the handle in order to get a better CT image. We also consulted the patient thoroughly with ophthalmology and neurosurgery departments to provide the best outcome.

In ED, patients with penetrating head trauma must be evaluated carefully. Hypoxia increases mortality from traumatic brain injury, therefore aggressive airway and breathing management is needed. Aggressive fluid resuscitation may also be required to prevent hypotension and secondary brain injury. Prophylactic antiepileptic drugs given after TBI decreases the incidence of early posttraumatic seizures, but there has been no observed reduction in the occurrence of late-seizures, death, or neurologic disability. In the first 72 h after a head injury, pneumococcus is generally the source of infection. Subsequently, gram-negative organisms and *Staphylococcus aureus* become more common. Patients should be given vancomycin (1 g IV) and a third-generation cephalosporin, such as ceftriaxone 1 g IV, until cultures confirm the cause. As mannitol is the best agent for reducing intracranial pressure, it must be administered by repetitive bolus (0.25 g/kg to 1 g/kg) (9). In our case, the patient was intubated immediately and given medical therapy according to the suggestions of the guidelines. However, due to lack of technical facilities, the patient was transferred to an advanced center.

In conclusion; penetrating head trauma is a potentially life-threatening injury. Complications associated with it include infections, intracranial hemorrhage, cerebrospinal fluid leak, epileptic seizures, and loss of mental and motor functions (3). Early diagnosis of brain injury may prevent serious neurological dysfunction (10). Our aim in reporting this rare case was to underline the importance of early imaging studies and to remind emergency physicians of management of patients with head trauma.

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