



## Penetrating Head Injury by a Knife Whetstone

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### Abstract

Non-missile penetrating head injuries are rare but well-known phenomenon among the civilian population. The authors reported a ten year-old boy, who has injured by piece of broken whetstone while watching his father's work. Brain Computed Tomography (CT) of the patient revealed bone fragments underneath the depressed fracture of the right frontal bone and frontal sinus. The patient was urgently operated; knife whetstone and the bone fragments were removed carefully.

**Keywords:** Penetrating head injury; Knife whetstone; Pediatric; Prevention

### Introduction

Non-missile injury is the injury caused by objects with an impact velocity less than 100 m/s [1]. In this unique case report, the penetrating head injury occurring with the breakage of industrial knife whetstone at the person not related to work, have been reported. Penetrating head injuries occurred with foreign objects are seen frequently in the workplaces and may cause serious morbidity and mortality [2]. Therefore, the most important thing is to take precautions before accidents.

### Case Presentation

A ten year-old boy was immediately transferred to our emergency department after being severely injured by piece of broken whetstone due to the breakage of industrial knife whetstone tool accidentally. Piece of knife whetstone entered into the head through the right frontal bone was observed in the initial examination (Figure 1). On physical examination, he was conscious, cooperative and had stable vital signs. The neurological examination revealed amnesia with GCS 15. It was learned that he was wounded in the head by piece of broken whetstone while watching his father working with tool.

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Conventional radiographs and Computed Tomography (CT) skull images revealed depressed fracture of the right frontal bone and frontal sinus underneath the huge foreign body (Figure 2). Surprisingly, no hemorrhagic lesions or associated edema was noticed in CT-scan and the superior sagittal sinus was thought to be robust.

An intravenous broad-spectrum antibiotic and anticonvulsant therapy were immediately administered in the emergency department. Urgent surgical craniectomy was performed and the foreign body was removed completely. Afterwards, the bone fragments were debrided and ruptured dura mater was repaired. The patient's postoperative course was uneventful. Antibiotic therapy was continued for 14 days and the patient was discharged with anticonvulsant medication, without neurological deficit and infection.

### Discussion

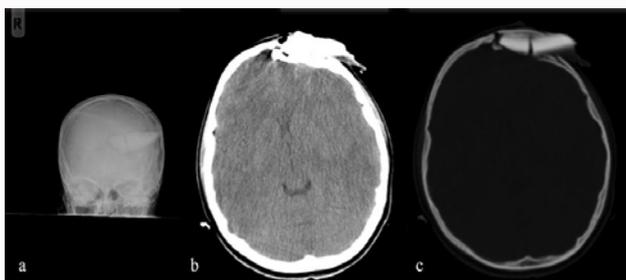
Non-missile low velocity PHIs are very rare among civilian population, especially in children. They may occur with various kinds of foreign objects. Despite their low incidence, PHIs have high risk of morbidity and mortality, particularly compared to closed head injuries [3].

Traumatic intracranial foreign objects may cause cranial hemorrhage and contusion at an early stage and epileptic seizures and infections at a later stage, leading to morbidity and mortality in children. Since the cerebral damage in low-velocity missile injuries is usually focal; there might not be disturbance of consciousness until secondary brain damage occurs; therefore adequate medical supervision is necessary to prevent and treat potentially fatal complications in a timely manner [4].

The risk of infection in children with penetrating cranial traumas is over 40%. Due to the high risk of infectious complications, a prophylactic wide-spectrum antibiotic treatment amenable



**Figure 1:** Initial physical examination of the patient shows a piece of the knife whetstone on the left frontal area.



**Figure 2:** (a) Skull x-ray shows a broken foreign object on the left frontal bone, (b) Cranial CT shows a depressed fracture of the left frontal bone and frontal sinus without hemorrhage underneath the huge foreign body, (c) Cranial CT (bone window) shows a broken foreign object that entered the head through the left frontal bone.

to crossing blood brain barrier should be given early in patient management [3]. Seizures occur in 50% of patients with penetrating head trauma, therefore, in cases of traumatic intracranial foreign objects prophylactic anticonvulsant therapy must be immediately initiated [5].

Computed tomography scan is useful in the initial evaluation because it can readily determine the extent of intraparenchymal injury, locate the offending object, plot its trajectory, and identify most bony defects in the skull. Therefore, CT is essential means in decision making of surgical strategy [6].

Degree of permanent neurologic deficit associated with low-velocity penetrating skull wounds is determined by the degree and location of the initial injury (eloquent versus non-eloquent cortex), the rapidity of operative exploration and debridement, and the avoidance of delayed secondary injury. Expeditious removal of the penetrating foreign body as well as all accessible bone fragments along with focal debridement of the devitalized tissues is the goals of surgery [7].

Traumatic Brain Injury (TBI) occurring in workplace divided into two main sub-groups: work-related TBI and non work-related TBI. The demographic and injury-related characteristics are significantly different among them. According to Kim et al. [2] machinery accidents constitute a rare sub-group of non work-related TBI and the overall frequency is 0.1%.

Interestingly in our case, a person, not related to work, experienced penetrating head trauma due to machinery accident in the workplace. Penetrating head injury occurred with a foreign body has a high morbidity and mortality rate. Therefore, it is most important to take protective measures for all persons in the workplace.

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