



# Management of Eight Hand Drill Nails Induced Penetrating Brain Injury

Sandeep Kumar<sup>1</sup> Shailesh Thanvi<sup>1</sup> Hemant Beniwal<sup>1</sup> Sharad Thanvi<sup>1</sup> Shelly Singh<sup>2</sup>

<sup>1</sup>Department of Neurosurgery, Mathuradas Mathur Hospital, Jodhpur, Rajasthan, India

<sup>2</sup>Department of Anaesthesia and Critical Care, Mathuradas Mathur Hospital, Jodhpur, Rajasthan, India

Address for correspondence Sandeep Kumar, MBBS, MS General Surgery, Department of Neurosurgery, MCH Neurosurgery 2nd Year Resident, Mathuradas Mathur Hospital, Jodhpur 342003, Rajasthan, India (e-mail: luckykundal1@gmail.com).

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## Abstract

**Background** Penetrating brain injury (PBI) can be caused by several objects ranging from knives to chopsticks. However, an assault with hand drill while working in a factory is a peculiar accident. Because of its rarity and lack of standard protocol management, the management of PBI is complex.

**Case Presentation** We presented a case of a 26-year-old male with alleged history of insertion of eight nails from a hand drill machine from right side of head while working in a factory accompanied by loss of consciousness and history of vomiting. Computer tomography demonstrated that nails passed through the right parietal bone and reached up to contralateral hemisphere and posterior cranial fossa. Removal of nails and hematoma evacuation was done timely that led the patient to have a good postoperative recovery.

**Conclusion** In this case report, we discussed the successful management of a very rare penetrating head injury with a hand drill machine. The goal of this case report is to demonstrate the general management principles in PBI that can improve the patient outcome.

## Keywords

- ▶ craniotomy
- ▶ foreign body
- ▶ hand drill
- ▶ posterior fossa
- ▶ trauma

## Introduction

Penetrating brain injury (PBI) includes any traumatic injury where an object pierces the skull and breaches the dural membrane surrounding the brain. PBIs are less prevalent than blunt head injuries and they represent approximately 0.4% of injuries; however, they often have more complex damage, worse prognosis, and there are very high rates of morbidity and mortality.<sup>1</sup>

## Case Report

### History

A 26-year-old male without any comorbidity presented to the trauma center of our hospital with alleged history of PBI with nails insertion on right side of the head with a hand drill while working in a factory as the history given by the attendants. There was history of loss of consciousness for 15 minutes along with history of vomiting. There was no

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history of convulsions and ENT bleeding. The vitals of the patient were within normal range. Immediate computed tomography (CT) head was done and patient was admitted under neurosurgery for further management.

### Examination

Neurological examination revealed a Glasgow Coma Scale (GCS) of 15/15. Bilateral pupils were normally reactive to light. A nail was seen penetrating the right parietotemporal bone through a lacerated horizontal wound of 20 mm × 10 mm. A noncontrast axial computed tomographic (CT) scan showed fracture of right parietotemporal bone. Multiple linear hyper dense foreign bodies with metallic artifacts noted predominantly in right posterior cerebral hemisphere and one of them was present in contralateral hemisphere against the transverse sinus touching the tentorium.

### Management

The patient was managed symptomatically and shifted to the neurosurgical intensive care unit for the preparation of patient for the surgery. Post-preparation patient was taken for emergency craniotomy after explaining the high-risk consent to the relatives.

The patient was emergently taken to the operating room and immediately given broad-spectrum antibiotic coverage. Under all aseptic conditions and under general anesthesia, horseshoe-shaped right temporoparietal incision was given with patient in supine position with head turned toward left side. Myocutaneous flap raised and two nails were seen penetrating the bone. Two nails came out along with bone flap. Duratomy was done in C-shaped manner with thin subdural hemorrhage with mild infarction seen underneath. Subdural hemorrhage evacuated. Hemostasis was achieved using bipolar. Nail track explored under C-arm and under microscopic guidance, five more nails were removed. Under C-arm, one more nail seen that was across the midline so it was planned to remove it in second stage of the surgery. Hemostasis was achieved in the surgical field. Duramater kept open with bone flap loosely repositioned. Patient was successfully extubated at the end of the surgery and shifted to neurosurgery intensive care unit for further monitoring and management. The patient was started on intravenous antibiotics, prophylactic anticonvulsants, and mannitol.

For further management, postoperative CT head was performed that revealed Burr hole craniotomy defects in the right parietotemporal region. A hyperdense foreign body of length of about 4.5 cm was seen in the left occipital region along tentorium. Few small contusions and air foci were noted in the right parieto occipital region.

Patient was again posted for surgery for the removal of the remaining nail. Left parieto occipital craniotomy was done and with the help of C arm we tried to find out the nail in left occipital lobe but could not find the nail. Drill nail was localized under the left side of tentorium in the posterior fossa. Tentorium was cut and nail was taken out under C- arm guidance. Proper hemostasis achieved. Bone

flap placed, drain inserted, and flap was closed. Aseptic dressing was done. CT again repeated in postoperative period that reveals craniotomy defect in left occipital region and no evidence of any metallic foreign body in both cerebral hemispheres.

### Postoperative Outcome

Patient was successfully extubated at the end of surgery with GCS E4M5V6. During the postoperative period, when the patient became fully awake, he complained of vision loss. In the follow-up, patient's vision improved. So, the immediate cause of vision loss might be the edema of the operative site.

### Discussion

PBI with foreign body is rare as compared to closed head injuries and most of these injuries have worst prognosis. In general, patients with PBI require prompt medical attention and penetrating object has to be removed within 12 hours, but patients with the PBI with active bleeding should be taken for intervention as early as possible.

The complications of PBI include local wound infection, meningitis, brain abscess formation, and cerebrospinal fluid (CSF) leakage.<sup>2</sup> Although PBI has high mortality rate, timely management can avoid the neurological deficits and lead to complete patient recovery. In addition, the incidence of epilepsy in patient with PBI is approximately 30 to 50%. Therefore, prophylactic antiepileptic drugs should be administered in the early stage of the injury to reduce the incidence of posttraumatic epilepsy.

Generally, the goals of surgical intervention for PBI are first to remove the penetrating object and accompanying necrotic debris around the injury site. In this patient, we removed the drill pins with minimum injury to the brain tissue. However, if the foreign bodies are removed roughly, it can lead to bleeding of puncture and poor prognosis.<sup>3,4</sup> Second, evacuate any hematomas developed from the injury. Third, ensure watertight closure of the dura and prevent CSF leakage.<sup>5</sup>

The patient had full GCS when he was discharged with no neurological deficit after surgery. Head CT scans were reviewed regularly after discharge and found no significant new changes. The patient was followed up for 2 months and there was no CSF leak or convulsions. This case is very rare, as in literature also very few case reports have been published about the management of PBI.

### Conclusion

In conclusion, this is very rare and unique case of PBI with eight hand drill nails. Despite the removal of the drill nails from posterior fossa where various vital centers are present, we achieved positive outcomes in this challenging case by tremendous cooperation of multidisciplinary team, involving neurosurgeons, emergency physicians, radiologists, and anesthesiologists. Timely and effective

surgical management leads us toward a better prognosis in this patient.

**Conflict of Interest**  
None declared.

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