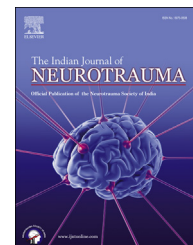


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## Case Report

# Self-inflicted penetrating brain injury by an iron rod in a psychiatric patient: Case report and literature review

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### ABSTRACT

In day to day clinical practice, closed brain injuries outnumber penetrating brain injuries (PBIs). Although PBIs can happen in industrial accidents, car accidents, fall accidents or criminal activities, it is rare to see such episodes in civilian practice. An interesting case of self-inflicted PBI by an iron rod in a psychiatric patient is being reported here. An iron rod approximately 15 cm long was driven inside the brain in an attempt to commit suicide by a 24-year-old female schizophrenic patient. After investigating the patient by plain X-ray and computed tomography (CT) scan, she was operated by the neurosurgical team and the rod was removed successfully. The post-operative period was uneventful. She was given medical and psychiatric care along with psychological counselling in post-operative phase. The principles of management of PBI with particular importance of suicide precaution in psychiatric patients are briefly reviewed in this paper.

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## 1. Introduction

Cranial penetrating injuries due to foreign bodies other than bullets are not frequent and its prevalence in civilian practice is less common. Though cases have been reported by various authors<sup>1</sup> of suicidal<sup>2</sup> or homicidal incidences where head injury occurred by means of nails and other objects, self-infliction of brain injury by an iron rod is rare. Till now, only few homicidal and accidental PBI cases by screwdriver have been described.<sup>3,4</sup> Due to its rarity in civilian practice and as a case of clinical interest, we are reporting such a case of deliberate self-harm by an iron rod in a psychiatric patient.

## 2. Case report

This 24-year-old female, a known case of schizophrenia who had attempted suicide four times earlier, was brought to the emergency department as a case of alleged self-inflicted injury by driving a pointed iron rod inside her skull. As she was residing in a remote village, it took about 8 h to bring her to our hospital. On arrival, she was fully conscious and oriented (Glasgow Coma Scale – 15), with no signs of focal neurological deficit. Clear watery discharge was noticed from her right nose. There was no history of headache, vomiting, seizures, visual disturbances. On local examination, an iron rod was seen to be protruded out of her skull in the midline of

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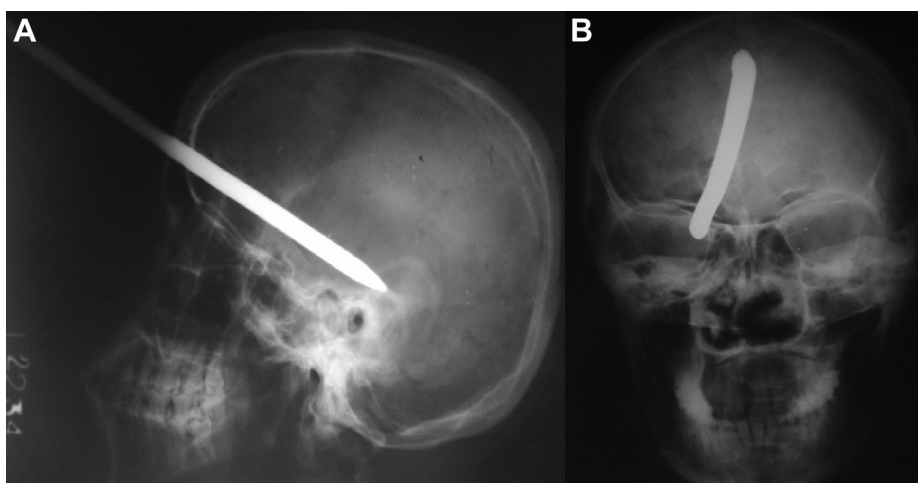
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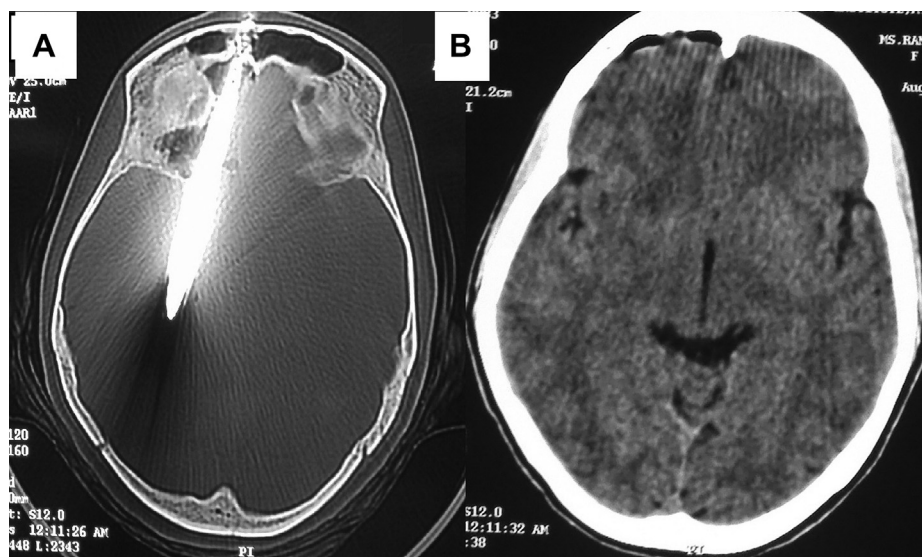
**Fig. 1 – Clinical photograph (A, B) showing an iron rod penetrating into the skull in midline of the forehead near vermilion region. Iron rod after removal (C).**

forehead near vermilion region (Fig. 1). This patient, a diagnosed case of schizophrenia was on and off taking anti-psychotic treatment, details of which was not available. Plain X-ray skull (Fig. 2) and non-contrast CT scan of head (Fig. 3) demonstrated a metallic rod penetrating into the cranial cavity. No cerebral injury except mild pneumocephalus was detected in the cranial CT scan. Due to non-availability of CT angiography at our centre, the patient could not undergo this investigation.

A general consensus was made by the neurosurgical team to remove the rod out of her skull. After proper counselling, frontal craniotomy was done under balanced general anaesthesia with rapid sequence induction. Intra-operatively colloids, blood products, and inotropes were kept ready with monitoring SPO<sub>2</sub>, ETCO<sub>2</sub>, ECG, urine output, and temperature. Under full aseptic precaution, bone chips were removed around the rod under direct vision without disturbing the surrounding structures (Fig. 4). The rod had penetrated the



**Fig. 2 – Lateral (A) and anteroposterior (B) skull X-ray showing iron rod inserted in the skull.**



**Fig. 3 – Computerised tomography scan head-showing skull penetration by metallic rod (A) with mild pneumocephalus (B).**

frontal sinus, the dura without injuring the brain parenchyma. It was removed very slowly in line of its original axis to avoid bleeding. Wound site was decontaminated thoroughly and haemostasis maintained under direct vision. Water tight dural closure was achieved. Mucosectomy and exteriorisation of frontal sinus was done by putting pericranial fascia over it. The skin flap was repositioned aseptically over a subgaleal drain. Vitals were maintained within normal limit during entire intraoperative period. After surgery, the patient was successfully extubated with stable vitals and shifted to

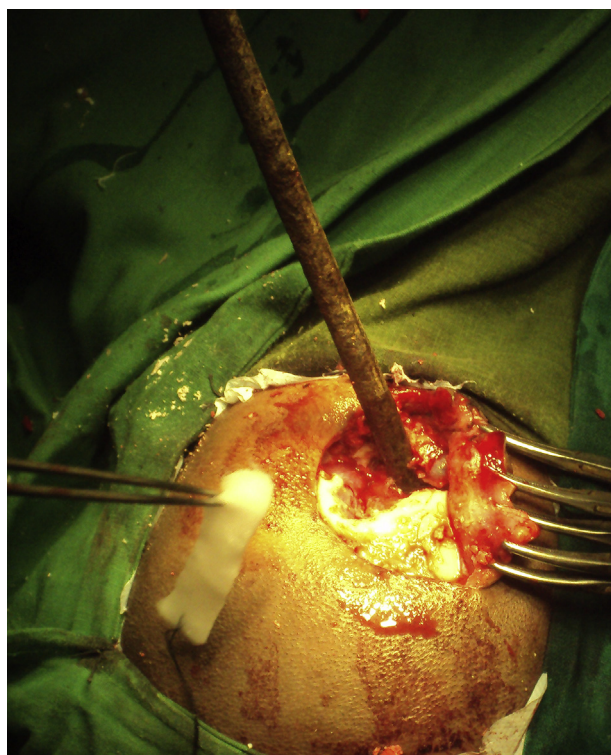
intensive care unit. Rest of the post-operative phase was uneventful. Treatment with antibiotic and anti-psychotic drugs was continued similarly to the preoperative phase. She was discharged after eight days along with psychiatric and psychological counselling. The parents were advised to keep her away from all such objects which can potentially be used as a weapon for self-harm. On three month follow-up she was doing well without any neurological deficit.

### 3. Discussion

Low velocity penetrating injuries, though less common, can happen in industrial accidents, car accidents, fall accidents or criminal activities.<sup>5</sup> Though some of these injuries occurred in psychiatric patients attempting suicide and the causative objects described in the literature include ball-pen,<sup>6</sup> spectacle arm,<sup>5</sup> screw,<sup>7</sup> nail,<sup>8</sup> there are few case reports describing self-inflicted craniocerebral injuries, caused by an iron rod. It reflects that any object can be a weapon in the hands of patients with psychiatric disorders. As it is in our case, in the majority, there is little compromise of the patient's clinical state. It is likely that this lack of permanent neurological deficit is a reflection of the low velocity, low energy nature of the injury.

The pathological consequence of the penetrating head injuries depends upon the circumstances of the injuries, including the properties of the weapon, the energy of impact, the location & characteristics of the trajectory. Following the primary injury or impact, secondary injuries may develop. A biochemical cascade begins when a mechanical force disrupts the normal cell integrity, producing the release of numerous enzymes, phospholipids, excitatory neurotransmitters, Calcium & free oxygen radicals that propagate further cell damage.<sup>9</sup>

Apart from CSF leak, a common complication of transcranial penetration is vascular injury, occurring in 30% cases. It leads to aneurysm in 15%, carotid-cavernous fistula in 7%, other arterio-venous fistula in 4%, trans-section in 3%, & severe vasospasm in 3% cases.<sup>10</sup> Introduction of infection into



**Fig. 4 – Intra-operative photograph showing the iron rod in situ.**

the central nervous system is another potential source of morbidity. Proper perioperative planning by a managing team of emergency physician, neurosurgeon, anaesthesiologist, and psychiatrist can save young life of society in such cases.

CT scan of brain is the best tool of evaluation of PBIs because it can localise the foreign bodies, reveal fractures, intracranial air and haematoma and the extent of brain damage.<sup>4</sup> It is recommended to do cerebral angiography to rule out vascular injuries in such types of cases.

Prompt surgical intervention is mandatory to reduce the mortality and complication rate. Blind removal of the penetrating object is dangerous, because blind removal may rock or twist the object, resulting in secondary vascular impairment & brain damage.<sup>11</sup> The goals of surgery are removal of the foreign bodies and bone fragments under direct vision, debridement of the path, evacuation of haematoma, and repair of vascular or dural damage.<sup>4,6,7</sup> As these objects are infected, the risk of infection is maximum. Although there is a paucity of evidence regarding causative agents of infection in PBI, the available data suggest that a wide variety of organisms may act as agents of infection in these patients. This diversity supports the use of a broad-spectrum antibiotic regimen.<sup>12</sup> All self-inflicted injured patients should have a complete psychiatric evaluation and treatment is necessary when indicated.<sup>4,8</sup>

#### 4. Conclusion

Awareness of the psychological condition and suicide precautionary measures should be kept in mind in all cases of self-inflicted PBI patients. Along with infection control, PBI patients need prompt surgical intervention to remove the foreign bodies, haematoma and nonviable brain tissue, to repair the broken dura, to reconstruct the skull base and vascular structures if indicated. Psychiatric care along with psychological counselling of the patient and the relatives is mandatory to prevent recurrence of such an event in future.

#### Conflicts of interest

All authors have none to declare.

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