

## CASE REPORT

# Self inflicted stab with a knife: An unusual mode of penetrating brain injury

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## ABSTRACT

Self-inflicted penetrating injuries have been very rarely described in the medical literature. We describe a middle-aged woman, who had driven a long knife inside her skull with the help of a brick. She had done this to get relief from chronic headache, which was troubling her for 10 years. Patient was hemodynamically stable and had Glassgow Coma scale score of 15. She was immediately operated to remove the knife and evacuate the acute subdural hematoma. Patient made a steady postoperative recovery. Psychiatric and neurological evaluation in the postoperative period revealed features of mixed anxiety and depressive disorder with migraine, for which she was started on treatment. Management of such cases needs a team approach with inputs from neurosurgeon, neurophysician and psychiatrist.

**Key words:** Head injury, headache, penetrating, stab, self-inflicted

## Introduction

Penetrating brain injuries account for about 0.4%<sup>[1]</sup> of head injuries and occur as a result of high velocity and gunshot trauma. They are one of the most common warfare injuries. Low velocity stab injury of the brain can occur due to attack with homicidal intent. Self-stabbing leading to penetrating injuries of abdomen, thorax, neck, or limbs have been reported%.<sup>[2]</sup> However, only few cases of self-inflicted penetrating brain injury had been reported in the literature. We describe an unusual case of self-inflicted stabbing of skull with brain injury in the patient with a psychiatric disorder, who had a good recovery after surgical intervention.

## Case Report

A female in her early forties was rushed by her relatives to our emergency department with a knife firmly embedded in her skull at vertex; with its wooden handle peeping out of

it [Figure 1a]. Accompanying relatives told that she was found in such a state in her room about an hour back. According to the patient, she was suffering from repeated headaches for last 10 years. She stabbed this long knife with the help of brick into her skull to get rid of a headache. A rapid clinical evaluation revealed an anxious patient with preserved consciousness and orientation. She had pulse rate of 110/min, blood pressure 136/80 and respiratory rate of 24/min. Her Glasgow coma scale (GCS) was 15. Pupils were bilaterally normal size, reacting briskly to light with normal ocular movements. Her motor and sensory examination were normal. On local examination, there was a lacerated wound over vertex in right frontal region through which wooden handle and part of the knife were visible, there was no herniation of brain parenchyma from the wound. After ensuring hemodynamic stability, patient was taken for computed tomography (CT) scan of the head, which revealed a hypodense focus of metallic density (knife) extending from occipital and parietal lobes, deep brain structures, frontal lobe, reaching up to left orbital roof [Figure 1b].

Patient was immediately shifted to emergency operation theatre after routine presurgical investigations. Left

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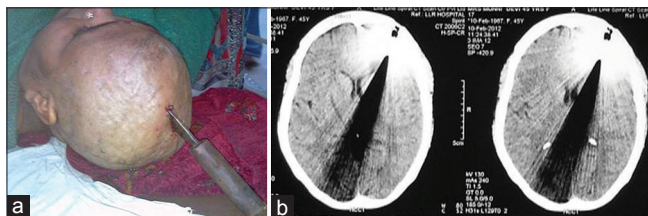
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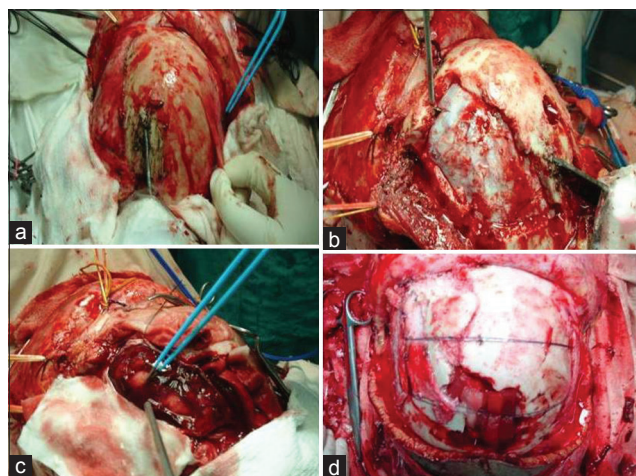
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**How to cite this article:** Qazi Z, Ojha BK, Chandra A, Singh SK, Srivastava C, Verma N, *et al.* Self inflicted stab with a knife: An unusual mode of penetrating brain injury. Asian J Neurosurg 2017;12:276-8.

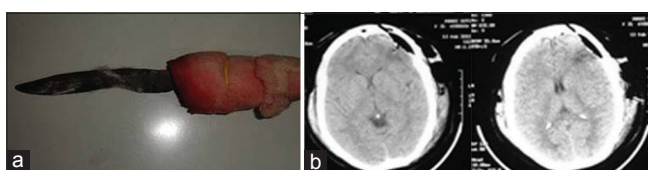
fronto-parietal craniotomy was made around the entry of knife and bone flap was removed in pieces holding the knife in position. On opening the dura, acute subdural hematoma (SDH) and contusion around the entry of knife was observed. The SDH was removed, and contusion was evacuated and the knife was slowly and carefully withdrawn. The tip of the knife was found traversing across the left frontal lobe and embedded itself in the roof of the left orbit. There were small bleeding points along the path of the knife which were controlled using bipolar coagulation. After satisfactory hemostasis, brain was lax and pulsating. Augmentation duraplasty was done using pericranium [Figure 2a-d]. The removed knife and postoperative CT scan of the head are shown in Figure 3a and b, respectively. Postoperative period was uneventful except superficial wound infection that was managed with dressing and antibiotics. Patient did not develop any neurodeficit during the recovery period. Postoperative CT scan did not show any residual or fresh hematoma.



**Figure 1:** (a) Patient with the knife stabbed through the skull. (b) Preoperative computed tomography head showing hypodense metallic knife extending from right occipital region to left orbital roof



**Figure 2:** Intraoperative photographs showing craniotomy (a), opening of dura (b), evacuation of acute subdural hematoma (c) and augmentation duraplasty using pericranium (d)



**Figure 3:** (a) The knife removed from patient's brain. (b) Normal postoperative computed tomography head

Psychiatric and neurological evaluation of the patient was performed in the postoperative period, which revealed features of mixed anxiety and depressive disorder with migraine. Patient was put on antidepressant treatment, supportive psychotherapy and relaxation exercises along with migraine prophylaxis. Subsequently, patient was discharged on 10<sup>th</sup> postoperative day.

## Discussion

Accidental head injury is an important cause of death and disability in the population of all ages. Penetrating head injuries, which account for a small number of head injuries are, usually, accidental or homicidal, and are associated with poor outcome when compared to blunt trauma. Suicidal penetrating head injuries are usually the result of high-velocity gunshot wound. Bukur *et al.* observed that 76% patients with self-inflicted gunshot wound had a head injury. However, stab wounds involved upper extremities (37%) and abdomen (36.4%).<sup>[3]</sup> Suicidal stab leading to penetrating brain injury is an extremely unusual event. This is purely due to the force needed to penetrate the skull. In our case, a 30 cm long knife with a wooden handle was forced through skull by patient herself with the help of brick into the frontal region that reached up to left orbital roof traversing through brain parenchyma of left frontal lobe. Such injuries are sparingly described in the literature. Various objects that have resulted in low-velocity penetrating brain injury include electric drill bit,<sup>[4]</sup> screwdriver,<sup>[5]</sup> stone,<sup>[6]</sup> bicycle spoke,<sup>[7]</sup> etc. A similar case was reported by Fekete *et al.*, in which the patient had stabbed a knife through his skull into the brain. The victim also had abdominal and chest stab wound and succumbed to his injuries.<sup>[8]</sup>

Penetrating brain injury poses a difficult challenge for the neurosurgeon. According to Taylor *et al.*, a higher incidence of complications is seen in patients with retained knife blades in the cranium as compared to those patients in whom the knife has been extracted.<sup>[9]</sup> Complications depend upon the structures that are penetrated. These include intracranial hemorrhage, major vascular injury with or without pseudoaneurysm formation, cerebrospinal fluid fistula, intracranial and extracranial infections along the knife track, injury to eloquent cerebrum with resulting neurodeficits, brainstem and deep brain injuries and orbital or mucosal injuries. Nathoo *et al.* observed that brainstem injuries occurred in 2.85% of patients with transcranial stab injuries.<sup>[10]</sup> Fortunately, our patient only had acute SDH and brain contusion along the knife track and she did not develop any intracranial infection. Higher infection rates are seen in patients in whom the knife penetrates through air sinuses or oropharyngeal mucosa.<sup>[9]</sup> Depending on the site and extent of injuries, the evaluation of such patients may include CT of brain and skull including face, angiography of intra and extracranial vasculature and imaging of orbits and upper

airways. Surgical management involves removal of foreign body with debridement of injured brain parenchyma along with dural closure. GCS at presentation, injury to brainstem and presence of vascular injury at presentation are the most important predictors of outcome in such cases. Managing intracranial and extracranial injuries in such patients may need collaborative care involving neurosurgeon, ophthalmologist, otorhinolaryngologist, oral and maxillofacial surgeon.<sup>[11]</sup>

Another important issue in our patient was psychiatric evaluation, as every effort should be taken in such patients to reduce the risk of future suicidal attempt. Self-stabbing is an age old method of suicide. Some psychiatric disturbance has to be present for a person to resort to such an extreme method of killing oneself. Gerard *et al.* conducted a psychiatric evaluation of survivors of self-stabbing and found a host of psychiatric comorbidities including depressive cognitions, melancholic features, substance abuse at the time of stabbing, personality disorder and disrupted childhood.<sup>[2]</sup> Our patient was diagnosed to have mixed anxiety and depression, compounded by migraine headache, which provided the stressor for committing such a violent act of suicide attempt. A timely psychiatric intervention is needed to ensure safety of the patient in the future.

To summarize, management of self-inflicted penetrating brain injury needs a rapid evaluation and imaging in emergency department, assessment of intracranial and extracranial damage, an emergent surgical management, prevention of infections and a timely psychiatric intervention during convalescence period.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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