Severe Penetrating Craniofacial Stab Injury with Retained Sharp Knife with Rounded Handle: A Very Rare Case

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KEYWORDS
Skull fractures, Sharp knife, Penetrating, Anterior Cranial fossa. Frontal lobe, Computed Tomography (C.T Scan)

ABSTRACT
Background: Craniofacial penetrating injuries are unusual but may cause massive injury to facial tissues and severe brain damage if cranium is entered. Because of the very critical anatomical area involved, these injuries can be challenging to the physicians who first receive them as well as the treating team. Prompt evaluation by utilizing the best diagnostic modality available and timely interference to remove foreign objects is the key aspects to avoid damage to vital organs surrounding the injury and to minimize the late complications.
Case Report: We report a case of 24 year old male presented in surgical emergency that sustained a severely penetrating craniofacial assault with a 15 centimeter long sharp knife with intact iron handle and retained blade. Patient was adequately resuscitated and x- ray skull and CT of head along with 3 dimensional reconstruction of face was done to assess any injury. CT scan showed no brain parenchymal injury and only undisplaced fracture of the anterior cranial fossa.
Methods and Result: Patient was explored surgically on an emergency basis. The debridement of the wound was done, bone fragments and necrotic tissue was excised. The penetrating knife was gradually removed after surgical procedure. The patient recovered well, and there was no neurological deficit on discharge.
Conclusion: The management of penetrating craniofacial trauma is a challenging task and should be handled by multidisciplinary team, so that the management and outcome can be favorable.
Keyword: -

1. Introduction

Craniofacial penetrating injuries are unusual but may cause massive injury to facial tissues and severe brain damage if cranium is entered. Such kind of injuries are dangerous to orbits as their walls are thin and can be easily broken due to sharp penetrating objects. Because of the very critical anatomical area involved, these injuries can be challenging to manage[1, 2, 3, 4] by the physicians who first receive them as well as the treating team. These injuries may look like a simple one or may be occult but on examination is found to be associated with grave and serious long and short term secondary complications.

Prompt evaluations by utilizing the best diagnostic modality available and timely interference to remove them (foreign objects) are the key aspects to avoid damage to vital organs surrounding the injury and to minimize the late complications.

2. Case Report

We report a case of 24-year-old male patient presented to us from district peripheral hospital after being stabbed in his left forehead. Patient when first received at emergency department was little drowsy, oriented and vitally stable. A primary survey examination revealed a retained knife with a handle and blade entering the lateral side of left forehead obliquely around 5 centimeters above supra orbital region of the left eye. Around 8 centimeters of handle and 5 centimeters of blade was visible outside.

Figure 1 – Image showing patient with stabbed knife

There was ptosis with little ecchymosis of the upper eye lid. The eye ball was intact with no signs of corneal tear or anterior scleral perforation. Further physical, neurological and ophthalmological examinations were normal. Initial X ray skull anteroposterior and lateral views were done which showed the tip of the knife entering the left side and crossing the midline and reaching the infra temporal region on the right side.

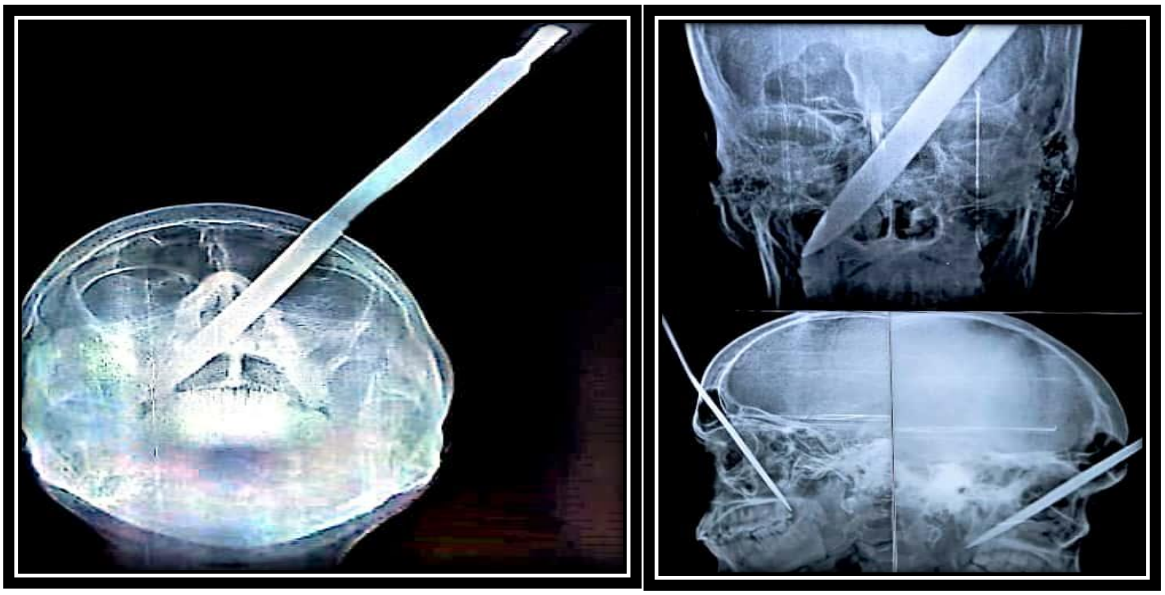

Figure 2 - X-ray images showing radio opaque metallic knif

The evaluation of wound was done for the assessment of tissue damage and planning of surgical management to avoid delayed complications

NCCT brain was done which showed normal brain parenchymal findings with minimal left frontal lobe edema and CT SCAN 3D FACE RECONSTRUCTION was also performed through the paranasal sinuses with special attention to the osteomeatel units and facial bones. The scan revealed a metallic foreign body[5,6,7]producing streak artifacts in left frontal bone seen passing through left frontal sinus , bilateral maxillary sinus reaching up to right infra temporal fossa with blood density in left frontal sinus , bilateral maxillary sinus and ethmoidal sinus.

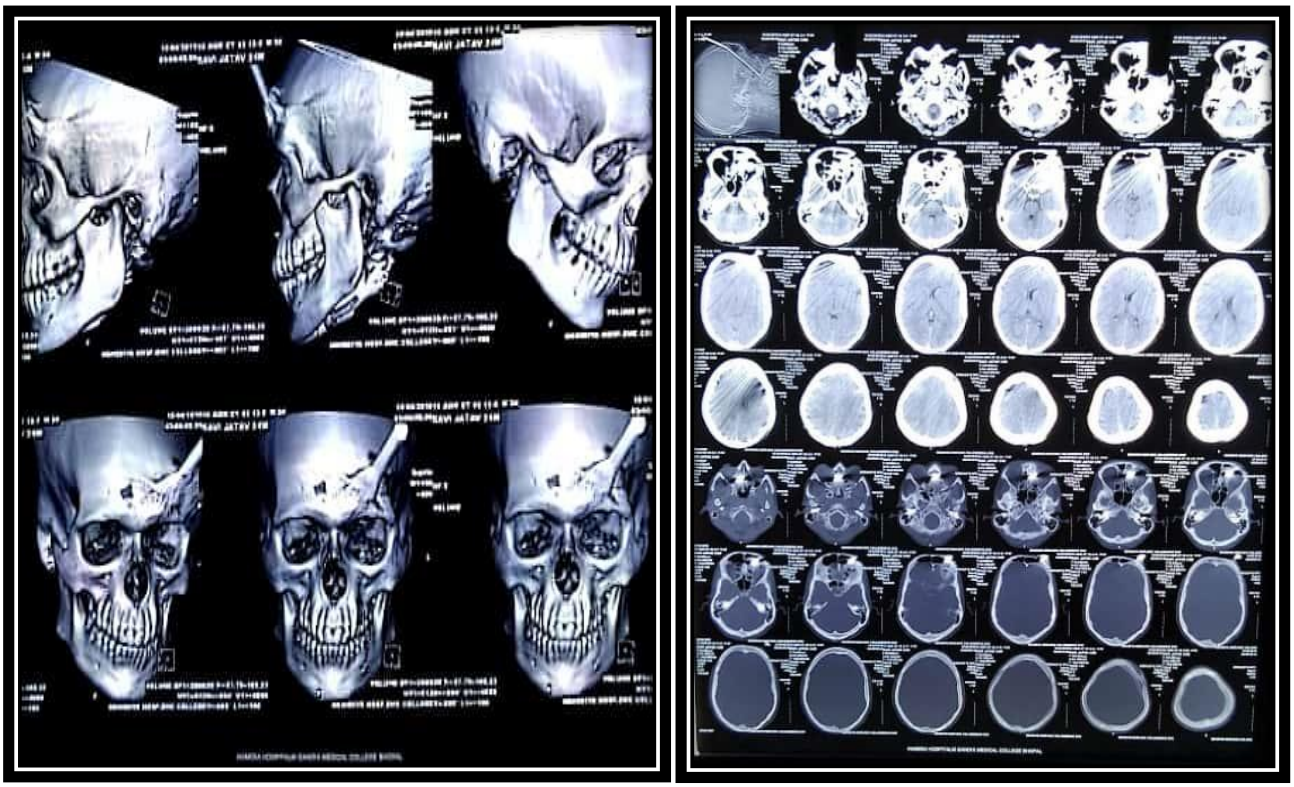

Figure 3 - 3 Dimensional reconstruction of face with NCCT brain

The patient was planned for emergency surgery and the knife was removed by surgical operation carried out by the neurosurgery team.

The knife was found stuck deep in the bony part of frontal sinus which was removed to loosen the knife blade. Soft tissues around the blade were dissected with debridement and maximum possible length was exposed. Knife was then pulled gradually with gentle force with taking care of bleeding.

Figure 4 - Intraoperative images showing knife stuck in frontal bone table and its removal

Postoperative recovery was uneventful and there was no Neurological and ophthalmological deficits at long term follow-up.

Figure 5 - Postoperative ncctbrain showing no abnormality

Figure 6 - Postoperative images of the patient showing complete recovery with no deficits

3. Discussion

Penetrating intracranial injuries causes considerable morbidity and mortality by direct damage to vital structures, vascular compromise , or infection Vascular compromise may be due to direct trauma, local effects due to hematoma, edema or vasospasm though these are uncommon but potentially life threatening injuries and it is a challenging situation both for the initially evaluating physician as well as for the surgeon as early, adequate and prompt evaluation can help in saving the life of the patient. Penetrating craniofacial injuries have been traditionally classified into high velocity and low velocity injuries. High velocity injuries are usually seen in war victims caused by missiles, gunshots etc. Due to their high kinetic energy they have the potential to cause more devastating injuries to face and cranium while on the other hand most of the civilian injuries are low velocity and are caused by otherwise simple objects which are in used daily routine and are not considered harmful. There are many scientifically reported incidents of such objects like toys, pencils, stones, wooden sticks, bicycle brake handle, chopsticks, umbrella ends, thumb tacks, tooth brushes, crochet hooks, and metal fence[8,9,10,11,12]while on the other hand reports on direct craniofacial stab injuries by knife are rare. The risk of these kinds of injuries is high especially in the orbital region because the orbital roof and medial wall of the orbit are relatively thin and even the objects with mild force can easily penetrate and can cause damage to the various vital structures like globe, brain, cavernous sinus, paranasal sinuses, and optic nerve.

Orbitocranial injuries and fronto-orbito-maxillary injuries are usually associated with compound fracture of the skull base resulting in profuse CSF rhinorrhea and and orbitorrhea. Such injuries may not be accompanied by dangerous due to their communication with the oral cavity or air sinuses. These injuries have to be recognized and repair of dural defect (usually by bifrontal craniotomy) to stop the CSF leak should be carried out at the earliest. Pericranial flaps, mashed muscle and fascia lata are extremely useful when dealing with these CSF leaks.

Hence, the permanent neurological damage caused and the sequel of the injury depends upon many factors like timing to access the medical care, timing of surgery after the injury, removal of the object

and avoiding the secondary injury[13,14] .The consequences of such wounds include brain contusions, cerebrospinal fluid fistulas and CSF leak, intracerebral, subdural, and extradural hematomas, and pneumocephalus.

Late sequel can be infectious complications like encephalitis, meningitis, cerebral abscess and osteomyelitis[15, 16, 17,18, 19] . Vascular malformations although rare can ensue[20, 21]. The outcome also depends upon primary injury and its associated complications. Subarachnoid hemorrhage for instance has been associated with poor outcome.

The diagnosis is obvious in such injuries if the detailed knowledge of how the traumatic event happened, the nature of the object used and the presence of the foreign body can be confirmed in the wound. However, diagnosis based on an incomplete history and in cases of trivial trauma is difficult and the penetrating injuries may be overlooked[22,23].

In this case, we obtained a detailed history of the event and the object was visualized in situ. Initial primary survey followed by detailed clinical examination and computed tomography altogether plays a key role to determine the site and impact of injury and guiding surgeon in the most appropriate method of removing foreign body safely. Computerized tomography is ideal imaging tool for documenting details of craniofacial trauma such as extent of soft tissue damage, site and nature of the foreign material, and presence of displaced or un-displaced bone fractures and should be done in all cases of suspected craniofacial injuries.

Our main aim is to stabilize the parameters, safeguard the air way against aspiration, obtained clinical history and examine to rule out other associated life threatening injuries. The optimal CT scan slides will help to evaluate the extent of soft tissue injury, any skull fracture, or presence of intracranial hematoma.

As the wound of entry was high enough through the supra orbital area, in the frontal region the surgery was done by the neurosurgery team along with a Facio maxillary surgeon and the best approach was to do craniotomy without opening the orbital rim for the removal of the knife blade. The surgical management of these patients is challenging as it will require removal of foreign body, debridement of necrotic tissue, evacuation of intracranial hematoma, removal of bony fragments. Restoration of craniofacial anatomy and facial aesthetics [24, 25, 26, 27]wide exposure can be achieved by extending the wound of entry and making a craniotomy around the fractured fragments, the impacted object needs to be removed gradually in the reverse entry direction (without causing further damage)[28,29].

4. Conclusion

The management of penetrating craniofacial trauma are definitely challenging and need detail examination by multidisciplinary team therefore the management and outcome can be favorable. Evaluation of x-ray and CT scan is mandatory to rule out the skull bases fracture for craniotomy which will save the time and associated morbidity. The aim should be to excise the necrotic tissue and removal of foreign body and restore the normal functioning and aesthetics with maintaining the normal shape.

Funding

No funding sources.

Conflict Of Interest

None declared.

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