IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 8 Ser.16 (August. 2020), PP 16-20
www.iosrjournals.org

Penetrating Brain Injury: A Case Report

Dr. Soorya Sekar[1], Dr. Nitin kotecha[2], Dr.Ishtyaque Ansari[3], Dr.Sushil shinde[4]
[1]*Postgraduate Resident, Dept of Surgery, MGM Medical College & Hospital, Aurangabad, Maharashtra, India*
[2,4]*Asst. Professor, Dept of Neurosurgery, MGM Medical College & Hospital, Aurangabad, Maharashtra, India*
[3]*Asso.professor, Dept of neurosurgery, MGM Medical College & Hospital, Aurangabad, Maharashtra, India*
[**]*Dr. Soorya Sekar, Dept of Surgery, MGM Medical College & Hospital, N6 CIDCO, Aurangabad - 431003*

***Abstract*:**
Aim: *Approach to a penetrating brain injury.*
Case*: 27-year-old male came to a casualty with an alleged history of assault with a knife and sustained multiple stab injuries on head, chest, and abdomen with a knife in situ in the left temporal region. On presentation, the patient was conscious, drowsy with GCS 13/15. BP 90/60 mmHg, PR 110/min. CT brain was suggestive of a foreign body in the left temporal region. CT angiography of the brain showed no involvement of major vessels. CT abdomen was suggestive of grade 2 splenic laceration and CT chest s/o pneumothorax on the left side.*
Discussion*: Traumatic brain injury(TBI) is one of the leading causes of morbidity and mortality in India. Penetrating wounds are responsible for only 0.4% of all brain injuries. In penetrating head injury, CT brain is the imaging modality of choice. Vascular complications are frequent following penetrating head injury and range from 5 to 40%. Cerebral angiography is recommended in patients with high suspicion of vascular injury. Our patient had a stab injury in the left temporal region with a knife in situ. Post-operative wound infection was a big concern due to the extensive deep penetration of the knife. proper antibiotic prophylaxis is needed to prevent wound infection.*
Conclusion*: Appropriate actions to be taken in a short time for penetrating brain injury to improve the prognosis of the patient. Emergency planning of surgery and removal of the foreign body decreases morbidity and mortality. So from our experience, we share that proper resuscitation of the patient and operating patient on an emergency basis will improve the prognosis of patients.*
Keywords: *penetrating brain injury, knife in the brain, foreign body*

Date of Submission: 16-08-2020 Date of Acceptance: 02-09-2020

I. Introduction:

Traumatic brain injury(TBI) can be either penetrating injury or blunt trauma. Penetrating head injury is a serious brain injury that has increased mortality and morbidity[2,7]. Penetrating brain injury (PBI) includes all traumatic brain injuries which are not the result of a blunt mechanism. Although less prevalent than closed head trauma[4]. In civilian populations, PBIs are mostly caused by high-velocity objects, which result in more complex injuries and high mortality. PBI caused by non-missile, low-velocity objects represents a rare pathology among civilians, with better outcomes because of the more localized primary injury. and is usually caused by violence, accidents, or even suicide attempts.[4,8]

II. Case Presentation:

27 years old male presented to casualty with an alleged history of assault with a knife following a fight. The patient had multiple stab injuries on the neck, chest, abdomen, and head with a knife in situ in the left temporal region. During the time of the incident, the patient was conscious and brought to our institution for further management. When presented to casualty patient was conscious but irritable, the patient had a history of vomiting 3 episodes, mild chest discomfort, no history of loss of consciousness, ear bleed, nasal bleed, convulsions. h/o profuse blood loss was present at the time of the assault. In meanwhile in casualty patient started to become drowsy, pulse rate was 112/min, BP: 90/60 mm Hg. GCS was E3V4M6. Bilateral pupils were reactive and equal. On local examination, the patient had multiple stab injuries over the neck, thorax, and abdomen, mostly on the left side of the body. The patient was resuscitated in casualty, primary closure was done for the stab wounds in casualty, and patient was planned for emergency craniotomy for removal of foreign body from the brain.

Imaging:

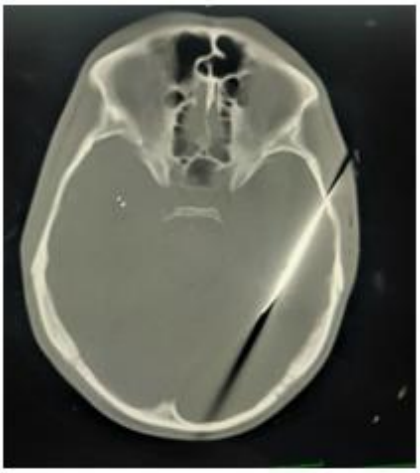
CT imaging is done for the brain, chest, and abdomen. CT BRAIN s/o: penetrating trauma to left temporal region with a foreign body in situ. CT chest s/o mild pneumothorax and CT abdomen s/o grade 2

splenic laceration. CT brain angiography was done and there was no significant involvement of major blood vessels. Chest and abdomen trauma was planned for conservative management, whereas the brain injury required a craniotomy for knife removal.

III. Clinical Pictures of Patient

Picture A

picture B



Picture A: shows the clinical presentation of the patient to a casualty with a foreign body (knife) in situ.
Picture B: A computed tomography picture showing knife which was penetrating the left brain parenchyma

IV. Management

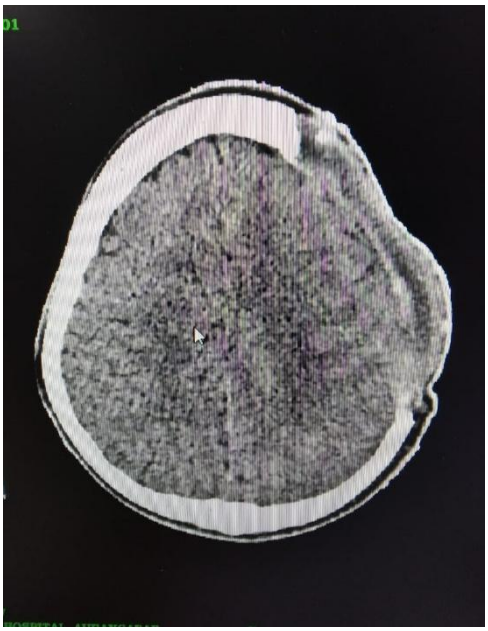
The patient was resuscitated and shifted to the surgical ICU for the preparation of the patient for surgery. Post preparation patient was taken for emergency craniotomy after explaining the high risk of the condition and the risk of the surgery to the relatives.Under general anesthesia, the patient in the supine position and head tilted towards the right. Initially, the handle of the knife is removed.Left fronto-parieto-temporal craniotomy done. Dura opened. e/o foreign body penetrating the brain parenchyma along the left parieto-temporal region. foreign body removed in toto.Hemostasis was achieved using bipolar. Closed in layers.Skullbone was preserved by placing itin the lateral aspect of the right thigh for future cranioplasty. The patient was shifted to the surgical ICU for further management. The patient was started on iv antibiotics, anticonvulsant, and mannitol.

Post-surgery foreign body image:

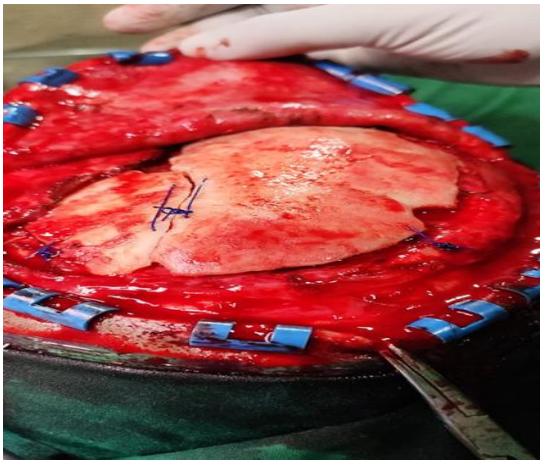
Around 9 cm deep penetration into the brain parenchyma mostly over the left parieto temporal brain lobe.

Hemostasis achieved following the removal of foreign body

Post-op management:
the patient was started on IV antibiotics, antiepileptics, analgesics. the patient was on ventilatory support for one day. Ventilator weaned off and the patient was extubated. Post-surgery patient's speech is preserved, with no motor or sensory deficits, no impairment in vision. The patient improved vitally, shifted to ward from the intensive care unit, and discharged on a postoperative day(POD) 7.



Post-operative CT image of the patient
The patient was under regular follow up for four months and the patient was planned for elective cranioplasty. Cranioplasty was done and the patient was discharged on pod 4.



Cranioplasty intraoperative picture of the patient.

V. Discussion

Traumatic brain injury is the leading cause of morbidity and mortality in India. 1.5 to 2 million people are injured and around 1 million succumb to death every year. Road traffic accidents are the most common modality of traumatic brain injury with around 60% occurrence, falls accounting for 20-25%, and violence in around 10% cases. [2,3]. puncture wounds are responsible for only 0.4% of all brain injuries.

Pathophysiology of penetrating brain injury depends on the velocity of the penetrating trauma, nature of the object causing trauma and location, and characteristics of the intracranial trajectory. [9]

In general, patients with penetrating head injury requires prompts medical attention and penetrating object has to be removed within 12 hours, but patients with the penetrating foreign body with active bleeding should be taken for intervention as early as possible.[2]

A systolic BP of at least 90 mm Hg should be maintained. In a large series of patients with severe traumatic brain injury, a single episode in which systolic BP fell below 90 mm Hg was associated with an 85% increase in morbidity.[2,6]. In our case, patient bp was maintained at a normal level by isotonic saline infusion.

There is a direct correlation between the severity of the injury and the increased risk of seizure. In all cases of penetrating brain injury, 30–50% of patients reported seizures, however, Prophylactic antiepileptic treatment is controversial. We routinely administer antiepileptic medicine in penetrating brain injury cases.

Optimum management of TBI requires adequate comprehension of the mechanism and pathology of injury.As in the cases of penetrating head injury, CT scan head is the imaging modality of choice. CT scan will not only locate penetrating objects and its fragments but also give detail information about injury to the underlying brain. As most of the penetrating objects are metallic, they generate CT artifacts that obscure anatomy crucial to planning surgical approaches. When available, DECT (Dual-energy computed tomography) scanning with 3-D reconstruction may be helpful [14,15]. MRI can be used toscreen the patient with non-metallic injury [2]. In our case, we opted for ct angiography and it showed no involvement of any major vessels. Cerebral angiography is recommended in patients with penetrating head injury where there is a high suspicion of vascular injury. [2]

Advanced planning about the direction of extraction is also of utmost importance. For this not only the imaging tests but also detail information about characteristics of object is essential [2]. Our patient had a stab injury in the left temporal region with knife in situ and only then handle of the knife outside the cranial vault. We opted for the ct brain with angiography.

Post-operative wound infection was a big concern because of extensive deep penetration of the knife. No standard of infection management has emerged from penetrating brain injury study due to variation in the infection control practice among different departments and institutes. Uncertainties remain regarding the timing of antibiotic use, length of the antibiotic regimen, and whether the early or prophylactic use of antibiotics produces more resistant strains of bacteria. Literature is very contradictory for the type and duration of antibiotics; some are recommending prophylactic use of antibiotics while are others advise the use of antibiotics when specific colony identify [2] We have given intravenous antibiotics for one week and oral antibiotics for 2 weeks. It is suggested that delay of debridement of the stab penetrating wound more than 48 h can lead to an increased chance of infection [6]

Vascular complications are frequent following penetrating head injury and range from 5 to 40%. these include true and pseudoaneurysm, arteriovenous malformation, and subarachnoid hemorrhage. Earlier guidelines of management of penetrating injury suggested pre-operative digital subtraction angiography study in cases suspected with vascular injury. However, recent data from middle east conflicts suggest that more than one-third of patient with penetrating injury develop a vascular injury. Thus warrants pre-operative CT

angiography in all patients with penetrating brain injury. Postoperatively, nonvascular short term complications like wound infection, subdural collection, and long term problems like brain abscess, are always a concern. Digital subtraction angiography will help in the diagnosis of vascular complications. Imaging with contrast CT/MRI play a vital role in the diagnosis of these conditions.[2]

VI. Conclusion

Penetrating head injury is rare and violent trauma which increases both mortality and morbidity of patients. Appropriate actions to be taken in a short period to improve the prognosis of the patient. Emergency planning of surgery and removal of the foreign body decreases the chances of infection being caused secondary to it. So from our experience, we share that proper resuscitation of patients and operating patients on an emergency basis will improve the prognosis of patients.

- This study was not funded by any person or organization.
- All procedures performed in the case report was under the ethical standards of the institution.
- Informed consent was taken from the patient and relatives of the patient.
- The author declares there is no conflict of interest regarding the publication of this paper.

References:

[1]. A. T Syed. Clinical Management of Patients with Minor Head Injuries
[2]. Batukdiyora, Nitin kotecha. Perforating head injury with iron rod and its miraculous escape: Case report and review of literature
[3]. Vineet Kumar Kamal, Deepak Agrawal,[1] and Ravindra Mohan PandeyEpidemiology, clinical characteristics and outcomes of traumatic brain injury: Evidences from integrated level 1 trauma center in India
[4]. Syed Faraz Kazim, Muhammad Shahzad Shamim, Muhammad Zubair Tahir, Syed AtherEnam, and Shahan WaheedManagement of penetrating brain injury
[5]. Federico C Vinas, MD; Chief Editor: Brian H Kopell, MD Penetrating Head (Brain) Injuries (pTBIs) Treatment & Management.
[6]. K Karimi Yarandi, SinaJelodar, Mahmoud Reza Khalatbari,[1] Saleh Rasras,[2] Reza Bahrami Ilkhchi,[2] and Abbas Amirjamshidi. stab Wounds to the Head; Case Series, Review of Literature, and Proposed Management Algorithm.
[7]. Cemil B., Tun K., Yigenoglu O., Kaptanoglu E. Attempted suicide with screw penetration into the cranium. Ulus. TravmaAcilCerrahiDerg. 2009;15:624–627
[8]. Esposito DP, Walker JP. Contemporary management of penetrating brain injury
[9]. Fredico n vinas, penetrating head injury (pTBIs)

Dr. Soorya Sekar, et. al. "Penetrating Brain Injury: A Case Report*." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(8), 2020, pp. 16-20.