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Original Research Paper

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MANAGEMENT OF LOW VELOCITY PENETRATING BRAIN INJURY WITH IMPACTED IRON ROD: A CASE REPORT.

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ABSTRACT Penetrating brain injury (PBI) is a potentially life threatening condition. PBI with impacted foreign body is very rare. These patients are at very high risk of vascular injury, infection, cerebrospinal fluid leak and seizures. These patients usually require multidisciplinary approach for better outcome. We are presenting a case of impacted iron rod in left temporal region associated with left orbital apex injury. Urgent craniotomy with removal of impacted iron rod with decompression of optic nerve and dural base repair was done and ophthalmological consultation was taken for vision loss in left eye. There was no sign of infection and CSF leak in the postoperative period. This case is discussed just to throw some light over the recent guidelines regarding management of PBI.

KEYWORDS : Penetrating brain injury, Optic nerve injury, Temporal Craniotomy, Dural base repair.

INTRODUCTION-

Penetrating brain injury (PBI) is a traumatic brain injury caused by low - velocity sharp/blunt objects (e.g. knife, scissors, chopsticks, iron rods) or high velocity projectiles (shell fragments or bullets). These are rare cases and are associated with high risks of morbidity and mortality due to relevant infection, seizures, vascular injury and cerebrospinal fluid leakage and optic nerve injury [1, 2]. Patients with impacted assault weapons or foreign bodies who rarely reach for surgery should be judiciously managed with regard to removal of weapon, vascular repair, ICH removal , antibiotic therapy and medico legal issues related to them. Our goal of presenting this rare case is to demonstrate certain neurosurgical management principles which can improve patient outcome.

Case report-

A 20 year young man was hit to his left temporal region by a iron rod under unknown circumstances.[figure:1] On examination, patient was unconscious, having eye opening to pain on right side, producing inappropriate words, moving all four limbs spontaneously and pupil were dilated nonreacting on left side with normal sized normally reacting pupils on right side. On local examination, there was curved metallic FB impacted in left temporal region with no exit wound. Computed tomography (CT) brain plain with 3D- CT face was suggestive of contusion around metallic FB in left temporal region with fracture of left squamous temporal bone, greater and lesser wing of sphenoid bone with involvement of left ethmoid sinuses and sphenoid sinus [figure:2]. Prophylactic antibiotic with anaerobic coverage and antiepileptic were started. Left frontotemporoparietal craniotomy with removal of FB and loose bone chips with left temporal contusectomy with duralpasty using pericranial patch was done. Intraoperatively, metallic FB after entering into left anterior temporal lobe was going into infratemporal fossa on left side. So left temporal base dura was repaired using graft of pericranial patch. On day 1 after surgery, patient became conscious with loss of vision, complete ophthalmoplegia and ptosis in his left eye. After ophthalmologist consultation, Magnetic Resonance Imaging (MRI) of orbit was done and was suggestive of left orbital apex injury involving optic nerve [figure:3]. Postoperative plain CT brain was suggestive of defect in left temporal region with underlying postoperative changes. CT angiography brain was not suggestive of any significant finding. Patient was discharged on antiepileptic in conscious, oriented state with vision from his right eye.

DISCUSSION-

PBI involving foreign bodies is less prevalent than closed head injury but well known since ages [3]. In western countries high velocity PBI (bullets, shell fragments) is more common and in developing countries like India, low velocity PBI (knife, pitch fork prongs, iron rod etc.) is more common. The most commonly encountered types of PBI are industrial accidents, suicidal attempts and assault [4]. Each patient of PBI comes with some different injury patterns but there are some general management principles which apply to almost every case.

Usually injuries are common on left side of skull due to right handedness of the assailant. The common injury sites are orbitocranial, temporal region and frontoparietal region [5]. Patients with pterional and orbitocranial injuries are specifically prone to harbor vascular injuries. Retained foreign bodies may prevent hemorrhage by tamponade effect on an injured vessel so they should be removed in the well equipped operation theatre under vision [6]. Adherence to advanced trauma life support guidelines is critical and should precede any imaging paradigm.

Computed tomography (CT), including three- dimensional (3D) reconstruction of the head is mandatory to define the entry site, trajectory of weapon, bony injury, parenchymal injury, any hematoma and edema. Involvement of air sinuses and mastoid air cells is highly associated with deep intracranial infections and cerebrospinal fluid leakage. Patients with pterional and orbitocranial injuries, large intracerebral hematoma and breach of two dural compartments are specifically prone to harbor traumatic intracranial aneurysms or arteriovenous fistulas [7]. So CT angiography or conventional angiography is mandatory in such cases if possible should be done in preoperative period. Wood appears like air bubble on CT scan, so wooden foreign body needs to be detected by magnetic resonance imaging (MRI).

Broad spectrum antibiotics and antiepileptic should be

started in the preoperative period. Our aim of surgical management is proper debridement, cranial decompression, dural base repair and watertight skin closure. Recent recommendations are to do craniotomy instead of craniectomy to have wide exposure and prevent bone loss [8]. Multidisciplinary approach is required in cases of extensive scalp injury, craniofacial injury and orbital injuries [9]. In postoperative period, antibiotics have to be continued for 2-3 weeks and antiepileptic for at least 2 years due to high incidence of posttraumatic epilepsy in these cases [10].

In our case patient was unconscious and after urgent 3D CT head, craniotomy was done. Impacted foreign body removed, debridement with left temporal hematoma evacuation, optic nerve decompression and dural repair using pericranial patch was done. After surgery CT angiography brain was done, this showed no significant finding. In postoperative period as patient became conscious, left eye vision loss with ptosis with ophthalmoplegia was detected and MRI orbit with ophthalmologist consultation was done. Left orbital apex injury with optic nerve injury was detected and regular follow up was advised. Patient was kept on antibiotics for 3 weeks and discharged in full conscious state on single antiepileptic drug.

CONCLUSION-

Low velocity PBI cases are rare and are associated with high morbidity and mortality. Multidisciplinary approach is required to diminish the risk of infection and CSF leak. Angiography should be done in cases suspected of having vascular injury. Patients with PBI require long-term antibiotic and antiepileptic treatment.

Figure 1 (a) clinical picture showing curved iron rod penetrating left temporal bone. (b) clinical picture showing curved iron rod removed surgically.

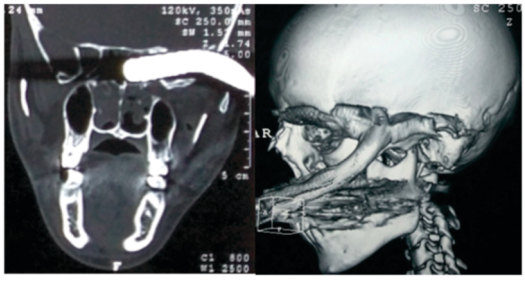

Figure 2 (a) CT bone window coronal image showing metallic foreign body penetrating left temporal region along skull base. (b) 3-D CT image showing metallic foreign body going into left temporal region.

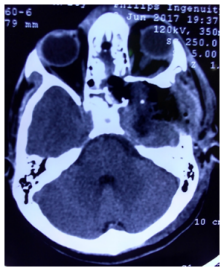

Figure 3 preoperative axial CT image showing left fronto-temporal contusion with subarachnoid hemorrhage with uncal herniation.

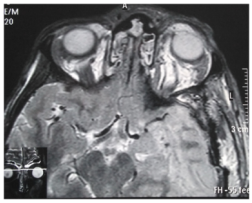

Figure 4. MRI orbit T2 axial image showing left optic nerve injury.

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