Penetrating Thoracic Spinal Injury with Impacted Glass Fragment

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ABSTRACT

Introduction: Penetrating injuries to the spine with retained foreign body is rare. We present a rare case of non-metallic penetrating injury of thoracic spine with a retained glass fragment which was successfully removed.

Case report: A 46 years old presented with penetrating injury to thoracic spine following road traffic accident. On wound exploration, a glass fragment was found impacted in depth. Neurological examination revealed left lower limb monoparesis with grade 3 power.

Investigation: X-ray showed radiopacity at the level of D4 vertebral body. Computed tomography (CT) of spine showed foreign body at the D4 vertebral level piercing the lamina, penetrating the left pedicle reaching up to D4 vertebra pushing spinal cord to the opposite side.

Treatment: Emergency D4 laminectomy followed by retrieval of foreign body was done.

Results: Postoperatively, weakness improved to normal power. On 6 weeks postoperative follow-up, he is able to walk without difficulty.

Conclusion: Management of penetrating non-metallic spinal foreign body is a real challenge which requires careful clinical and radiological assessment. Early decompression with retrieval of foreign body leads to better outcome.

Keywords: Penetrating, Glass, Thoracic, Spinal.


Source of support: Nil

Conflict of interest: None

INTRODUCTION

Penetrating injuries to the spine are relatively infrequent compared to other sites and is a real challenge to the treating surgeons.1 Penetrating injuries with retained foreign body is still rare except following gunshot injuries.2 In our case report, we present a rare case of penetrating injury of thoracic spine with impacted glass piece which was successfully removed.

The patient was a 46 years old gentleman, who was a lorry driver by profession, presented in the surgery casualty of our institution with weakness of left lower limb following a road traffic accident. On detailed history taking, we understood that, in the accident, he crashed into the front glass and was thrown out of the vehicle. In the fall, he sustained a penetrating injury on the back of chest with a broken glass piece. He had a penetrating entry wound of size 4 cm in length and 3 cm in breadth (depth of the wound could not be assessed) which was approximately 2 cm lateral to the midline toward left side (Fig. 1). There was profuse bleeding from the wound and hence explored in the casualty by general surgeons, and the bleeding was controlled. Few glass pieces which were found in the muscle plane were removed. One glass piece which was found impacted in depth was left in situ and the patient was shifted to trauma ICU. Since the patient had left lower limb weakness, neurosurgery consultation was sought. Detailed neurological examination revealed grade 3 power of left lower limb with no sensory impairment. Deep tendon reflex were all sluggish with extensor plantar on the left side. Right lower limb power was normal. Rectal tone was reduced. He had urinary retention and hence was catheterized.

INVESTIGATIONS

X-ray thoracolumbar spine anteroposterior (AP) and lateral views showed a radiopaque shadow at the level of D4 lamina and vertebral body (Figs 2A and B).

Computed tomography (CT) of spine with three-dimensional (3D) reconstruction (Figs 3A to C) was taken which showed radiopaque foreign body 3 × 5 × 4 cm

Fig. 1: Entry wound shown in black thick arrow
Since, it was sure that the intraspinal foreign body was a glass fragment, a magnetic resonance imaging (MRI) was done to precisely locate the foreign body as well as to assess the condition of thoracic spinal cord. Magnetic resonance imaging (Figs 4A and B) revealed hypointense foreign body confirming the CT findings. Cord was pushed to opposite side with possible dural tear.

**MANAGEMENT**

He was started on prophylactic antibiotics preoperatively.

**OPERATIVE FINDINGS**

Emergency exploration with a midline incision away from the entry wound was done. Glass fragment was found impacted after separating paraspinal muscles (Figs 5A and B). Three glass pieces in the intermuscular plane came out removed while separating paraspinal muscles. (Figs 5A and B). Glass piece was seen penetrating D4 lamina. Small apical part of impacted glass which was lying loose were removed. D4 laminectomy (Fig. 6A) consistent with glass at the D4 vertebral level piercing the lamina extending into spinal canal. Foreign body was found penetrating the pedicle reaching up to D4 body on the left side. Spinal cord was pushed to the opposite side.
was done without disturbing the impacted glass fragment. High speed drilling was continued laterally into the facet and medial facetectomy was done (Fig. 6A). Pedicle was also drilled laterally to loosen the glass fragment. Glass fragment was going in between nerve roots intending the cord medially and was found impacted on the vertebral body. Glass fragment was disimpacted carefully (Fig. 6B) and removed, and retrieved glass fragments are shown in Figures 8A and B. There was a small dural tear with cerebrospinal fluid (CSF) leak which was repaired with fat graft after attaining hemostasis (Figs 7A and B). Spinal canal was irrigated with antibiotic solution. Wound was closed in layers with drain. Intraoperatively, methylprednisolone was given.

**POSTOPERATIVE COURSE**

Postoperatively, left lower limb weakness improved to normal grade 5 power. There was no evidence of CSF leak or features of meningitis. Drain was removed on 3rd day. Suture removal was done on day 10 and was discharged the same day. Postoperative X-ray (Figs 9A and B) was taken which showed complete removal of foreign body. On 6 weeks postoperative follow-up, he was able to do his profession without difficulty.

**DISCUSSION**

Nonmissile nonmetallic penetrating injuries are relatively infrequent, and only few case reports are available in literature. Nonmetallic penetrating injuries are usually accidental in nature in contrast to metallic injuries. Case reports with penetrating injuries with nonmetallic objects, like glass, pencil, sugarcane, broomstick, are reported. Usually, they present late due to compression by foreign body granuloma or abscess formation. Our case is unique in that patient presented with neurological deficit following a penetrating injury with
glass fragment in thoracic spine which was successfully removed resulting in complete recovery of the weakness.

Thoracic spine is a common area of penetrating injury. Injury to this region differs from other regions as it is less mobile and is responsible for trunk stability. Lumen of the spinal canal is narrowest in thoracic spine. Nerve roots existing are responsible for intercostals muscle function. Thoracic region is a constant watershed area of the spine.

Plain radiographs are the initial investigation in all cases. Computed tomography (CT) is a good investigation modality for patients with nonmetallic foreign body as well in considering ability to detect retained foreign body, spinal/paraspinal hematoma and bone fragments. Although, MR is a powerful tool for identifying injury track, cord, root lesion and associated lesion like hematoma, role of MRI is controversial in metallic penetrating injury as magnetic field is associated with movement of material and heat production causing neurological deficits.

Management of patients with penetrating spinal cord trauma depends on the mechanism and duration of injury. Surgical intervention is critical to neurological outcome regardless of initial neurological status. Early surgical intervention decreases infection rate, CSF leak and arachnoiditis. Early surgical retrieval of nonmetallic foreign body can prevent foreign body granuloma, abscess formation causing neurological deficit. It can also prevent foreign body migration later.

The technical aspects of surgical intervention include identifying correct spinal level of foreign body, surgical decompression with removal of foreign body in the line of original trajectory to minimize additional damage. Dural repair without primary closure needs to be done to contain spinal cord edema. Manipulation or closed removal may result in fresh neurological deficit, CSF leak, and infection.

CONCLUSION
Penetrating nonmissile nonmetallic foreign body is a real challenge and its management requires careful clinical and radiological investigation and needs meticulous surgical planning. Early surgical decompression with
disimpaction of foreign body in line with the original trajectory without disturbing vital structures lead to better outcome by preventing neurological deficit, abscess formation, foreign body granuloma and CSF leak.

REFERENCES