

Penetrating Stab Injury to the Thoracic Spinal Cord: A Case Report

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Abstract

Keywords

- ▶ penetrating spinal cord injury
- ▶ stab wound
- ▶ Brown-Séquard plus syndrome

Stab injuries to the spinal cord due to knife are rare. Usually the knife slips into the interlaminar space to injure the cord incompletely. We report a 24-year-old man who was stabbed by robber in the thoracic region. He presented with the Brown-Séquard plus syndrome. Knife penetrated the lamina, driving the bony chip into extradural space injuring the dura and cord. The patient was subjected to laminectomy and duraplasty with fascial graft. He showed good improvement and has joined his occupation.

Penetrating spinal cord injuries are seen less often when compared with injuries caused by firearm. The incidence has been reported most commonly from South Africa.¹ Neurologic deficits are invariably present rather than exception.²

Case Report

A 24-year-old youth was struck on his back with knife by a robber. He fell down and noted the inability to move the left lower limb. His friend pulled out the knife and the patient was taken to nearby hospital. He was given 2 g of methylprednisolone and then brought to our hospital. On examination, his Glasgow Coma Scale (GCS) score was 15/15, blood pressure was 130/60 mm Hg, and pulse rate was 90 beats/min. There was a curvilinear 1-cm wound about 1 inch to the left of midline at the lower thoracic region. On neurologic examination, he had grade 0 power in the left lower limb and grade 4 power in the right lower limb. All modalities of sensation were absent in the left lower limb up to D12 level, and pain and temperature were lost in the right lower limb. Computed tomography (CT) revealed fracture of D9 lamina with a fragment in the spinal canal (▶**Fig. 1a**) and VR images revealed penetrating injury in the lamina (▶**Fig. 1b**). On conducting magnetic resonance imaging (MRI), stir images revealed high signal intensity in the spinal cord and along the track (▶**Fig. 1c**). Laminectomy

revealed bony fragments in the spinal canal with dural tear of 1 cm size with contusion and swelling of the cord. Dural opening was extended. Hemostasis was ensured by pressure with cotton patties. The dura was closed with a fascial graft and wound closed in layers. Two weeks following surgery, urinary catheter was removed and the patient could void without any difficulty and motor power improved to grade 2 in the left lower limb. He could stand with support by 2½ months and became ambulatory in another 2 weeks. Sensations improved on the left side by that time, but they have not improved on the right side so far. He joined his job 10 months back. Postoperative MRI, 15 months after injury, showed hyperintense intramedullary signal changes at the site of previous surgery (▶**Fig. 2a and b**).

Discussion

Knife injuries to the spinal cord are rare and have been reported as case reports in the literature.^{3,4} Thoracic region is the common area of penetrating injury because of long segment as compared with the cervical and lumbar area and being within the natural sweep of the attacker's arm arc. The stab wound usually enters the spinal canal by passing through the interlaminar space. In this case, the knife pierced the lamina, taking the chip away into the spinal canal, which perhaps injured the dura and contused the spinal cord and caused subarachnoid hemorrhage. Rarely,

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Fig. 1 (a) Computed tomography showing fracture of lamina with a small intraspinal fragment underneath. (b) Volume rendering image showing perforation in the lamina (arrow). (c) Sagittal stir MR image showing knife track extending from the skin to the spinal cord and cord contusion.



Fig. 2 (a and b) Postoperative MRI axial T2 and sagittal STIR sequences showing hyperintense signal at the site of injury, 15 months after surgery.

cord infarction may occur when there is penetrating injury to the artery of Adamkiewicz or rarely due to the spinal epidural hematoma.⁵ Most stab injuries to the spinal cord occur in the young men attacked from behind in a single stab, most frequently in the thoracic region. Typically the weapon used is a knife that is withdrawn by the attacker, rarely wedging or breaking into the bone to present as a retained foreign body.

Hemisection or lateral injury to the cord results in Brown-Séquard syndrome consisting of ipsilateral hemiplegia and

loss of proprioception with contralateral pain and temperature sensation deficit. A pure form of this syndrome occurs rarely and therefore the term “Brown-Séquard plus syndrome” is used when additional neurologic findings are present as seen in our case as well.⁶ Delayed onset of neurologic symptoms may result from retained foreign weapon, bone fragments, infection, edema of cord, cerebrospinal fluid (CSF) leak, and granuloma formation.³

CT of the spine is useful in displaying bony structures although there may be some artifacts. MRI is particularly

helpful in detecting infarct, hematoma, or cord edema. MRI should not be attempted in the presence of metallic foreign body because presence of strong magnetic field may increase neurologic deficits.^{7,8} Surgery is mandatory in the presence of progressive neurologic deficits and CSF leak, which may consist of removal of fragments from the canal and dural repair. In our case the dura was closed with fascial graft. Direct closure of the dura was avoided, which would have reduced the space available to accommodate the swollen contused cord and which could have caused secondary injury. Alternatively, collagen matrix graft without suture has been recommended.

The prognosis for the stab wound of the spinal cord is better than that for with blunt spinal cord injury or gunshot injuries because most patients with stab injury present with incomplete spinal cord injuries as demonstrated by our case as well.⁹ Patients with minimal or no cord changes have best outcome whereas those with parenchymatous hemorrhage or contusion have poor prognosis.¹⁰ Postoperative hyperintense lesion may be responsible for the nonrecovery of pain and temperature on the right lower limb. We do not recommend the use of methylprednisolone because of the controversy in the literature.

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