Penetrating Cervical Spine Injury

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Management of penetrating cervical injuries is challenging. The weapon may be withdrawn or may be intact, and its removal may add to neurologic deficit. Immobilization of spine and careful transportation are important. Penetrating cervical spine injuries are most commonly caused by gunshots; penetrating trauma with other objects is relatively rare.[1]

Case 1

A 12-year-old boy was injured in the neck by a javelin while playing. The javelin was removed immediately, and he was sent to a local hospital where the wound was debrided and sutured. The child was referred 8 days after injury to our center. On examination, there was a sutured laceration in the posterior cervical region. He had spasticity in all four limbs, power 4/5 in both upper limbs with moderate grip weakness in right hand. Lower limb power was 3/5 on right and 5/5 on left side. Bilateral triceps reflexes were absent, and all reflexes in lower limbs were exaggerated with upgoing plantars and absent abdominal reflex. He had 50% sensory loss to all modalities up to T8 level. Computed tomography (CT) of the cervical spine revealed a C6 lamina fracture on the right side with bone fragments in the spinal canal (►**Fig. 1A, B**). Magnetic resonance imaging (MRI) showed a cord contusion at C6 level (►**Fig. 1C, D**). The patient's C6 vertebra was operated by right-sided hemilaminectomy of the C6 vertebra with removal of bony fragments impinging on the cord and foreign bodies in the form of hair, and dust in the subcutaneous tissue was done. There was no dural rent. Antibiotics (injection ceftriaxone 100 mg/kg/d q12h and injection amikacin 15 mg/kg/d q12h) were given for 1 week till the time of suture removal after surgery. Steroids were not used intra- or postoperatively. Postoperatively, the patient showed improvement in the motor response from 3/5 to 4+/5 in the right lower limb and he could walk with support (►**Fig. 1E** and **F**). There was improvement in the right hand grip up to 80%.

Case 2

A 42-year-old man (►**Fig. 2A**) had history of assault by an ice pick on left side of the neck. Following incidence the patient was not able to move his left-sided upper and lower limbs. On examination, there was small puncture wound of size 4 mm on left lateral side of the neck (►**Fig. 2B**). There was no active bleed or discharge; localized tenderness was present. On examination, tone was increased on left upper and lower limbs. Power was 0/5 across all joints in the left lower limb and upper limb, and power was 4+/5 across all joints in the right upper limb and lower limb. Deep tendon reflexes were exaggerated. Plantar reflex was extensor bilaterally. Sensory loss was present to touch and pain up to T8 level.

X-ray and CT of the cervical spine were normal. MRI of the cervical spine was done, which was suggestive of cord contusion at C3 level (►**Fig. 2C, D**). The patient was managed conservatively. Entry site did not show any signs of infection at presentation and also during the period of hospital stay. Only antibiotics were administered for 7 days (injection ceftriaxone 100 mg/kg/d IV q12h and injection amikacin 15 mg/kg/d IV q12h), and no wound debridement was deemed necessary. Steroids were not given. There was improvement in the power, 5/5 across all joints in right upper and lower limbs, and it was 2/5 across shoulder, 3/5 across elbow, and 3/5 across all joints in lower limbs.

Most of the penetrating spinal injuries consist of gunshot injuries. Cervicothoracic spinal involvement is most common. Penetrating cervical injuries with other objects are relatively rare[1] and are usually associated with assault. These injuries are mostly reported in younger men, and the weapon is typically knife (incidence: 72–84%).[2] Penetrating injuries with other objects are even rarer. In the largest series from South Africa, assault with axes, screwdriver, bicycle, spokes, garden forks, sickles, and sharpened broomsticks have been reported.[2] Assailants typically aim for the neck or chest, and the cervicothoracic region is within the natural sweep of attacker's arm. Laterally directed horizontal stab can cause complete transaction of the cord as can pass between the two vertebrae, but stab from behind usually produces incomplete cord damage.[3] Immediate damage is caused by primary neural injury, vascular injury, injury caused by in-driven foreign bodies, and bone fragments. Secondary damage may be caused by retained weapon, infection, edema, and cerebrospinal fluid (CSF) leak. According to literature, prophylactic

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Fig. 1 (**A**) Axial CT of the cervical spine showing C6 lamina fracture right side with canal compromise. (**B**) Sagittal CT cervical spine showing C6 lamina fracture with bone fragments in spinal canal. (**C**) Axial T2WI MRI showing fractured bone fragment impinging on thecal sac at C6 with cord contusion. (**D**) Sagittal T2WI MRI showing fractured bone fragment impinging on thecal sac at C6 with cord contusion. (**E**) Close view of surgical wound postoperatively. (**F**) Patient regained significant power postoperatively and could walk with support. MRI, magnetic resonance imaging.

antibiotics should be given, but the duration to which they should be continued is controversial. The agent should be chosen depending on antibiotic policy in each institution, site of injury, associated viscous perforation (lungs, bowel, etc.), and degree of contamination by the penetrating object. Viscous injuries are more associated with lumbar or thoracic region penetrating trauma. These may require more extensive management such as thorough peritoneal lavage, wound debridement, diverting colostomies, etc. In such cases, antibiotic coverage may be indicated for a prolonged period of time.[4] The duration of antibiotics extended for a period of 7 to 14 days reduces rate of infection as compared with 48 to 72 hours.[5]

Heary et al[6] advocated that steroids do not offer any significant advantage in penetrating injuries to the spine and thus must be avoided. The risk of immune compromise and subsequent infection is much higher than any other expected benefit.

Indications for surgery include progressive neurodeficit, CSF leak, radiologic evidence of neural compression by retained foreign body, bone fragment, or soft tissue. Thakur et al treated 81% of nonmissile penetrating spinal injuries cases by doing surgical exploration with dural repair and removal of foreign body or simple exploration and irrigation.[7] However, others report no difference in outcome following surgical management in patients with complete or incomplete spinal injury.[8] Karlins et al have shown improvement in patients even with delayed intervention.[9]

Gold standard procedure includes surgical decompression with laminectomy, removal of the foreign object in the original trajectory path, and repair of the dural tear. We conclude that nonmissile penetrating spinal injuries are a rare cause of penetrating cervical cord injuries. In properly selected patients, surgery can offer good neurologic outcome even in delayed cases.

Conflict of Interest

None.

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Fig. 2 (**A**) Profile photo of the patient. (**B**) Close view of puncture wound site on left side of neck. (**C**) Axial T2WI MRI s/o cord contusion at C3 level. (**D**) Sagittal T2WI MRI showing cord contusion at C3 level. MRI, magnetic resonance imaging.

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