Spinal cord injury caused by stab wounds after a penetrating trauma: About 2 cases

Hana Kessentini[1], Rim Karray[1], Fedi Ben Ali1, Haifa Snoussi[2], Marwa Bellakhal[1], Olfa Chakroun[1], Noureddine Rekik[1]

1. Emergency Department Habib Bourguiba University Hospital Sfax, Tunisia

2. Emergency Department, Regional Hospital Mahres, Sfax,Tunisia

Abstract

Background: Penetrating spinal cord injury caused by stab wounds is rare but represents a distinct clinical entity within traumatic spinal cord injuries. Non-missile penetrating injuries account for a small proportion of spinal trauma, most often occurring in the context of interpersonal violence. Their management remains challenging due to limited clinician experience and the absence of clear treatment guidelines. In addition to immediate neural damage, these injuries may result in delayed complications such as infection, cerebrospinal fluid leakage, and chronic neuropathic pain.

Case presentation: We report two cases of cervical spinal cord injury caused by stab wounds without associated vertebral fracture or dislocation.

The first patient, a 50-year-old woman, presented with complete tetraplegia following a cervical stab wound. Imaging showed a transverse spinal cord contusion with hemorrhagic edema at C4. Despite conservative management including immobilization, prophylaxis, and corticosteroid therapy, neurological status remained unchanged at three months.

The second patient, her daughter, sustained a lateral cervical stab wound and presented with right hemiparesis. MRI demonstrated an incomplete spinal cord transection at C5–C6. She was treated conservatively with corticosteroids and rehabilitation, resulting in slight neurological improvement at three-month follow-up.

Conclusion: Spinal cord injury caused by stab wounds is uncommon but potentially devastating. MRI plays a central role in diagnosis and prognostic evaluation. In the absence of compressive lesions or foreign bodies, conservative management with close neurological monitoring remains an appropriate strategy.

Key words : Penetrating trauma - spinal cord injury – MRI – Conservative treatment

INTRODUCTION

Spinal Cord Injury caused by stab Wounds (SCIW) is rare. It represent an uncommon cause of traumatic spinal cord injury. Nevertheless, they constitute a distinct clinical entity and rank as the third leading cause of open spinal cord trauma, after gunshot wounds and injuries related to road traffic accidents (1).

These rare injuries present a significant clinical challenge due to the limited experience of clinicians and the absence of specific management guidelines. In addition to direct tissue damage, spinal cord injuries caused by stab wounds can lead to delayed complications, including infection, cerebrospinal fluid leakage, and chronic pain(2).

In this context, we report the cases of two patients admitted for spinal cord trauma secondary to vertebro-spinal penetrating injuries that were not associated with vertebral fractures or dislocation.

Case 1

A 50-year-old woman with no significant past medical history was admitted to the emergency department following a stab wound assault inflicted by her son.

The initial assessment following the ABCDE approach revealed a patent airway. Respiratory rate was 16 breaths per minute, with symmetrical chest expansion, normal lung auscultation, and an oxygen saturation of 98% on room air. Hemodynamically, the patient was stable, with a blood pressure of 120/70 mmHg and a heart rate of 80 bpm, and no peripheral signs of shock.

Neurologically, the patient was conscious, cooperative, and had a Glasgow Coma Scale score of 15/15. Examination revealed complete tetraplegia associated with absent anal tone on digital rectal examination. Deep tendon reflexes were absent in both the upper and lower limbs (patellar and Achilles reflexes) with a sensory level at C4. The remainder of the physical examination identified two linear wounds with minimal oozing: one measuring 3 cm located on the posterolateral aspect of the neck, and another measuring 2 cm on the scalp. No other impact sites were found.

Initial management consisted of strict cervical spine immobilization with a rigid cervical collar, meticulous wound closure, and appropriate prophylactic measures, including antibiotics, tetanus immunization, and passive tetanus antitoxin administration. A whole-body CT scan performed 3 hours after admission did not reveal any additional traumatic lesions, except for soft-tissue infiltration along the wound trajectory.

Repeated neurological examinations performed over time by different clinicians confirmed the persistence of a complete spinal cord syndrome, unchanged from the initial findings. A cervical MRI demonstrated

a linear transverse spinal cord contusion with hemorrhagic edema at the level of the C4 vertebral body, without associated vertebral fracture or dislocation. (Figure1).

At three months of follow-up, the patient's clinical condition remained unchanged, with continued tetraplegia.

Figure 1: *(a) Sagittal section of spinal cord MRI (b) Transversal section of spinal cord MRI*

Orange arrow: linear transverse spinal cord contusion with hemorrhagic edema at the level of the C4 vertebral body

Case 2

The daughter of the same patient was also a victim in the same assault, sustaining multiple scalp lacerations and a small punctiform wound to the left lateral cervical region.

On admission, the ABCDE assessment confirmed a patent airway. She was breathing at 18 breaths per minute with symmetrical chest expansion, normal lung sounds, and an SpO_2 of 97% on room air. Hemodynamics were stable. Neurological assessment yielded a GCS of 15/15, with weakness of the right hemibody. Anal sphincter tone was normal on rectal exam. Wound management and suturing were completed. CT scans of the brain and cervical spine were unremarkable

Subsequent cervical spine MRI demonstrated an incomplete transection of the spinal cord at the C5–C6 level, predominantly on the left side. The only plausible explanation for this lesion was direct penetration of the spinal cord by the knife without associated vascular or osseous injury.

A multidisciplinary team decision, in collaboration with neurosurgeons, opted for conservative treatment. High-dose corticosteroid therapy with methylprednisolone was indicated following the same protocol as the first patient. The patient was then transferred to the neurosurgery department.

At three months, follow-up revealed a slight improvement in the right hemiparesis with physiotherapy.

DISCUSSION

Spinal cord injury caused by stab wounds (SCISW) represents one of the rarest causes of traumatic spinal cord injury. (3) (4). It results from a partial or complete transection of the cord(5).

Stab wounds are generally inflicted in the setting of assault and produce a sharp, pointed pathway of damage(6). Injury can be both immediate from the direct trauma of the penetrating object and delayed, as can occur with infection, spinal fluid leak, and chronic pain.

In the emergency department, the initial evaluation of patients is performed according to a systematic, well-codified approach developed by Advanced Trauma Life Support (ATLS) (7).

In the absence of neurological deficits, CT imaging is used to evaluate bony structures, delineate the trajectory of the stab wound, and detect the presence of pneumocephalus (8). Spinal MRI remains the only imaging modality capable of accurately identifying spinal cord lesions and evaluating disc-ligamentous integrity(9). This exam played a crucial role in ensuring diagnostic accuracy in our two patients.

Considerable controversy persists regarding the neurosurgical management of patients with penetrating spinal injuries(9). There is no clear consensus on the indications for urgent surgical intervention within the first few hours. In general, surgery is recommended only in cases of neural compression caused by a bone fragment, retained foreign body (such as a blade fragment), or hematoma, as well as in the presence of persistent cerebrospinal fluid leakage. It consists of a laminectomy, followed by the removal of devitalized tissue and compressive elements, and concludes with an airtight closure of the dura mater (10) (11).

The role of high-dose corticosteroid therapy is highly debatable, although the NASCIS study shows that the use of methylprednisolone in humans is beneficial in combating the various mechanisms leading to spinal cord ischemia. However, the impact of management on long-term neurological outcomes remains uncertain (9) (12).

Both patients were managed conservatively with high-dose intravenous corticosteroid therapy. At three months of follow-up, the clinical course remained largely unchanged, with persistent paraplegia in the first patient, while the second patient showed slight improvement, marked by partial regression of right-sided hemiparesis.

CONCLUSION

Direct stabbing injuries rarely lead to complete transection of the spinal cord, as in our first case. Computed tomography (CT) scans, or plain radiographs, are necessary to exclude retained foreign bodies. MRI, as a further imaging tool,

can confirm the Spinal cord injury and may be useful as a predictor of outcomes. Regarding optimal management, conservative treatment should be preferred over surgical intervention in the absence of a foreign body at the injury site.

REFERENCES

1.Naja A, Tahrir Y, Laidi A, Jamal O, Edderaz L, Saidy J. Les plaies vertébro-médullaires par arme blanche : à propos de 13 cas. Neurochirurgie [Internet]. 1 avr 2019 [cité 3 févr 2026];65(2):129. Disponible sur: https://www.sciencedirect.com/science/article/pii/S002837701930102X

2.Szymoniuk M, Kochański M, Dryla A, Kamieniak P. Stabbing injury of the spinal cord: A case report and systematic literature review. Clinical Neurology and Neurosurgery [Internet]. 1 déc 2024 [cité 13 févr 2026];247:108629. Disponible sur: https://www.sciencedirect.com/science/article/pii/S030384672400516X

3.Szymoniuk M, Kochański M, Dryla A, Kamieniak P. Stabbing injury of the spinal cord: A case report and systematic literature review. Clin Neurol Neurosurg. déc 2024;247:108629.

4. Kamaoui I, Maaroufi M, Benzagmout M, Sqalli Houssaini N, Boujraf S, Tizniti S. MRI findings in spinal cord penetrating injury: three case reports. J Neuroradiol. 2007 Oct;34(4):276-9. Disponible sur: https://www.sciencedirect.com/science/article/abs/pii/S0150986107002520

5.McCaughey EJ, Purcell M, Barnett SC, Allan DB. Spinal Cord Injury Caused by Stab Wounds: Incidence, Natural History, and Relevance for Future Research. J Neurotrauma. 1 août 2016;33(15):1416-21.

6.de Cayenne S. Plaies par arme blanche. 2010;

7.Kool DR, Blickman JG. Advanced Trauma Life Support®. ABCDE from a radiological point of view. Emerg Radiol [Internet]. juill 2007 [cité 18 févr 2026];14(3):135-41. Disponible sur: https://pmc.ncbi.nlm.nih.gov/articles/PMC1914302/

8.Sqalli Houssaini N, Maaroufi M, Kamaoui I, Hamdi D, Lamhadri M, Tizniti S. NR63 Apport de l'imagerie dans les plaies vertebro-medullaires. A propos de 4 cas. Journal de Radiologie [Internet]. 1 oct 2005 [cité 13 févr 2026];86(10):1518. Disponible sur: https://www.sciencedirect.com/science/article/pii/S0221036305761187

9.Assoumane II, Dossou MW, Amadou Moussa AW, Lawson LD, Agada KN, Hamma OI, et al. Dorsal vertebro-medullary stab wound: Two cases from Niamey National Hospital and review of literature. Interdisciplinary Neurosurgery [Internet]. 1 déc 2023 [cité 10 févr 2026];34:101828. Disponible sur: https://www.sciencedirect.com/science/article/pii/S2214751923001111

10.Smith C, White JB. Penetrating knife injuries to the spine: Management considerations and literature review. Interdisciplinary Neurosurgery [Internet]. 1 mars 2014 [cité 10 févr 2026];1(1):3-4. Disponible sur: https://www.sciencedirect.com/science/article/pii/S2214751914000024

11.Dran G, Fontaine D, Litrico S, Grellier P, Paquis P. Plaie médullaire cervicale par arme blanche: Présentation de deux cas. Neurochirurgie [Internet]. 1 nov 2005 [cité 10 févr 2026];51(5):476-80. Disponible sur: https://www.sciencedirect.com/science/article/pii/S0028377005835064

12.Neurosurgical management of penetrating spinal injury. - Abstract - Europe PMC [Internet]. [cité 12 févr 2026]. Disponible sur: https://europepmc.org/article/med/9122834