

Management of gunshot wounds to the spine at Parakou University Teaching Hospital In Benin Republics

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Abstract

Objective: Describe the clinical features and bullet removal in gunshot wound (GSW) to the spine.

Patients and methods: From 2015 to 2021 we present Case series of consecutive five cases of GSW with spinal cord injury treated at a single center of parakou university neurosurgery department.

Results: Patient ages ranged from 16 to 40 yr (mean: 27.4 yr). All the patients were male. Three had complete thoracic spinal cord injury (ASIA A), two had lumbar level injury with cauda equina syndrome in one case. Surgical and rehabilitation management, as well as the outcome, of a patient who with sustained spinal cord injury from a high velocity gunshot wound to the thoracic spine. Decompression and bullet removal were performed using an open surgery. The patient with thoracic spinal cord lesion associated with extended injuries related to bullet fragmentation have a poor prognosis. The patients with incomplete injuries had a good follow-up and neurologic recovery. There were no postoperative wound infections, cerebrospinal fluid (CSF) fistulas, or other complications related to the procedure.

Conclusion: Surgical decompression and bullet removal is a safe technique that may help reduce the risk of postoperative infections and CSF fistulas in patients with GSW to the thoracic and lumbar spine.

Objective

Gunshot wound (GSW) to spine although rare, are on the rise in our environment nowadays. A bullet presence in the narrow space such as subdural space intra canal without causing neurological injuries is a rare situation and surgical management of these patients might be controversial. But, when neurological deficit occurred to GSW, surgery represent the solution to cure the spinal cord injury. The authors present their experience of

management of GSW in there environnement about fives cases with the report of surgical technique.

Cases description

Case 1

A 25 year-old man was admitted to our department after a hold up with paraplegia following GSW. The clinical examination concluded to ASIA (American Spinal Injury Association) score A. A thoracic X-ray showed

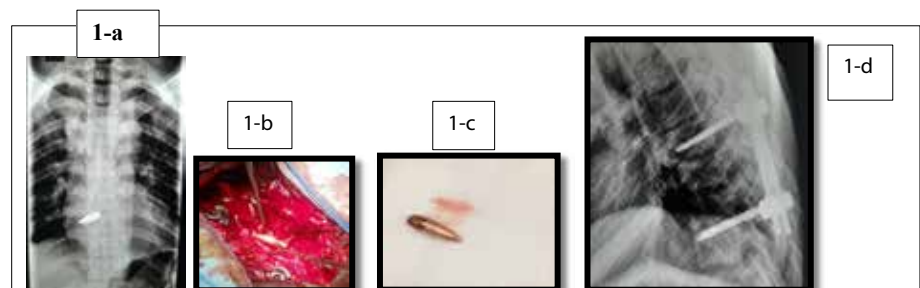


Figure 1. (1-a) : Thoracic X-ray showing the bullet at T7T8 interface; per operative view with the bullet after laminectomy (1-b) and removal of the bullet (1-c). Post operative x-ray showing the stabilization by screws and rods (1-d).

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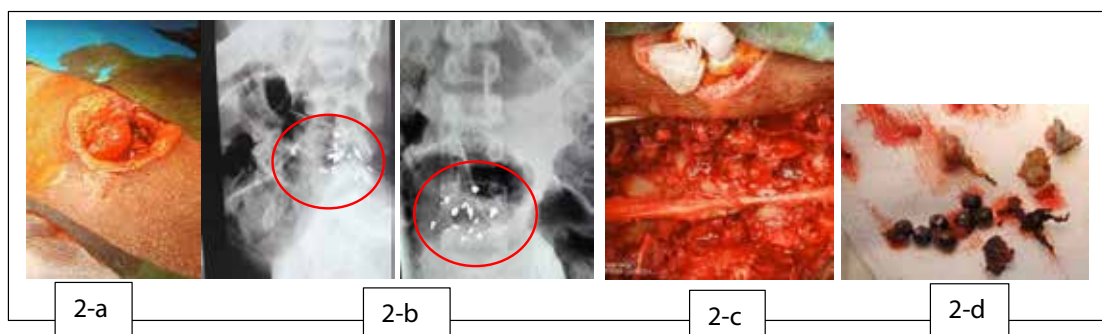


Figure 2. (2-a) : entry gunshot wound ; lumbar X-ray showing multiple bullets at L4L5 levels (2-b). intra operative view (2-c) and the bullets removal (2-d).

a bullet located in the spinal canal at the level T7-T8 (Figure 1-a). A posterior approach to T6/T8 level with laminectomy of T7 and T8 was performed after positioning the patient in a prone position. The dural sac was exposed and the bullet was located with fluoroscopy and removed (Figures 1-b and 1-c) with spine stabilisation by screws and rods (1-d). After the surgery, the hypoesthesia improved with motor palsy also and no additional neurological damage was detected. The patient underwent physiotherapy received antibiotic prophylaxis after surgery. Sensitivo motor deficit and paresthesia were resolved completely after 3 months.

Case 2

A 16 -year-old patient was referred to our center after suffering from hunting accident. The patient has a past history of lumbar spine trauma. After initial exploration, the entry wound could be detected at the level of L4-L5, 10 cm from midline (Figure 2-a) and at neurological examination, the only impairment found on reception of the patient was hypoesthesia at the perianal area; sphincter function is normal and muscle weakness was detected with score ASIA D. He presented cerebrospinal fluid (CSF) fistula from the skin wound. The X ray showed a multiple bullets at the levels L4 and L5 inside the spinal canal (Figure 2-b). The only damage to the posterior arc compatible with an entry hole

for the bullets were seen at the posterior arc of L5 level (Figure 2-c) and dura tear was closed during the surgical procedure and all the bullet seen were removed with fluoroscopy control (Figure 2-d). The post operative outcome was favourable with neurological recovery in two months.

Case 3

A 22 year old man, with no past history, victim of armed robbery who suffered two close range GSW fired by a handgun, one to the left leg and one to chest with paraplegia and nonspecific dysesthesias. There is no side to side differences on pain and temperature sensation. No evidence of head trauma was noticed on physical examination. Anal sphincter tone was present as well as sensation. A detailed motor and sensory score according to ASIA is A. Diagnosis of spinal cord injury was made. CT scan of the thorax showed T6 spinous process and pedicle fracture, T5 and T6 posterior arc comminuted fracture and posterior paraspinous muscle hemorrhage with evidence of intra canal stenosis by bullet. Multiples bullets were positioned within the spinal canal at the thoracic 5/6 interspace (Figure 3). He underwent surgical procedure with T5-T6-T7 laminectomy, ablation of bullets and osteosynthesis of the level T4 to T7. He was put under pain medication and rehabilitation. Six months after, there were no neurological improvement.

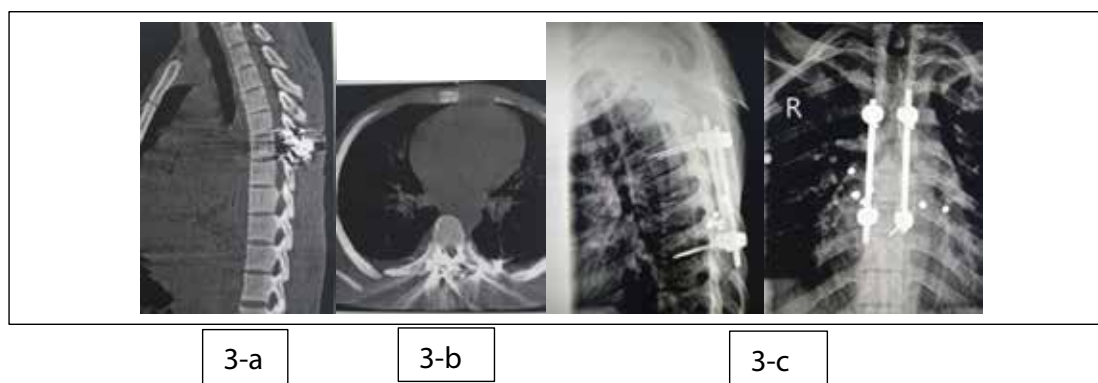


Figure 3. Thoracic CT scan showing multiple bullets at T5T6 interface 3-a with on the axial view multiple lesion on spinous process, posterior arc, pedicle of T6 (3-b); post operative X-ray showing after laminectomy and removal of the intra canal bullet (Figure 3-c) and the stabilization by screws and rods.

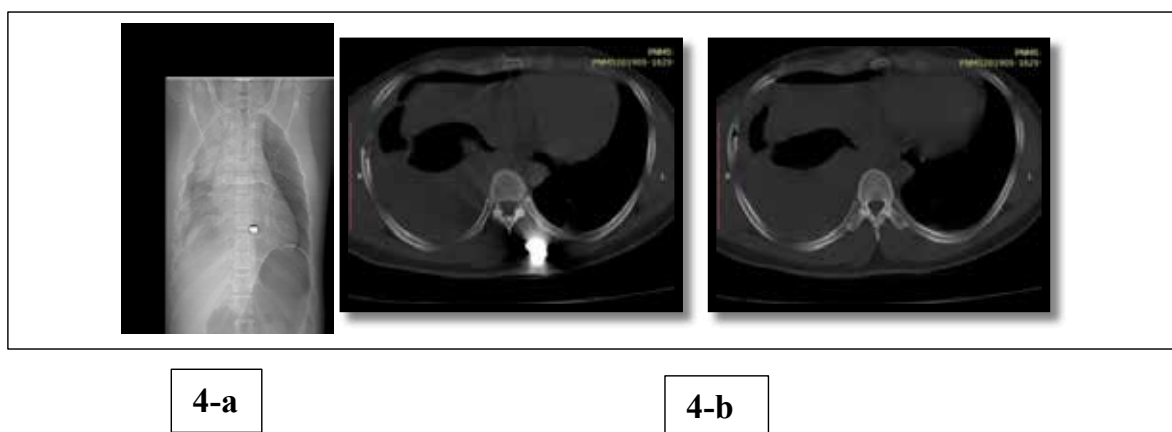


Figure 4. Thoracic X-ray showing the bullet at T8T9 interface 4-a; on axial CT scan view the bullet crossed the thorax and lodge in the paravertebral muscles on T8 (4-b) with hemopneumothorax.

Case 4

A 34-year-old, male patient became paraplegic after a GSW to the thoracic spine. The injury occurred when he went under fire during a shooting rampage and the bullet went through the thorax to the victim's back. He presented a clinical polytrauma findings with hemodynamic instability that resulted in a vertebral medullary wound and a large hemopneumothorax. The CT scan showed a right diaphragmatic rupture, large hemopneumothorax (Figure 4-b) and the bullet at T8T9 interface (Figure 4-a). He went intensity care unit for resuscitation due to his traumatic injuries and findings. 48 hours after admission to intensive care, he suffered a sudden alteration of consciousness and he die despite thoracic drainage and hemodynamic compensation. His spinal injury was managed nonoperatively due to his hemodynamic status.

Case 5

A 40-year-old man was admitted in emergency for GSW to the lumbar spine. The hole of the bullet in the spinal canal was detected approximately on the midline at the level of L5. No CSF leakage was evident. The patient complained about headache, and bladder dysfunction such as urinary incontinence, but no

fever. The neurological exploration revealed hypoesthesia at the perianal area and moderate weakness, nonspecific dysesthesias in bilateral legs compatible with neurological incomplete caudal equina syndrome. A lumbar X-ray (Figure 5-a) and CT scan of spine showed a bullet located in the spinal canal at the level of S1-S2 but no damage to the posterior arc could be visualized at this level (Figure 5-b). He underwent surgical procedure. After laminectomy and observing the bullet through the transparent dura a durotomy was done to expose the intrathecal bullet, which was removed (5-c). The dura was sutured watertightly with 4-0 nylon. Post operative period was favourable with no CSF leakage, no fever. The hypoesthesia improved and no additional neurological damage was detected.

Discussion

TWe present five consecutive cases of GSW to spine with intrathecal localization and migration of a bullet causing neurological damage. The scan reconstruction showed the position of the bullet. When the patient presented a neurological deficit, surgical procedure is the solution to solve spinal cord injury by laminectomy and bullet removal [1]. Actually, there is no specific protocol available for treatment decision in gunshot

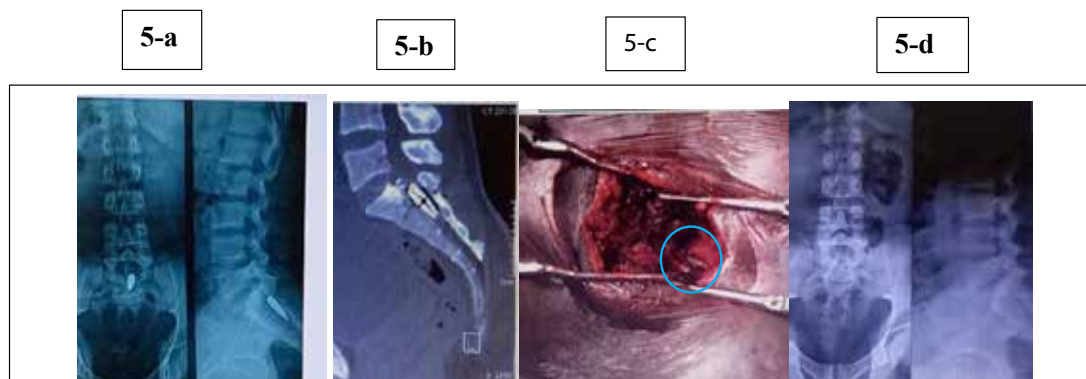


Figure 5. lumbar X-ray showing the bullet at S1S2 interface 5-a confirm by the CT scan 5-b ; per operative view with the bullet after laminectomy (5-c). Post operative control x-ray (5-d).

spinal cord injuries, like in blunt and penetrating chest and abdominal trauma [2].

Several studies have shown that patients do not benefit from the use of steroids in penetrating wounds to the spinal canal and in this case they were not used either [1,3,4]. Surgical treatment should be individualized and during the decision finding process for surgery several facts have to be taken into account such as neurological damage, bullet location, spinal stability, associated injuries, and hemodynamic stability. We found controversy about decompression surgery in complete and incomplete gunshot spinal cord injuries, as in spinal cord injuries due to other causes [2,5]. The migration of intradurally located bullet has been described in literature before [2, 5-8]. In most cases the migration has been following gravity and away from the medullary cone to the lowest place in the spinal canal at the lumbosacral area where the spinal canal is narrowing and trapping the bullet at this location [8-10].

Conclusion

The presence of a migratory bullet in the spinal canal is an indication of surgery, to avoid the possibility of delayed neurological symptoms. Bullet removal by open surgery do not occurred no additional damage like CSF leakage or infections. Post operative period with physiotherapy was favourable with neurological recovery.

Conflict of interests

The authors report no actual or potential conflict of interests in relation to this paper.

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