



Case Report

Bullet retrieval from the cauda equina after penetrating spinal injury: A case report and review of the literature

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ABSTRACT

Background: When gunshot injuries occur to the spine, bullet fragments may be retained within the spinal canal. Indications for bullet removal include incomplete spinal cord injury, progressive loss of neurologic function including injury to the cauda equina, and dural leaks with impending risk of meningitis.

Case Description: Here, we present a 34-year-old male with a missile penetrating spinal injury to the cauda equina. In addition to the computed tomography scan demonstrating retention of a bullet in the left L1/2 disc space, the scan suggested likely dural injury. The patient underwent a decompression/instrumented fusion with retrieval of the retained bullet fragment. A laminectomy was performed from T12 to L3, and at L1 and L2, a large traumatic durotomy was identified and repaired. The patient, unfortunately, continued to have bilateral lower extremity plegia with neurogenic bladder/bowel dysfunction at 1-year follow-up.

Conclusion: We discuss the operative management and provide an intraoperative video showing the bullet extraction and dural closure.

Keywords: Bullet retrieval, Cauda equina, Missile penetrating spinal injury, Neurosurgery, Spine

INTRODUCTION

There continues to be an increase in missile penetrating spinal injuries (MPSIs) resulting from the discharge of firearms.^[5] While aggressive surgical management can result in increased neurologic dysfunction, in some cases, it is beneficial.^[5]

Here, we report a case involving a 34-year-old male who sustained multiple gunshot wounds, including an MPSI to the cauda equina. The clinical, radiological, and surgical management of this patient are presented, along with the intraoperative video and literature review.

CASE DESCRIPTION

A 34-year-old male presented following multiple gunshot wounds to his abdomen, left flank, right shoulder, and L1-L2 spine resulting in a T12 complete paraplegia (ASIA A).

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Computed tomography (CT) of the abdomen/pelvis and general surgical intervention

Abdominal/pelvic CT studies showed intra-abdominal injuries/hemorrhages, which immediately required an exploratory laparotomy for bowel resection and evacuation of a retroperitoneal hematoma.

CT of the lumbar spine

The CT scan of the lumbar spine revealed a bullet lodged in the left L1/2 disc space/spinal canal resulting in severe cauda equina compression, destruction of the left L2 pedicle, and destruction of the left L1/2 facet joint [Figure 1]. There was also air within the spinal canal, reflecting a likely dural injury.

Neurosurgical intervention

When the T12 to L3 laminectomy was performed, the bullet was found lodged in the L1/2 disc space and the left L2 pedicle was destroyed. Utilizing a rough diamond burr, the retained bullet fragment was removed and the cauda equina was decompressed [Figure 2]. At L1 and L2, a large traumatic

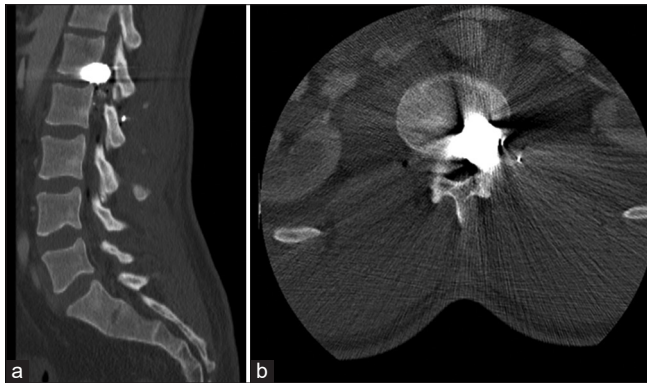


Figure 1: Lateral (a) and axial (b) images from preoperative computed tomography scan showing the retained bullet and compression of thecal sac. Air can be seen within the spinal canal secondary to the penetrating injury.

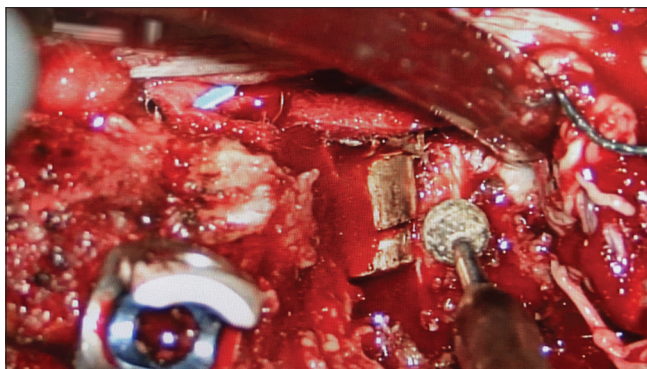


Figure 2: Photograph of surgical removal of bullet from the cauda equina.

durotomy was identified on the left side and repaired using interrupted 4-0 Nurodon® sutures and bolstered with DuraGen® overlay and Adherus® dural sealant. Finally, pedicle screws were placed from T12 to L3, excluding the left L2 pedicle [e.g., Video 1]. The patient, unfortunately, remained paraplegic without sphincter function at 1-year follow-up.

DISCUSSION

Decompression should be considered for any patient with an incomplete neurological injury with associated spinal canal compromise (ideally within 24–48 hours of injury). The main surgical indications for bullet retrieval include progressive clinical deterioration secondary to incomplete injury of cord;^[5] migration of a bullet within the spinal canal,^[4,5] with resultant neurological deficit;^[2] dural leaks leading to impending risk of infection/meningitis;^[5] cauda equina injuries in which retained fragments can contribute to chronic pain syndromes;^[1] and possible copper/lead toxicity.^[5,6] In addition to these indications, Gupta *et al.*^[3] added that surgery should be performed “to achieve reduction in infective complications and spinal stabilization.” Moreover, Kumar *et al.*,^[5] proposed that if a cerebral spinal fluid leak is present, one should not attempt exploration until conservative management alternatives with antibiotic coverage have been exhausted.

Notably, patients with lesions between T12 and L4 experience significantly greater motor recovery after removal of the bullet versus patients with no bullet removal.^[8] Early bullet removal is also endorsed when there is abdominal involvement to avoid septic complications.^[7]

CONCLUSION

Removal of a retained bullet from a penetrating injury to the cauda equina at the L1–L2 level should be considered if there is an incomplete spinal cord injury with progressive neurologic deterioration, migration of the bullet within the spinal canal contributing to an increased deficit, a dural leak, or a significant risk of infection/meningitis.

Declaration of patient consent

Patient’s consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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