

# Migrating bullet in the thecal sac at the level of the conus medullaris without neurological deficit



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## ABSTRACT

Bullets can lodge in the organs, blood vessels or thecal sac. To our knowledge, a migrating bullet at the level of the conus medullaris without neurological deficit has never been reported. We present our patient along with a discussion of bullet migration in the spinal canal and its mechanisms, diagnosis and treatment. A 29-year-old man was admitted to the emergency department due to a gunshot wound in the right upper quadrant of his abdomen. He had no neurological deficit. Spinal CT scan and plain radiography showed the bullet had passed through the L2 vertebral body and had migrated downwards until it had lost its energy and come to rest in the spinal canal at the L3 vertebra level. There was a grade 5 injury to the pancreas head concomitant with mesenteric injury of the transverse colon, harboring a 0.5 cm hole. He had an emergent laparotomy to have a Roux-en-Y reconstruction and repair of the transverse colon. After his general status stabilized, he was taken back to the operating room to extract the bullet from the spinal canal. L3 and partial L2 laminectomy were performed. The dura was opened and the bullet was observed intrathecally. No cerebrospinal fluid fistula was observed. The surgeries and post-operative period were uneventful.

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## 1. Introduction

Bullets dissipate their energy by heat and impact. Sometimes bullets lodge in the organs, blood vessels or the thecal sac [1]. Migration of a bullet in the spinal canal has rarely been described in the literature [1–20]. To our knowledge, a migrating bullet at the level of the conus medullaris without neurological deficit has never been reported. We present our patient along with a discussion of bullet migration in the spinal canal and its mechanisms, diagnosis and treatment.

## 2. Case report

A 29-year-old man was admitted to the emergency department due to a gunshot wound in the right upper quadrant of his abdomen. The bullet had passed through the liver from the junction of segments VII and VIII to the IVb segment. The bullet had entered the spinal canal from the anterior aspect of the spinal column and had lodged there with no exit wound. He had no neurological deficit. Spinal CT scan and plain radiography showed the bullet had passed through the L2 vertebral body and had migrated downwards until it had lost its energy and come to rest in the spinal canal at the L3 vertebra level (Fig. 1).

There was a grade 5 injury of the pancreas head concomitant with mesenteric injury of the transverse colon, harboring a 0.5 cm hole. He underwent an emergent laparotomy for Roux-en-Y reconstruction and repair of the transverse colon. The patient developed atelectasis on the third post-operative day. Respiratory rehabilitation and antibiotics were started immediately. On post-operative day 7 he had a bilious discharge from the abdominal wound. The wound was re-explored, and a hepato-biliary fistula

was noted intra-operatively and repaired accordingly. After his general status stabilized, he was taken back to the operating room for a third time to extract the bullet from the spinal canal. C-arm fluoroscopy was used to localize the bullet once more before skin incision (Fig. 2a). L3 and partial L2 laminectomy were performed. The dura was opened and the bullet was observed intrathecally (Fig. 2b). No cerebrospinal fluid fistula was observed. The surgeries and post-operative period were uneventful.

## 3. Discussion

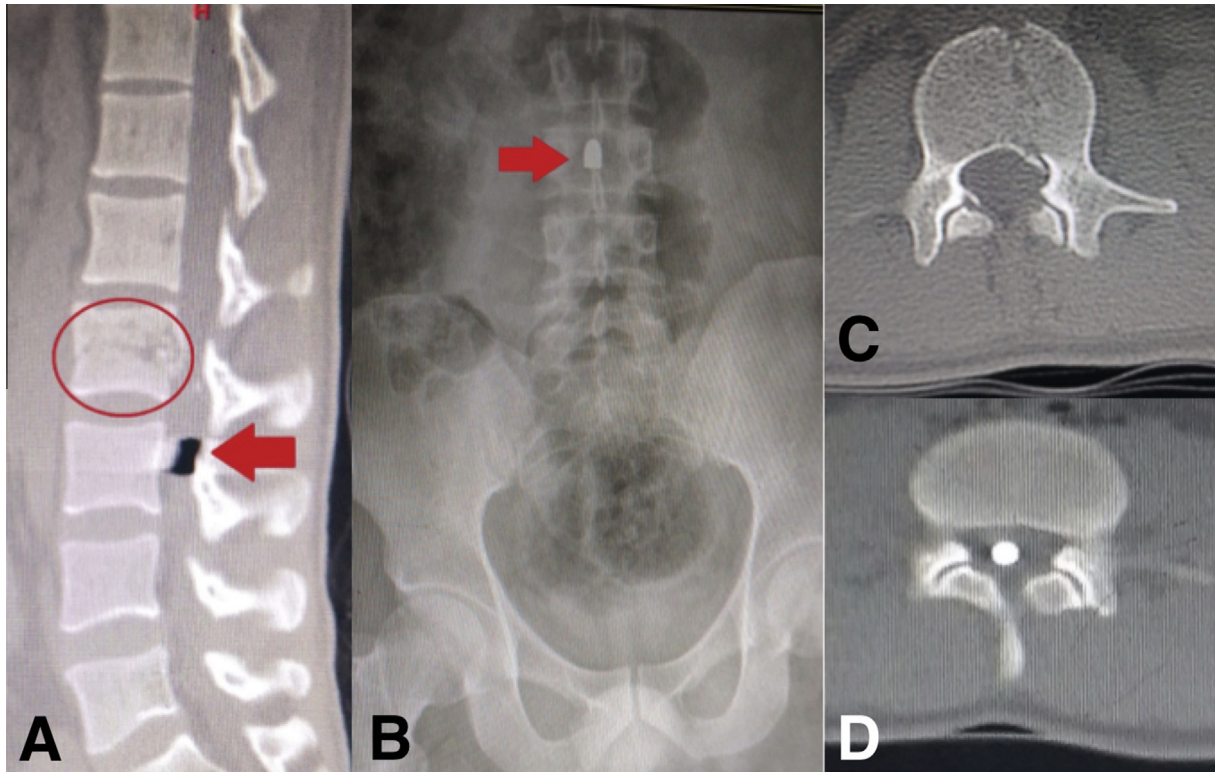
Intradural migration of a bullet was first described by Villandre and Morgan [1,21]. The spinal canal is larger at T10 and below, and narrower above T10. Migration of a bullet is hence easier below the T10 level [22]. Long distance migration of bullets in the spinal canal has been reported [3,4,11]. Driving forces for bullet migration within the spinal canal are gravity, respiration and physiological movement of cerebrospinal fluid [9,12].

The spinal cord and spinal nerve roots may be damaged from the impact itself and the thermal energy and mass effect of the bullet. There are a number of case reports regarding bullet migration in the spinal canal, and most patients displayed neurological symptoms to some degree. Ben-Galim and Reitman [1] presented an asymptomatic patient with bullet migration in the thecal sac from S1 to T12 and from T12 back to S1. The patient experienced some radicular leg pain until spinal surgery was carried out. However our patient had no neurological signs or symptoms even though the bullet was in close proximity to the conus medullaris and his surgery was performed some time after the trauma due to his unstable clinical condition. A close trajectory of the bullet to the spinal canal as seen here could harm the spinal cord and nerve roots, making this patient all the more novel [4].

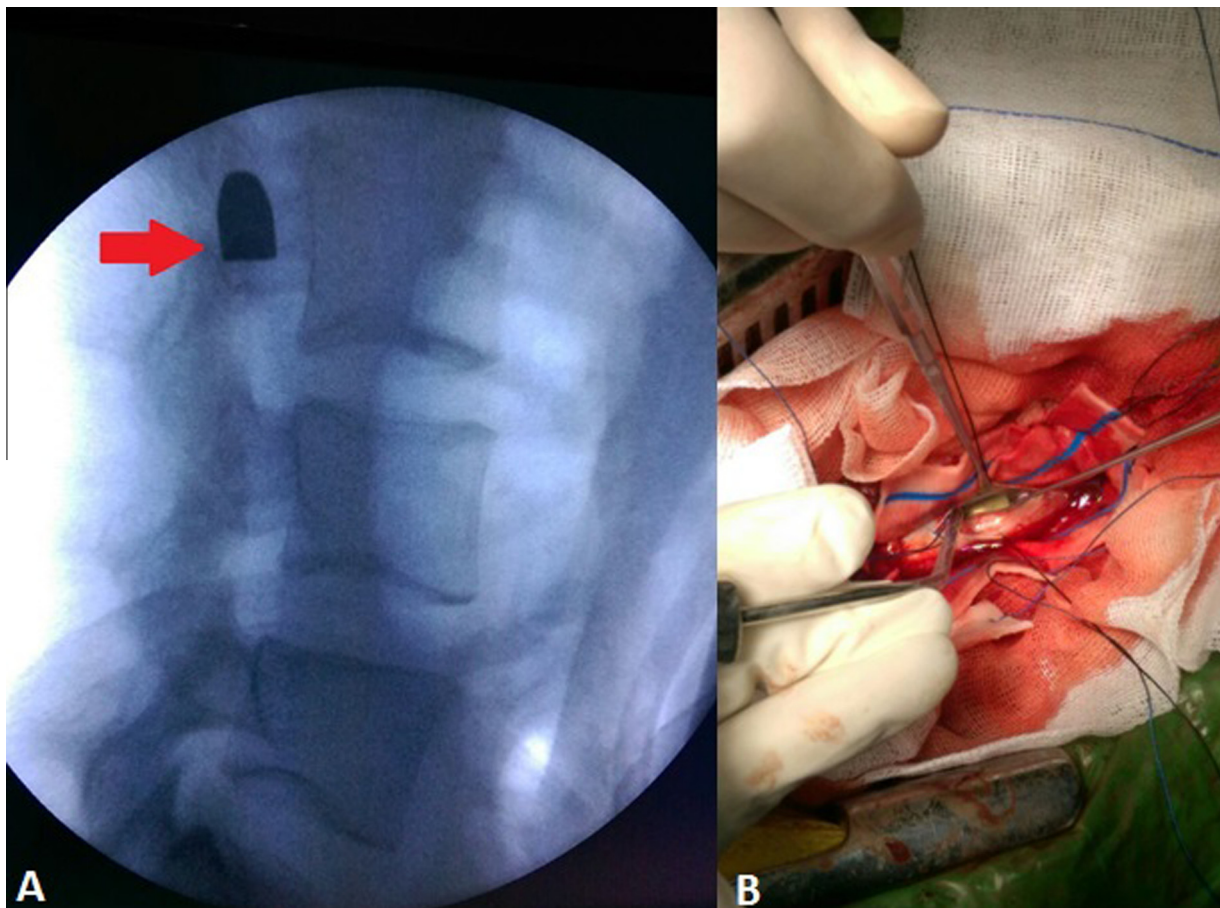
Plain radiographs and CT scans with or without myelography are the two most valuable tools for detecting migrating bullets in the spinal canal [1,16]. The usual pattern of migration is from a

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**Fig. 1.** (A) The bullet entered at the L2 vertebral body (circle) and came to rest in the spinal canal at the L3 vertebral level seen on sagittal CT scan (arrow). (B) On anteroposterior plain radiograph the bullet is seen at the L3 vertebral level (arrow). (C) The entrance site of the bullet is seen at the L2 vertebral body on axial CT scan. (D) The bullet came to rest in the spinal canal at the L3 vertebral level seen on axial CT scan.



**Fig. 2.** (A) The bullet location was confirmed pre-operatively using C-arm fluoroscopy. (B) After opening the dura mater, the bullet was observed intrathecally.

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