

KLINIKINIAI ATVEJAI

The bullet in the dural sac. How to catch it? A report of two cases

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Key words: spine; spine injury; gunshot injury.

Summary. *Objective.* The purpose of this article is to present two cases of penetrating gunshot injuries to the lumbar spine with migration of the bullets within the dural sac and to describe the method of removal of the bullet from the dural sac.

Material and methods. Two cases of penetrating gunshot injuries to the lumbar spine with migration of the bullets within the dural sac are presented. Clinical course, diagnostic tools, and management of two patients who suffered from these injuries are illustrated. The method of removal of the bullet from the dural sac is described too.

Results. The wounds in these two cases healed without infection. The neurological status of our patients improved gradually. Radiographs taken 2 years after the injury did not demonstrate the postoperative instability of the lumbar spine.

Conclusions. The bullet in the dural sac at the level of the cauda equina must be removed. The method proposed by us can facilitate this procedure.

Introduction

The incidence of a spinal cord injury from gunshot wounds in penetrating trauma continues to increase with the violent nature of society (1, 2). The management of this trauma is controversial, and the exact role that surgery plays in these types of injuries is unclear (3–5). One of the indications for surgery is a retained bullet fragment in the spinal canal at the level of the cauda equina (2, 6). The purpose of this article is to present two cases of penetrating gunshot injuries to the lumbar spine with migration of the bullets within the dural sac and to describe the method of removal of the bullet from the dural sac.

Illustrative cases

Case 1. A 38-year-old man (A. A.) sustained a penetrating bullet injury to the right regio infrascapularis. On admission 10 min after the accident, he was still conscious, but hypovolemic shock and signs of the internal bleeding were determined. The entrance wound, 10 mm in diameter, was found on the right regio infrascapularis. Neurological level of the third lumbar segment and C grade of the impairment scale (guidelines established by the American Spinal Injury Association were used) was determined after a neurological exam-

ination (7). The patient underwent emergency laparotomy and right nephrectomy because laceration of the kidney was found. The debridement of the missile track was performed too. Computed tomography scan of the spine showed destruction of the right pedicle of the fourth lumbar vertebra; the bullet was found at the level of the second sacral vertebra (Fig. 1). Twelve hours after the accident, right transversotomy of the fourth lumbar vertebra was performed, and bone fragments were removed from the spinal canal. The dural laceration was not noted intraoperatively, so the spinal canal was not revised at the place of the entrance of the bullet. The bullet was removed too. The wounds healed without infection. Radiographs taken 2 years after the injury did not demonstrate the postoperative instability of the lumbar spine and any signs of vertebral osteomyelitis. The neurological status of the patient 2 years after the injury was defined as grade D according to the American Spinal Injury Association recommendations.

Case 2. A 32-year-old man (K. M.) sustained a penetrating bullet injury to the right regio scapularis. On admission 15 min after the accident, he was conscious, but hypovolemia was determined. The entrance wound, about 10 mm in diameter, was found on the

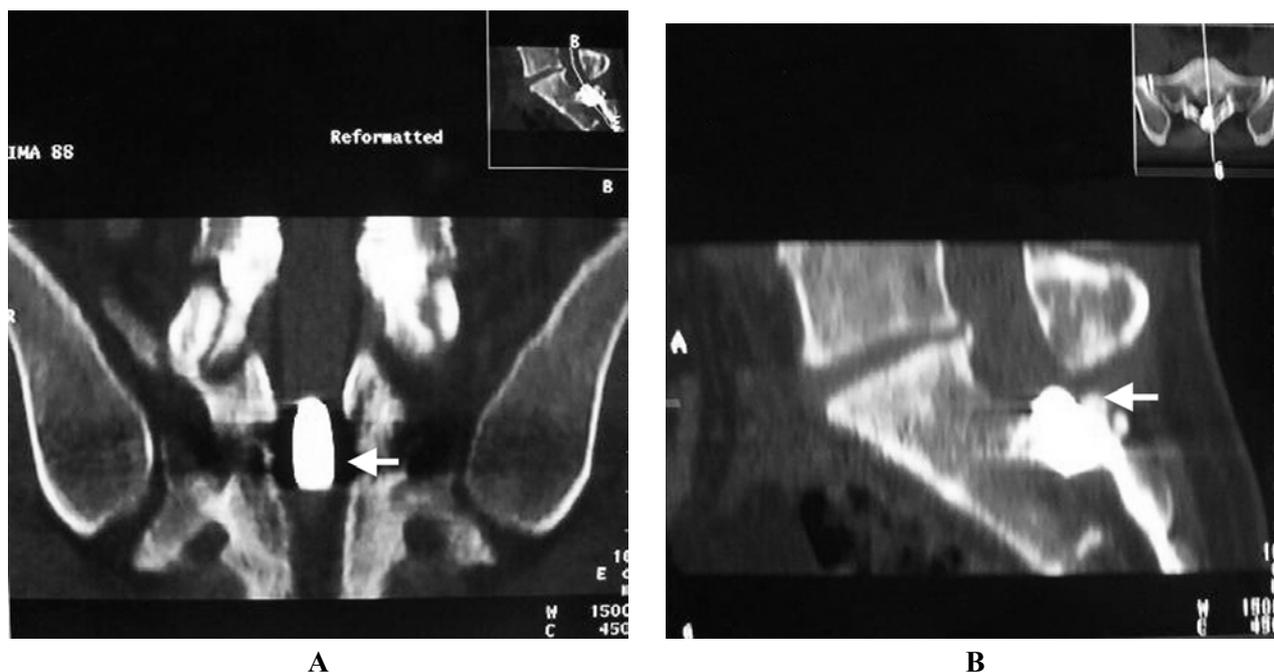


Fig. 1. A–B – CT scans revealed retained bullet in the spinal canal at the level of the second sacral vertebra (arrows)

right regio scapularis. A physical examination revealed paraplegia with a complete loss of sensation to light touch and pinprick below the first lumbar segment. Computed tomography scan of the abdomen showed a superficial damage of the right kidney and revealed destruction of the right pedicle of the first lumbar vertebra; the bullet was found at the level of the third lumbar vertebra (Fig. 2). The patient underwent emergency right lumbotomy, nephrorrhaphy, and diaphragm repair because the diaphragm laceration was found too. The debridement of the missile track was performed too. Twenty-four hours after the accident, right transversectomy was performed at the place of the entrance of the bullet, and bone fragments were removed from the spinal canal. The dural laceration was not noted intraoperatively, so the spinal canal was not revised. The bullet was removed too. The wounds healed without infection. The patient regained sensation to light touch and pinprick 24 hours after the surgery. Radiographs taken 2 years after the injury did not demonstrate the postoperative instability of the lumbar spine and any signs of vertebral osteomyelitis. The neurological status of the patient 2 years after the injury was defined as grade C according to the American Spinal Injury Association recommendations.

Method of removal of the bullet from the dural sac

After general anesthesia had been induced in the patient, he was placed in the prone position. Bolsters were placed longitudinally under the patient's sides.

Fluoroscopy was used to determinate the bullet location in the dural sac. In the first patient, the bullet was revealed at the level of the fourth lumbar vertebra. In the second patient, the bullet was found at the level of the third lumbar vertebra. Midline longitudinal incisions over the spinous processes were made for these patients. Classical laminectomies were attempted to perform at levels of bullets, but fluoroscopes showed that the bullets had a tendency to migrate caudad to its previous places. Classical interlaminectomies were performed one level below to bullets, and curettes were inserted to prevent their migration, and laminectomies were completed. The dural sacs were opened at levels of bullets by midline longitudinal incisions, and foreign bodies were removed (Fig. 3). Patients received antibiotics 7 to 14 days after the surgery.

Discussion

The treatment of patients with gunshot wounds to the spine must be directed by maintaining spinal stability, enhancing any potential for neurological recovery, and preventing complications. Indications for surgery are retained bullet fragments in the spinal canal at the level of the cauda equina and lodged in the spine bullet, which has perforated the alimentary tract (2, 8). The role of removal of the bullet in neurological recovery is controversial (9, 10). Recent data from the study performed by the National Spinal Cord Injury Model Systems indicate that laminectomy and removal of the bullet play no role in the cord level



Fig. 2. A – Sagittal CT scan revealed retained bullet in the spinal canal at the level of the third lumbar vertebra (arrow). B – Axial CT scan revealed destruction of the right pedicle of the first lumbar vertebra at the place of entrance of the bullet to the spinal canal (arrow)

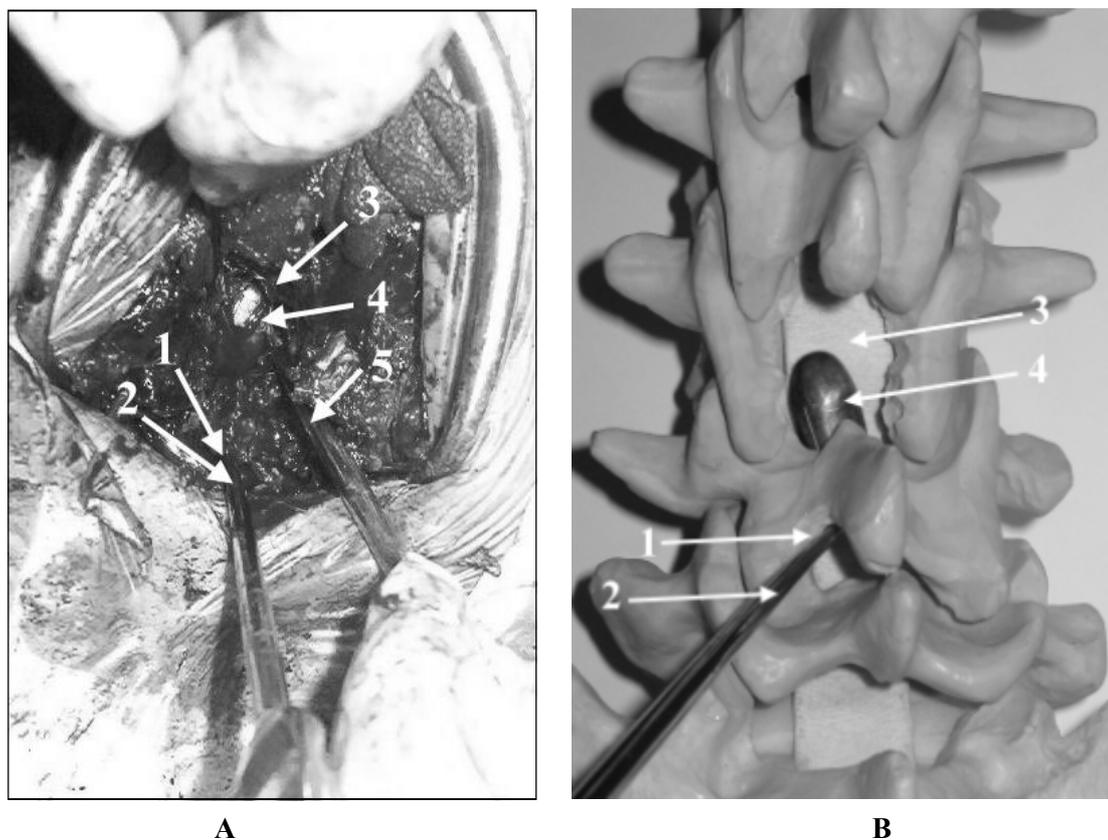


Fig. 3. A (intraoperative photo (case 2)) – B (reconstruction) – Classical interlaminectomy (1) was performed one level below to the bullet, and curette (2) was inserted to prevent its migration. Classical laminectomy (3) at the level of the bullet was performed later. The dural sac was opened and the bullet (4) was removed. 5 – suction system.

lesion, but worthwhile at the level of the conus and caudad to the conus (11). This is thought to be based on the regional anatomy of the spinal cord and the greater susceptibility of the spinal cord to the injury as compared with the spinal nerve roots. It is probable that the root level lesions have a greater clinical improvement after decompression because of the relatively large number of lumbar and sacral roots that can be compressed by a bullet at this level and the

potential for axons to regenerate (9, 11). Clinical and experimental studies have showed that intradural retained bullet fragments may elicit a fibrotic reaction in the pia-arachnoid layer what can cause scar formation and may destroy axons and myelin, and this can be associated with delayed neurological deterioration too (12–14). According to these data, we think that the bullet must be removed from the dural sac and we propose the method that can facilitate this procedure.

Kulka nugaros smegenų kietojo dangalo maiše. Kaip ją išimti? (Du klinikiniai atvejai)

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Raktažodžiai: stuburas, stuburo sužalojimas, šautinis sužalojimas.

Santrauka. Darbo tikslas. Aprašyti du stuburo šautinio sužalojimo atvejus, kai, atlikus tyrimus, kulka rasta kietojo nugaros smegenų dangalo maiše ties arklio uodega. Pateikti autorių sukurtą kulkos išėmimo metodą.

Tyrimo medžiaga ir metodai. Nuodugnai aprašomi du pacientai, kurie patyrė stuburo juosmeninės dalies šautinius sužalojimus, o kulkos rastos kietojo nugaros smegenų dangalo maiše ties arklio uodega. Pateikiamas autorių sukurtas metodas išimant kulka, kuri slankiojo nugaros smegenų kietojo dangalo maiše.

Rezultatai. Abiem pacientams pooperacinės žaizdos sugijo be komplikacijų. Nervų struktūrų pažeidimo laipsnis mažėjo. Atlikus rentgenologinį tyrimą, po traumos praėjus dvejiems metams, stuburo juosmeninės dalies nestabilumo požymių nerasta.

Išvados. Manome, kad kulka, esanti nugaros smegenų kietojo dangalo maiše ties arklio uodega, turi būti pašalinta, o sukurtu metodu tą galima atlikti lengviau.

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