

Neurological Symptoms Secondary to the Intraspinal Migration of a Bullet

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Introduction. This is a very rare case of a bullet wondering into the spinal canal after a dorsolumbar firearm wound; we present the radiological findings and the problems faced at the time of surgery.

Case report. The patient is a 28 year old man who had sustained a firearm wound in the dorsolumbar region two weeks before. He presented with deferred radicular symptoms after the bullet migrated from L5-S1 to S1-S2. The patient was placed in the reverse Trendelenburg position in order to extract the foreign body. Six months after the operation the patient made a full recovery with no signs of neurological damage.

Discussion. The relevant literature of this uncommon condition is reviewed. Given the size of the femoral canal, the transit of the bullet in the subarachnoid space is generally limited to the movement between levels T-10 and S-1, following the laws of gravity depending on the position of the patient. We recommend extraction of a bullet present in the spinal canal, even if no neurological damage is present, if after taking sequential x-rays, the bullet is seen to migrate progressively and the patient starts reporting some radicular symptoms.

Key words: *bullet, medullary canal, secondary neurological symptoms.*

Sintomatología neurológica secundaria a la migración de una bala intrarraquídea

Introducción. Presentamos un caso singular de la migración de una bala dentro del canal raquídeo tras una herida dorsolumbar por arma de fuego, los hallazgos radiológicos y los distintos sucesos ocurridos durante la intervención quirúrgica.

Caso clínico. Varón de 28 años que dos semanas antes había sufrido una herida por arma de fuego en zona dorsolumbar. Presentó radiculopatía tardía tras la migración del proyectil desde L5-S1 a S1-S2. El paciente fue colocado en posición antitrendelenburg para poder realizar la extracción de la bala. Seis meses después de la intervención el paciente se encontraba asintomático sin evidencia de trastornos neurológicos.

Discusión. La movilización de la bala en el espacio subaracnoideo, libre en el líquido cefalorraquídeo, generalmente está limitada a los segmentos entre T10 y S1 por cuestión del tamaño del canal medular. Los proyectiles pueden migrar por efecto de la gravedad según la posición del paciente. Nosotros consideramos la necesidad de extraer un proyectil intracanal, aun sin déficit neurológico, si se objetivaba movilización en diferentes estudios radiográficos o tras la instauración de clínica radicular compresiva, tratándose de una cirugía urgente.

Palabras clave: *bala, canal medular, sintomatología neurológica secundaria.*

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The prevalence of gunshot injuries is increasing, especially in urban areas, to the extent that since 1990 it has become, in American series¹, the second cause of spinal cord injury (25%), surpassing falls from a height. Bullets are usually of intermediate caliber (32-38) and most injuries are the result of shots sustained from the back. As regards the location of the injuries, 20% tend to be sustained in the cer-



Figure 1. The image shows the initial position of the bullet at L5-S1 level.

vical area, 50% in the thoracic area and 30% in the thoracolumbar area¹.

Gunshot injuries to the spine are often associated to significant neurological impairment, surgery being indicated according to most authors when the deficit is progressive or if nervous structures have been compressed^{2,3}.

When there is no neurological impairment, the decision is more controversial and there is scarce literature on the subject. The potentially harmful local effect of the bullet materials trapped in inveterate injuries is not known⁴. The literature is also rather sparse on descriptions of the migration of the bullet in cases like that of our patient.

CASE REPORT

The subject is a 28-year old male who had sustained a shot in the back two weeks before; the bullet's entry-point was the lumbar region, at L1 level, without any further complication. At that moment, the patient had no neurological alteration. X-rays revealed that the bullet was lodged at L5-S1 level, inside the spinal canal. Given this clinical si-

tuation, antibiotic treatment was prescribed and a decision was made not to extract the bullet.

The patient was readmitted with late neurological symptoms. He presented with the following alterations on the left side: dysesthesia in the S1 sensitive territory; motor disorder: muscle strength was 4/5 in the extensor hallucis longus, 3/5 in the triceps surae and 3/5 in the perineal muscles. No alterations were observed in the right lower limb. Achilles reflex was absent on the left side and there was no sphincter involvement.

In the x-rays we observed that the bullet had migrated to the S1-S2 level. Computerized axial tomography confirmed the position of the bullet inside the spinal canal (figs. 1, 2 and 3).

Involvement of the left S1 root was corroborated by means of an electromyographic study.

During surgery, after an L5-S1 laminectomy, intraoperative x-rays were taken which showed the migration of the bullet to more distal segments. After placing the patient in a reverse Trendelenburg position, the bullet was located in an intradural position and duly extracted.

At 6 months from surgery, the patient is asymptomatic and has no neurological impairment.



Figure 2. Observe the bullet's position at S1-S2 further to its migration.



Figure 3. Computerized axial tomography clearly showed the bullet's position inside the spinal canal.

DISCUSSION

Numerous papers have been published on gunshot injuries to the spine and the consequences of such lesions, although they seldom report instances of bullet migration. The migration of a bullet in the skull, within the central nervous system, was first described back in 1916⁵. Since then, several cases of intracranial bullet migration through the hematoma or abscess caused have been reported⁶⁻¹¹.

Tanguy et al, en 1982, published the first account of the intraspinal migration of a bullet in the subarachnoid space from the cervical to the sacral region which, in spite of not being followed by neurological changes, led to a serious complication: meningitis¹². Since then, only three reports have been made of the migration of a bullet in the spinal canal always with late radicular symptoms¹³⁻¹⁵. They were all similar to our own case in that the bullet reached the thecal sac from T11-T12 proximal levels and, after migrating to S1- S2 caudal positions, caused radiculopathy by a direct compressive effect. There were no cases of associated meningitis.

Given the size of the spinal canal, migration of the bullet in the subarachnoid space is generally restricted to the section between T10 and S1¹³. Bullets can migrate as a result of the laws of gravity, depending on the position of the patient. This has been shown by fluoroscopy¹⁴ and intraoperative observation¹⁵.

To conclude, after assessing the literature available and on the basis of our own experience of the case described, we recommend extraction of an intraspinal bullet, even if there is no neurological injury, provided that either x-ray

studies reveal bullet migration, or when compressive radicular symptoms are present (in this case the procedure should be considered an emergency).

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Conflict of interests

The authors have declared that they have no competing interests.