

# Cauda Equina Syndrome Caused by a Migrated Bullet in Dural Sac

## Dural Kese İçerisinde Yer Değiştirerek Kauda Equina Sendromuna Neden Olan Mermi

### ABSTRACT

Cauda equina syndrome (CES) is a serious neurological condition and the most common cause is a central disc herniation. Migration of a bullet down the spinal canal is uncommon. In this report, the authors present an unusual case of cauda equina syndrome caused by a migrated bullet in dural sac. The patient's cauda equina syndrome was related to possible compression of cauda equina resulting from both bone fragments in L1 level and bullet itself in S2 level. The patient's symptoms and neurological deficits resolved considerably after surgery. In our opinion, it is important to pay attention to diversity of injury when confronted with a gunshot wound. It is essential to perform early and sufficient surgical decompression of the cauda equina to provide a better postoperative neurological recovery.

**KEYWORDS:** Cauda equina syndrome, Migrated bullet, Dural sac

### ÖZ

Kauda equina sendromunun en sık sebebi santral disk herniasyonudur. Spinal kanal içinde bir merminin aşağı doğru yer değiştirmesi nadir olarak görülür. Olgumuz spinal kanal içinde aşağı doğru hareket eden merminin neden olduğu kauda equina sendromudur. Hastada gelişen kauda equina sendromunun lomber 1 seviyesindeki kemik parçasına ve sakral 2 seviyesine doğru yer değiştiren merminin baskısına bağlı olarak gelişmiştir. Hastanın semptom ve bulguları cerrahi girişimden sonra önemli ölçüde düzelmiştir. Kanaatimizce ateşli silah yaralanmalarında hasarlanan bölge yanı sıra, olabilecek ek patolojilerinde gözününe alınması gerekir. Bu gibi hastalarda erken dönemde yeterli dekompresyon yapmak ameliyat sonrası dönemde daha iyi nöral düzelme sağlamaktadır.

**ANAHTAR SÖZCÜKLER:** Dural kese, Kauda ekuina sendromu, Yer değiştiren mermi

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## INTRODUCTION

The cauda equina syndrome (CES) is a serious neurological condition and the most common cause is a central disc herniation (5). Migration of a bullet down the spinal canal is uncommon (1,4,6). We present an unusual case of cauda equina syndrome caused by a migrated bullet in dural sac. The patient's symptoms and neurological deficits resolved considerably after surgery.

## CASE REPORT

A 42-year-old man wounded on the left side of the abdomen by a gunshot was referred to our hospital after an abdominal explorative operation had been carried out at another hospital 10 days previously. Initially, the patient had a bleeding wound penetrating into abdomen with stable vital signs. He was operated on immediately. Colon perforation was noted and repaired. After transferred into our hospital, the patient complained about urinary retention and fecal incontinence; saddle anesthesia; bilateral leg pain and paraesthesia. Neurological examinations revealed reduced muscle power of bilateral quadriceps (4/5) and anterior tibial muscles (3/5) combined with the absence of ankle reflexes and anal tonus. All the above gave led to a diagnosis of Cauda equina syndrome. Lumbar X-ray located the bullet at the S2 level (Figure 1A, B). Sacral computed tomography (CT) confirmed that the bullet was located in the spinal canal at S2 level (Figure 2, 4), but the entry site was not at that level. There was a bullet trajectory observed throughout

L1 vertebrae body and bone fragments in the spinal canal of the same level (Figure 2, 3). This showed that the patient's Cauda equina syndrome was related to possible compression of cauda equina resulting from both bone fragments at the L1 level and the bullet itself at the S2 level.

The patient underwent operation one day after hospitalization. An L1 laminectomy was carried out and bone fragments in the canal that constrained the cauda equina were removed. We also performed an S2 laminectomy, and then opened the dura where we found the bullet and a haematoma about the same size of the bullet between the roots. The bullet and haematoma were removed and the dura was sutured finally.

After operation, the pain and paraesthesia gradually resolved in both lower extremities, the saddle anesthesia was relieved, and the patient was observed to have increased urinary compliance and improvement in fecal incontinence combining with recovery of muscle power both in bilateral quadriceps (5/5) and anterior tibial muscles (5/5) after the two-month rehabilitation program.

## DISCUSSION

The cauda equina syndrome is a complex of bilateral sciatica, saddle anesthesia, and motor weakness in the lower extremities that progresses to paraplegia with rectal and urinary incontinence. CES was first reported in 1934 by Mixer and Barr (7). The clinical presentation of CES varies from chronic back pain and sciatica that gradually progresses to loss of



**Figure 1:**  
Anteroposterior (A) and lateral (B) lumbosacral X-ray film showing the bullet at the S2 level.



**Figure 2:** Lumbar CT scan (sagittal) showing the bullet in the spinal canal (black arrow) and the bone fragments in posterior margin of L1 vertebrae body (white arrow).



**Figure 3:** Lumbar CT scan showing the trajectory of bullet (black arrow) and the bony fragments at the L1 level (white arrow).



**Figure 4:** Sacral CT scan showing the bullet in the spinal canal at the S2 level.

urinary function, to acute trauma-related sciatic pain with immediate problems with vesicular control. The most common cause of CES is central lumbar disc herniation (3,5). Intradural migration of bullets was first reported in 1916 (1, 7). However, reports of bullet migration in the spinal canal have been rare in the following several decades (1,4,6).

Our case is unique due to several reasons. It is the first report of a gunshot injury by a bullet penetrating from the abdomen and the vertebral body into the spinal canal producing CES that also migrated down to the end of the spinal canal. Compression of the cauda equina consist of two different elements: bone fragments caused by the direct force of the bullet penetrating the L1 vertebra body and the bullet combined with surrounding haematoma at the S2 level. We think the reason of migration phenomena is that the bullet came into the dural sac after collision with structures of the abdomen and the vertebral

body and migrated down to the end of the spinal canal due to gravitational forces as its kinetic energy decreased.

More recent studies have indicated that the prognosis improves with earlier decompression of CES. However, the management of a bullet that has migrated in the spinal canal remains controversial. Some advocate conservative therapy, and others operation. Tanguy et al. (10) reported improvements of neurological deficits after conservative therapy. However Soges LJ et al. (9) described patients who experienced recovery for the symptoms and signs related to the bullet. Moon E et al. (8) summarized

literature reviews on gunshot wounds to the spine and recommended surgery for treating this condition. Ben-Galim P et al. (2) reported one case of intrathecal migratory bullet without neurological deficit after a gunshot wound and believed that the bullet necessitated surgical removal due to the possibility of variable neurological complaints caused by intrathecal migrated bullets. In our case, we also advocated taking surgical measure to decompress the cauda equina as early as possible and achieved remarkable results. We think that decompression at the L1 level resulted in motor and sensorial improvements in the legs and the recovery of urinary retention and fecal incontinence resulted from removing the compression at the S2 level due to the bullet and the haematoma.

### CONCLUSION

To our knowledge, no report of CES caused by a migrated bullet in dural sac has been described in the literature. It is important to pay attention to diversity of injury when confronted with a gunshot wound and essential to perform early and sufficient surgical decompression of the cauda equina to prevent poor postoperative neurological recovery.

### REFERENCES

1. Arasil E, Taşçıoğlu AO: Spontaneous migration of an intracranial bullet to the cervical spinal canal causing Lhermitte's sign. *J Neurosurg* 56(1):158-159, 1982
2. Ben-Galim P, Reitman CA: Intrathecal migratory foreign body without neurological deficit after a gunshot wound. *Spine J* 8(2):404-407, 2008
3. Bruggen A: Massive extrusions of the lumbar intervertebral discs. *Surg Gynecol Obstet* 81:269-277, 1945
4. Kerin DS, Fox R, Mehringer CM, Grinell V, Miller RE, Hieshima GB: Spontaneous migration of bullet in the central nervous system. *Surg Neurol* 20(4):301-304, 1983
5. Kostuik JP, Harrington I, Alexander D, Rand W, Evans D: Cauda equina syndrome and lumbar disc herniation. *J Bone Joint Surg Am* 68:386-391, 1986
6. Mirovsky Y, Shalmon E, Blankstein A, Halperin N: Complete paraplegia following gunshot injury without direct trauma to the cord. *Spine* 30(21):2436-2438, 2005
7. Mixter WJ, Barr JS: Rupture of the intervertebral disc with involvement of the spinal canal. *N Engl J Med* 211:210-214, 1934
8. Moon E, Kondrashov D, Hannibal M, Hsu K, Zucherman J: Gunshot wounds to the spine: Literature review and report on a migratory intrathecal bullet. *Am J Orthop* 37(3):E47-51, 2008
9. Soges LJ, Kinnebrew GH, Limcaco OG: Mobile intrathecal bullet causing delayed radicular symptoms. *AJNR Am J Neuroradiol* 9(3):610, 1988
10. Tanguy A, Chabannes J, Deubelle A, Vanneuville G, Dalens B: Intraspinial migration of a bullet with subsequent meningitis. A case report. *J Bone Joint Surg Am* 64(8):1244-1245, 1982