

# Gunshot Injury To The Cervical Spine With Progressive Neurological Deterioration - A Case Report

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## Abstract

A gunshot wound to the spine is a complex injury and is a major cause of spinal cord injury (SCI) globally among civilian populations, members of the military armed conflict personnel, or civilians injured in terrorists' attacks. The bullet fragments may cause damage to the spinal cord directly and/or indirectly even without penetrating the spinal canal by concussive effects, heat, fractures or vascular injury. Regardless of injury level, new-onset or progressive neurologic deterioration is an indication for urgent decompression. In this article we report a case of a gunshot wound to the cervical spine with progressive neurological deterioration.

## INTRODUCTION

The number of gunshot injuries to the spine has been rising steadily over the past decades. Most of these are encountered in military warfare, but in today's times, homicides also account for significant number of such potentially lethal injuries in civilian life. The bullet fragments may cause damage to the spinal cord directly and/or indirectly even without penetrating the spinal canal by concussive effects, heat, fractures or vascular injury. Involvement of the cervical region is particularly challenging for the surgeon because of its unique anatomy and the potential for severe sequelae. We report the case of a young patient with a gunshot wound in the neck where the bullet was outside the spinal canal sitting in front of C6/7 but causing progressive neurological deterioration due to cord compression by fractured bone and haematoma. Decompressive laminectomy and retrieval of bullet was done with a satisfactory outcome.

## CASE REPORT

A 32 year old male presented with a history of gunshot injury 48 hours prior. He had sustained penetrating bullet injury entering from the back of neck near the midline without any exit wound. Initially he was able to move his upper and lower limbs but gradually he became quadriparetic with bowel and bladder dysfunction.

On examination, he was afebrile with stable vitals. Power in the left upper and lower limbs was MRC grade 2/5 and grade 3/5 in the right upper and lower limbs. Sensations to

pinprick were more affected on the left side with a sensory level sensory level at C5-C6 dermatomes

Initial radiographic studies showed a single bullet in the left side of the neck and sitting anterolateral aspect of C7 vertebra (Fig 1).

## Figure 1

Figure-1: A/P view (radiograph) of cervical spine shows the location of bullet.

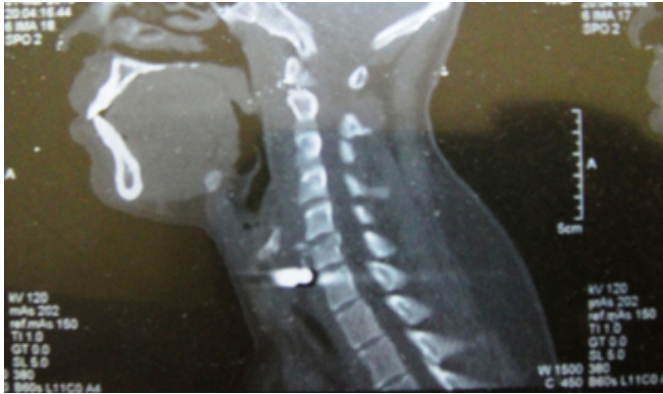


Cervical spine CT without contrast medium revealed a single bullet sitting anterolateral aspect5 of C6/7 with entry tract

(Fig 2). It also shows the fracture vertebra (Fig 3).

**Figure 2**

Figure-2: Computed tomography of cervical spine at C6/7 level shows bullet outside spinal canal.



**Figure 3**

Fig- 3: Computed tomography of cervical spine at C6 level shows bullet fragment outside spinal canal with fracture.



MRI of cervical spine shows spinal canal stenosis with cord compression with some signal change of cord.

**Figure 4**

Fig 4. MRI of cervical spine at shows spinal canal stenosis with cord compression.



He underwent C6 laminectomy. The bullet was found sitting anterolateral aspect of C6/7 region. The dura and the neural tissue were oedematous but intact. The spinal canal was compromised by fracture vertebra and haematoma. He did not develop signs of sepsis and the wound was healthy after suture removal. The patient was mobilized and was discharged after proper rehabilitation with MRC grade IV in both upper and lower limbs and good bowel and bladder control.

**DISCUSSION**

Our case illustrates that a single bullet may cause spinal injury indirectly without causing vascular or spinal cord damage.

Initial measures should aim at stabilization of vital signs. Physical examination alone offers a safe and accurate evaluation of the vascular injuries in penetrating injuries of the cervical region. [1] A hypotensive episode despite fluid resuscitation in a patient with zone II neck injury warrants immediate surgical exploration, since the probability of injury of the great vessels in the neck is high. [2]

Mechanisms of injury may include direct spinal cord transection, contusion caused by the shockwave created by the bullet, and spinal cord ischemia due to arterial injury, spinal cord compression secondary to fracture, and haematoma.

Serial neurologic examinations are the most important factor dictating therapy. [3] An incomplete neurologic lesion, especially with progressive deterioration, may be caused by direct compression of the neural elements and might benefit from surgical decompression. In our opinion, an improving neurologic examination is a relative contraindication for surgery, as well as a complete neurologic lesion, in which the risks of wound infection, cerebrospinal fistulas, and spinal instability outweigh the minimal chances of neurologic recovery.

Computed tomography is a good tool to evaluate the location of bullet and bone fragments with respect to the spinal cord. Patients with gunshot wounds to the neck should also have angiography to assess the patency of the vertebral arteries and the presence of possible arteriovenous fistulas.

The decision to do surgical decompression should be made on an individual basis, taking into consideration the patient's potential for recovery and possible complications. [3]

Literature review shows the following indications for surgical intervention and retrieval of bullet - progressive clinical deterioration of patient with an incomplete injury of cord [4], migration of bullet within the canal [5], dural leaks and impending risk of meningitis, and possible copper and lead toxicity [6, 7, 8]

## **CONCLUSION**

Gunshot injury cervical spine is a complex injury considering the anatomy and pattern of trauma. It can pose significant diagnostic and therapeutic challenges for neurosurgeons. Prompt resuscitation and physical examination is a significant factor that aid in the management of a gunshot neck wound. Prudent use of CT and catheter angiography when necessary might reduce morbidity in these special injuries. Early surgery may halt the progressive neurological deterioration with a favourable outcome.

## **References**

1. Atteberry LR, Dennis JW, Menawat SS, et al: Physical examination is safe and accurate for evaluation of vascular injuries in penetrating zone II neck trauma. *J Am Coll Surg* 1994; 179:657-662
2. Klyachkin ML, Rohmiller M, Charash WE, et al: Penetrating injuries of the neck: selective management evolving. *Am Surg* 1997; 63:189-194
3. Jallo GI: Neurosurgical management of penetrating spinal injury. *Surg Neurol* 1997; 47:328-330
4. Benzel EC, Hadden TA, Coleman JE. Civilian gunshot wounds to the spinal cord and cauda equina. *Neurosurgery* 1987; 20:281-5.
5. Oktem I, Selcuklu A, Kurtsoy A, Kavuncu I, Pasaoglu A. Migration of bullet in the spinal canal: a case report. *Surg Neurol* 1995; 44: 548-50.
6. Linden M, Manton W, Stewart R, Thal E, Feit H. Lead poisoning from retained bullets. Pathogenesis, diagnosis, and management. *Ann Surg* 1982; 195: 305-13.
7. Tindel N, Marcillo A, Tay B, Bunge R, Eismont F. The effect of surgically implanted bullet fragments on the spinal cord in a rabbit model. *J Bone Joint Surg* 2001; 83:884-90.
8. Grogan DP, Bucholz RW. Acute lead intoxication from a bullet in an intervertebral disc space. A case report. *J Bone Joint Surg Am* 1981; 63:1180-82

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