

Postoperative Rare Presentation of Ventral Cervical Cord Herniation: A Case Report

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ABSTRACT

Cervical spinal cord herniation is a rare occurrence and is usually seen after C3-C5 fusion with C4 corpectomy using a posterior approach. Herniation in the cervical spine with an anterior approach is unusual and has only been reported in a few cases. Hereby, a case of a 53-year-old male who underwent C3-C5 fusion with C4 corpectomy for Ossification of the Posterior Longitudinal Ligament (OPLL) of the cervical spine is reported. Following surgery, the patient deteriorated, leading to re-exploration. Delayed postoperative Magnetic Resonance Imaging (MRI) shows ventral cord herniation with an anterior pseudo meningocele. Spinal cord herniation should be considered if neurological deficits occur after C3-C5 fusion with C4 corpectomy.

Keywords: Cervical spine, Ossification of posterior longitudinal ligament, Surgery

CASE REPORT

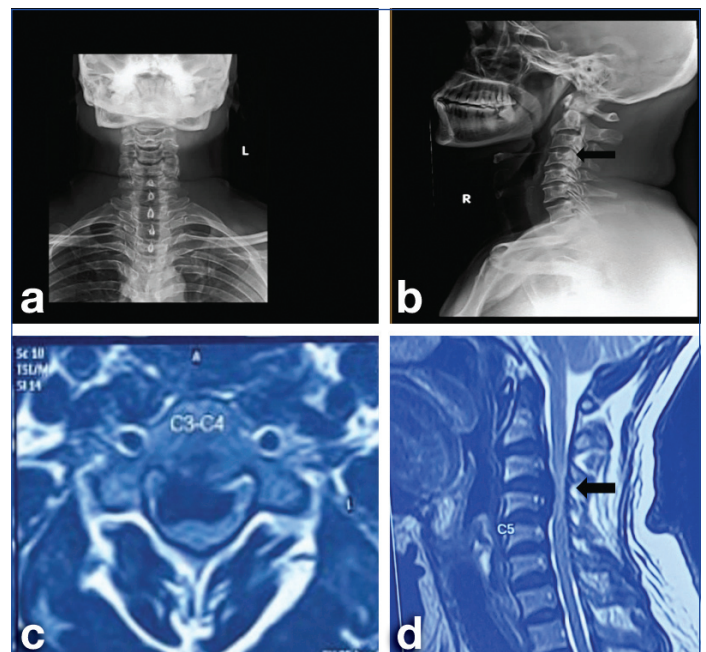
A 53-year-old male presented to the Neurosurgery Outpatient Department clinic with neck pain that increased with activity, neck extension, and decreased with rest, medication, associated with tingling and numbness in all limbs. The symptoms were insidious in onset and gradually progressive over the past few years. There was no history of bladder or bowel involvement, fever, or constitutional symptoms. There was also no history of small joint involvement or morning stiffness noted. On examination, hyperreflexia was found [Table/Fig-1].

Reflexes and strength	Right	Left
Babinski reflex	Absent	Absent
Knee jerk	Hyperreflexia	Hyperreflexia
Ankle jerk	Hyperreflexia	Hyperreflexia
Biceps and brachioradialis reflex	Hyperreflexia	Hyperreflexia
Triceps reflex	Hyperreflexia	Hyperreflexia
Bulk	Normal	Normal
Tone	Normal	Normal
Strength	Normal	Normal

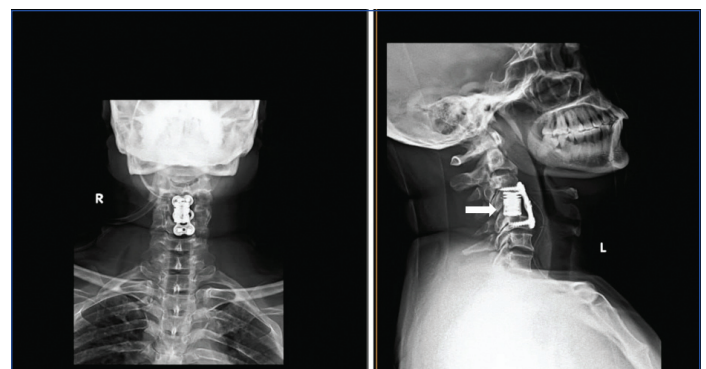
[Table/Fig-1]: Muscle strength and deep tendon reflexes across right and left upper and lower limbs.

Preoperative cervical radiograph and MRI performed elsewhere showed C3-C5 OPLL and cervical myelomalacia with severe functional disability [Table/Fig-2]. The patient underwent C3-C5 fusion with C4 corpectomy with an anterior approach [Table/Fig-3]. In the immediate postoperative period on the same day, the patient developed lower limb weakness. Subsequent MRI using a 1.5T GE machine and T1W, T2W, and Maveric SL fluid sequences revealed cord re-expansion and signal changes with maintained ventral subarachnoid space and a simple prevertebral collection likely due to Cerebrospinal Fluid (CSF) leak [Table/Fig-4]. The patient was then treated with steroids (Fludrocortisone 0.1 mg orally for 17 days).

Four days later, the patient presented with soakage of the surgical wound dressing, intracranial hypotension, weakness in both upper and lower limbs, and bladder and bowel involvement. Subsequently, urgent re-exploration with dural repair was performed.

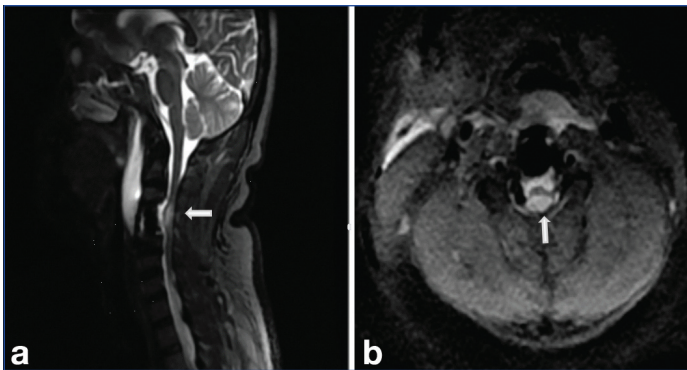


[Table/Fig-2]: Preoperative radiograph images: a, b) showing Ossification of the Posterior Longitudinal Ligament (OPLL) (black arrow); c) Preoperative MRI axial sections; d) Sagittal section shows cord compression at C3-C5 level.



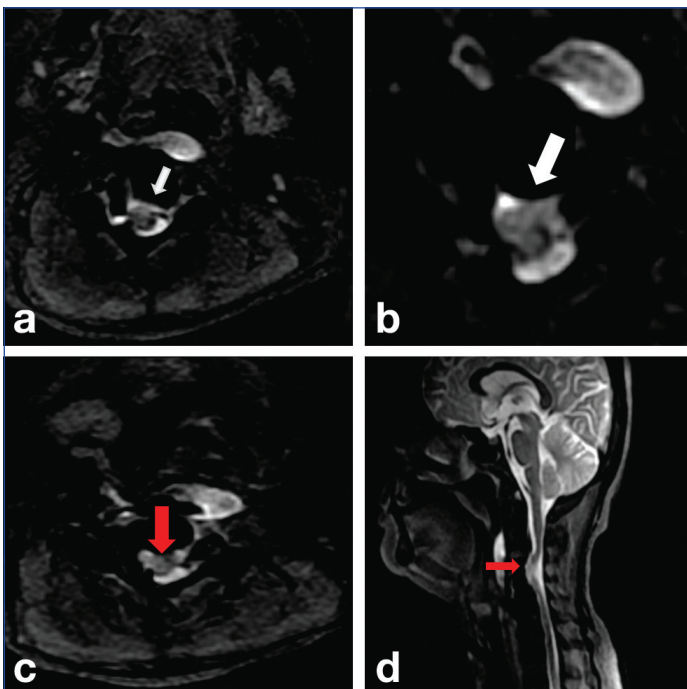
[Table/Fig-3]: Postoperative day 0 cervical spine X-ray showing C4 anterior corpectomy and C3-C5 fusion with an implant with slight posterior displacement of the lower end of the implant (arrow).

While in recovery, the patient further deteriorated. An MRI performed on postoperative day 18 revealed ventral cord herniation at the



[Table/Fig-4]: Mavric SL Fluid MRI postoperative day 0. Sagittal (a) and axial image (b) showing re-expansion oedema, marked with an arrow, with preserved ventral subarachnoid space and prevertebral collection.

operated site [Table/Fig-5]. A follow-up surgery was recommended, but the patient declined.



[Table/Fig-5]: Mavric SL Fluid MRI images postoperative day 18. Axial image: (a) shows a dural tear (white arrow) (b) is the magnified image and (c) shows obliteration of ventral space. On sagittal section (d), ventral displacement with tethering of the spinal cord (red arrow) is seen along with enlarged subarachnoid space dorsally.

DISCUSSION

Spinal cord herniation is the herniation of the spinal cord through a dural defect commonly seen in idiopathic conditions along the thoracic spine [1]. Other aetiologies include trauma and iatrogenic causes, which usually present with dorsal defects [2]. Spinal cord herniation at the cervical level is mostly associated with surgery using a posterior approach and is thus dorsal in position [3]. OPLL surgery can result in various complications such as CSF leakage, C-5 nerve palsy, spinal cord injury, dural tear, and neurological deterioration [3]. Dural tear has an incidence of 1.6-10% for all spinal surgeries, and factors such as ageing spinal canal narrowing, osteophytes, ligament thickening, or calcification can make the dura more friable, increasing the chance of tears [4]. Dural tears commonly lead to pseudo meningocele, and a rarer complication includes cord herniation.

Spinal cord herniation is an uncommonly encountered entity that can have an idiopathic, iatrogenic, or post-traumatic cause [5]. In idiopathic cases, it usually occurs in the thoracic cord via an anterior dural defect and usually affects middle-aged

females [6,7]. Post-traumatic or iatrogenic cases can be seen anywhere along the traumatic or surgical site in the spine. The pathogenesis of spinal cord herniation is unclear, but adhesions, spine alignment, CSF dynamics, and dural tears are implicated [8]. Following cord herniation, neurological deficits can occur due to cord compression, traction, distortion, or tethering at the herniation site [9]. In terms of spine alignment, herniation typically occurs on the concave side; thus, in the cervical spine, it usually happens on the dorsal side.

There have been few reports in the literature showing dorsal herniation in the cervical region; however, only three cases of operative ventral herniation at the cervical level with dural defects have been reported earlier [3,10,11].

The first case of spinal cord herniation after OPLL surgery was described by Min JH et al., [3]. The 52-year-old patient underwent C4-C5 corpectomies with mesh cage placement for OPLL and cord compression at the C3-C6 level. In the immediate postoperative period, the patient developed right hemiplegia, and imaging revealed cord kinking at the C3-C4 level with herniation. The patient underwent another procedure for cervical cord decompression, but persistent Spinal Cord Herniation (SCH) was found on follow-up MRI. Another case was reported by Kizilay Z et al., where the patient had quadriplegia for the last three years due to OPLL at the C3-C6 level [11]. A C4-C5 corpectomy with plate fixation was performed. A CSF leak was found two days later, for which a lumbar drain was placed. An MRI done on day 6 showed cervical cord herniation into the corpectomy site. The patient was treated with steroids, and slight improvement was noted. Guppy KH and Silverthorn JW described a case where a patient underwent a C5-C6 cervical corpectomy and fusion seven years ago with persistent CSF leak [10]. Following this, the patient underwent a redo C5-C6 corpectomy with untethering of the spinal cord. During the corpectomy, an anterior approach was performed, resulting in a dural tear and pseudo meningocele formation with cord herniation. Since the defect was on the anterior side, the herniation was ventral.

CONCLUSION(S)

Anticipation of dural defects in OPLL may also be important in planning anterior procedures. Additionally, it is critical for radiologists to meticulously search for such complications, as further treatment is based on them.

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