World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(Case Report)

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Cervical ossification of the posterior longitudinal ligament: A case report and literature review

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World Journal of Advanced Research and Reviews, 2025, 26(01), 3951-3958

Publication history: Received on 16 March 2025; revised on 01 April 2025; accepted on 04 April 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.26.1.1448

Abstract

Ossification of the posterior longitudinal ligament (OPLL) is a rare but important cause of cervical myelopathy, characterized by progressive ossification that narrows the spinal canal and compresses the spinal cord. Although more prevalent in East Asian populations, cases are increasingly reported worldwide. We present the case of a 48-year-old Moroccan man with no notable medical history who developed progressive tetraparesis and urinary incontinence. Imaging revealed multilevel cervical OPLL from C2 to C5 with spinal cord compression and myelomalacia. The patient underwent posterior decompressive laminectomy from C2 to C7. Postoperative evolution showed mild right-sided motor improvement, with persistent left-sided deficits and urinary dysfunction. This case underscores the need to consider OPLL in the differential diagnosis of cervical myelopathy, even in non-endemic regions. Early recognition and appropriate surgical intervention are essential to prevent irreversible neurological damage and improve clinical outcomes.

Keywords: Cervical myelopathy; Ossification of the posterior longitudinal ligament; OPLL; Spinal cord compression; Posterior decompression; Cervical spine; Case report

1. Introduction

Ossification of the posterior longitudinal ligament (OPLL) is a degenerative condition first described in Japan in the 1960s [1]. Although initially thought to be more prevalent in East Asian populations, with reported rates of 2–4% in men over 40 years old [2], increasing numbers of cases are being documented globally, including in North Africa. Some studies have reported cases in African populations, albeit with lower estimated prevalence and limited epidemiological data [3].OPLL is characterized by progressive calcification of the posterior longitudinal ligament, leading to spinal cord compression and a spectrum of neurological manifestations ranging from mild radiculopathy to severe tetraparesis [4]. Diagnosis relies on computed tomography (CT) and magnetic resonance imaging (MRI), which are essential for assessing the extent of ossification and its impact on the spinal cord [5].We present the case of a 47-year-old Moroccan man who underwent surgical decompression for progressively worsening tetraparesis caused by cervical OPLL extending from C2 to C4.

2. Case Presentation

We report the case of a 48-year-old male with no significant medical history who presented with a three-year history of bilateral cervicobrachial neuralgia and intermittent paresthesias in the upper limbs. Initially, the patient managed symptoms with over-the-counter medications and did not seek medical evaluation.Approximately nine months prior to admission, his condition deteriorated with the gradual onset of heaviness in all four limbs and urinary incontinence.

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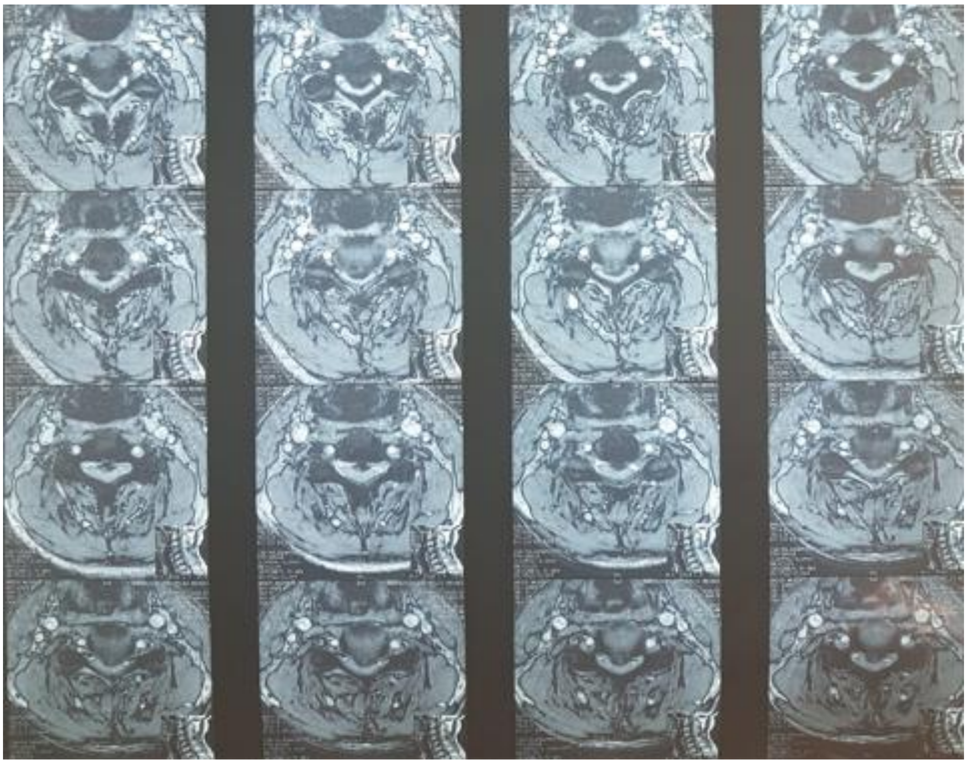
This progressed to complete motor deficit of the left hemibody, prompting hospital admission.On clinical examination, the patient exhibited spastic tetraparesis, more pronounced on the left (motor strength: 3/5 on the right, 1/5 on the left), with hyperreflexia and generalized polykinetic responses. Rectal tone was preserved. The Japanese Orthopaedic Association (JOA) score for cervical myelopathy was 4, indicating severe neurological impairment.

MRI of the cervical spine (T1- and T2-weighted sagittal and axial sequences) showed a hypointense lesion along the anterior spinal canal from C2 to C5, causing significant canal narrowing—most severe from C2 to C4—and T2 hyperintensity within the cord suggestive of myelomalacia. (figure.1) . CT scan confirmed extensive OPLL from C2 to C5, Sagittal parenchymal window images show cervical canal narrowing at C2–C4 and C5–C7 levels due to an intracanalicular calcified lesion. Multilevel cervical spondylosis with calcification of the anterior longitudinal ligament is noted, while the cervical lordosis is relatively preserved.
Axial images demonstrate extensive ossification of the posterior longitudinal ligament (OPLL), leading to significant spinal canal stenosis and a laminated appearance of the spinal cord.
Based on these images, the occupancy rate of the ossified ligament within the spinal canal can be calculated using three parameters:

- **A:** Diameter of the ossified mass
- **C:** Available spinal canal space
- **B:** Diameter of the entire spinal canal

The occupancy rate is calculated as **A/B × 100%**, resulting in an estimated 50%. (figure 2)



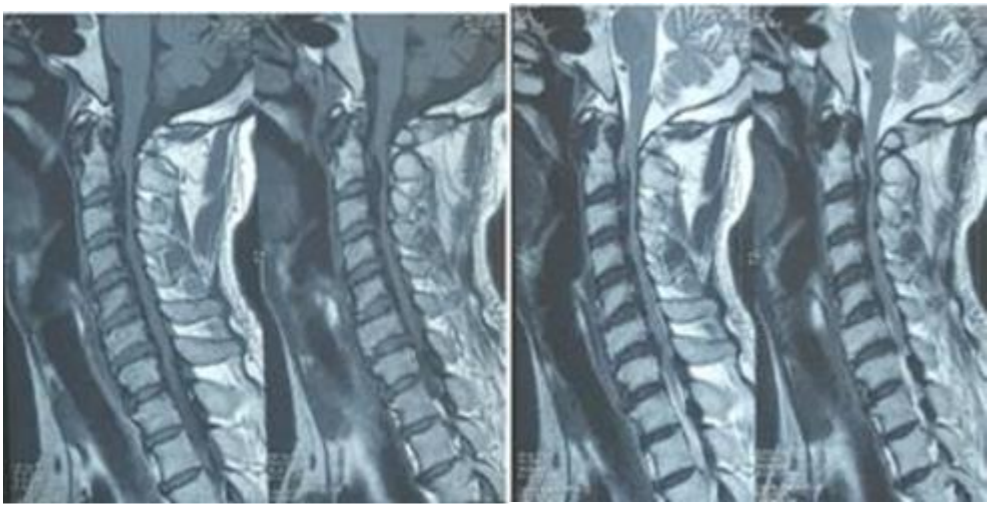


Figure 1 Cervical spine MRI (sagittal T1- and T2-weighted sequences) showing a hypointense lesion along the anterior spinal canal from C2 to C5, with significant canal narrowing—most severe from C2 to C4—and intramedullary T2 hyperintensity suggestive of myelomalacia, as well as hypertrophy of the anterior longitudinal ligament at C5–C7

Axial T2-weighted image showing a segmental and multilevel hypertrophy of the posterior longitudinal ligament, resulting in canal stenosis and focal spinal cord compression.

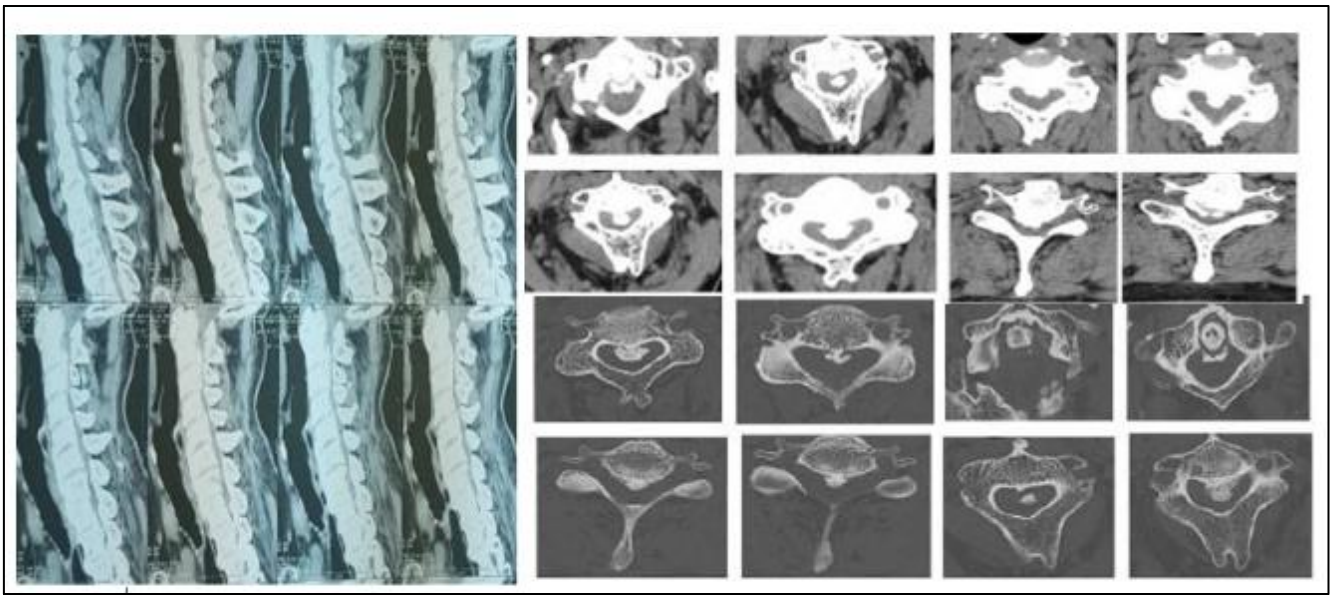


Figure 2 Cervical spine CT scan.Sagittal parenchymal window images show cervical canal narrowing at C2–C4 and C5–C7 levels due to an intracanalicular calcified Axial images demonstrate extensive OPLL leading to significant spinal canal stenosis lesion . the cervical lordosis is relatively preserved

The diagnosis of cervical spinal cord compression due to OPLL was confirmed. The patient underwent an extensive posterior decompressive laminectomy from C2 to C7. (figure 3) The postoperative course was uneventful. Neurologically, the patient remained stable in the immediate postoperative phase, with no change in the JOA score. He was discharged early and began rehabilitation promptly.

At three-month follow-up, mild improvement in right-sided motor function (4/5) was noted, while the left hemibody deficit and urinary symptoms persisted. Follow-up assessments at six months and one year showed clinical stabilization, with the JOA score unchanged from baseline.

Figure 3 Intraoperative steps of the surgical procedure with the patient in the prone position. A midline incision was made from the external occipital protuberance to the C7 spinous process. Intraoperative view of the spinal cord following multilevel laminectomy from C2 to C7

3. Discussion

OPLL is a degenerative disorder characterized by ectopic ossification of the posterior longitudinal ligament—a fibrous structure located posterior to the vertebral bodies within the spinal canal. Initially described in Japan in the 1960s [4], OPLL was once thought to be confined to East Asian populations but is now recognized globally, though it remains rare in Africa [6].

The condition typically manifests after age 40 and shows a marked male predominance (male-to-female ratio of 2:1 to 3:1) [7]. Risk factors include genetic predisposition, diabetes mellitus, and inflammatory diseases such as rheumatoid arthritis [8].

The pathogenesis of OPLL remains incompletely understood. Tsukimoto (1960) proposed a degenerative mechanism involving progressive ligamentous calcification [4]. Matsunaga and Sakou (1998) suggested repetitive cervical microtrauma activates osteogenic cells, promoting ossification [5]. Genetic mutations associated with OPLL have been identified by Guo et al. (2014) [6]. Li et al. (2018) demonstrated that inflammatory cytokines such as IL-6 can stimulate ossification in ligamentous tissue [7]. Kawaguchi et al. (2003) proposed a role for diabetes, in which chronic hyperglycemia may alter ligament structure and favor ectopic bone formation [8].

Clinically, cervical OPLL presents with progressive myelopathy. Early-stage symptoms may include axial pain and radiculopathy, while advanced stages feature motor and sensory deficits, gait disturbances, and sphincter dysfunction. In this case, the patient exhibited late-stage signs with severe tetraparesis and urinary incontinence. To assess neurological severity and guide treatment, two main scoring systems are employed: the JOA score, which evaluates upper and lower limb function and sphincter control (scores <12 suggest severe disease)(table 1) , and the Nurick grade, which focuses on ambulatory status.(table2)

Table 1 Japanese Orthopaedic Association (JOA) Score for Cervical Myelopathy

Function	Max Score	Scoring Criteria
Upper limb motor function	4	0: Unable to use hands 1: Can hold a spoon 2: Can eat with difficulty 3: Can use chopsticks with difficulty 4: Normal
Lower limb motor function	4	0: Unable to walk 1: Can walk on flat ground with support 2: Can climb stairs with support 3: Can walk without support but with difficulty 4: Normal
Sensory function – upper limbs	2	0: Complete loss1: Decreased sensation 2: Normal
Sensory function – lower limbs	2	0: Complete loss 1: Decreased sensation 2: Normal
Sensory function – trunk	2	0: Complete loss 1: Decreased sensation 2: Normal
Bladder function (sphincter control)	3	0: Complete retention or incontinence 1: Severe dysfunction 2: Mild to moderate dysfunction 3: Normal

Total Score: 17 points

Table 2 Nurick Grade – Ambulatory Status

Grade	Description
0	Signs or symptoms of spinal cord compression but no difficulty in walking
1	Mild gait involvement; able to work full-time
2	Difficulty walking but able to work; not requiring assistance
3	Able to walk only with assistance; not able to work
4	Able to walk only with support at home; mostly confined to home
5	Chairbound or bedridden

MRI remains the gold standard for evaluating spinal cord compression and intramedullary changes such as T2 hyperintensities, indicative of chronic myelopathy. CT provides detailed characterization of the ossified mass, including its morphology, distribution, and degree of canal compromise. The Japanese Ministry of Public Health and Welfare classification distinguishes OPLL subtypes—segmental, continuous, mixed, and localized—each with implications for surgical planning [13].

Radiological indices such as the occupying ratio (>60% indicates severe compression) and the K-line help determine the surgical approach (anterior vs posterior) (table 3) . While no specific biomarkers exist for OPLL, associated metabolic conditions like diabetes, hyperinsulinemia, hyperuricemia, and calcium metabolism disorders may influence management.

Given the extent of OPLL in our patient (C2–C5), a posterior decompressive approach was selected. Posterior laminectomy is recommended when the cervical spine is stable, typically confirmed with dynamic imaging. Kato et al. [18] reported a recovery rate of 44.2% at 1 year, decreasing to 32.8% at 10 years. Laminoplasty offers an alternative with favorable long-term outcomes while preserving stability—Morimoto et al. [20] reported JOA score improvement from 9 to 14.1 at three years and a 96% fusion rate.

Anterior approaches (e.g., anterior cervical discectomy and fusion [ACDF], anterior corpectomy and fusion [ACF]) allow direct decompression. Kawano et al. [17] noted a 78% neurological improvement post-anterior surgery, compared to 46.1% with posterior approaches. However, complications such as pseudarthrosis (up to 13%) may occur. Dynamic plating improves fusion rates (up to 97.9%) and reduces complication risk [18-17-20].

In cases involving multilevel corpectomies, posterior fusion may be required to prevent postoperative instability. Techniques include posterior tension bands, lateral mass screws, or pedicle screw-rod constructs. Kirkpatrick et al. [21] showed a 62% reduction in sagittal mobility with posterior fusion, compared to 43% with anterior fusion alone.

Surgical strategy should be individualized based on neurological status, alignment, OPLL extent, and surgeon expertise. Anterior approaches are preferred for compression involving ≤3 levels, especially with kyphosis, K-line negativity, or high occupying ratios. Posterior decompression is favored for extensive lesions (>3 levels), neutral or lordotic alignment, or minimal anterior symptoms.

In our case, the posterior approach was chosen due to multilevel involvement and preserved spinal alignment.

Conservative treatment is reserved for asymptomatic or mildly symptomatic cases. However, 40–50% of untreated patients develop clinical myelopathy, underscoring the need for surveillance with sequential MRIs.

Postoperative care includes cervical immobilization with a soft collar or rigid orthosis for two months. Corticosteroids may be administered to reduce airway edema. Drain removal is typically performed on postoperative day one, and radiographs confirm graft placement.

Postoperative complications vary with the surgical approach and include instability, infection, and residual deficits. Understanding these risks is essential for surgical planning and prognosis.A meta-analysis of 27 studies involving 1,558 patients summarized complication rates and recovery outcomes (figure 9).

Neurological improvement is often partial, especially in advanced cases. Our patient showed slight motor improvement without resolution of sphincter dysfunction. Prognosis correlates with symptom duration and preoperative severity [18]. Early surgery (<6 months from symptom onset) yields better outcomes, with average improvement rates of 50–70%. Recurrence is rare after posterior decompression (5–10%) but more frequent after anterior surgery with incomplete fusion.

Long-term follow-up is essential due to the risk of OPLL progression post-surgery. Iwasaki et al. reported progression in 70% of patients after laminoplasty over 10 years [18]. Hori et al. found similar rates (71%) in a retrospective cohort [132]. Chiba et al. documented 56.5% progression two years after posterior decompression alone. Notably, progression was lower in posterior fusion groups (PDF) than in laminoplasty (2.0% vs. 7.5% annually, $p < 0.0001$) [17].

4. Conclusion

OPLL is a rare but increasingly recognized cause of cervical myelopathy beyond East Asia. Early diagnosis and timely surgical intervention are crucial for preventing irreversible neurological deficits. The choice of surgical approach should be tailored based on radiological, anatomical, and clinical factors. Posterior decompression remains a safe and effective option for multilevel OPLL with preserved alignment, while anterior or combined approaches may be warranted in select cases. Long-term follow-up is essential due to the risk of postoperative progression.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from the patient for publication of this case report and any accompanying images.

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