



CERVICAL MYELOPATHY DUE TO MULTILEVEL OSSIFICATION OF THE POSTERIOR LONGITUDINAL LIGAMENT: A CASE REPORT OF SURGICAL MANAGEMENT WITH LAMINOPLASTY

Alfred Sutrisno Sim^{1*}, Herlina Uinarni², Edwin Destra³

¹Department of Neurosurgery, Faculty of Medicine, Tarumanagara University, Jakarta

²Department of Anatomy, ²School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia

³Master Program in Biomedical Sciences, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia
alfred@fk.untar.ac.id

Abstract

Ossification of the posterior longitudinal ligament (OPLL) is a degenerative spinal condition characterized by ectopic bone formation along the posterior aspect of the vertebral bodies, most commonly affecting the cervical region. This process leads to gradual spinal canal narrowing and may result in cervical myelopathy due to chronic spinal cord compression. A 52-year-old male presented with severe bilateral arm pain, progressive upper extremity weakness, and paresthesia following minor trauma. Neurological examination revealed upper limb motor deficits and positive pathological reflexes. Cervical MRI showed multilevel OPLL from C3 to C6 with significant spinal cord compression and intramedullary hyperintensity. The patient underwent cervical laminoplasty to decompress the spinal cord while preserving vertebral stability. Postoperative follow-up demonstrated substantial neurological recovery, improvement in motor function, resolution of paresthesia, and stable implant positioning. Laminoplasty is a reliable surgical option for managing cervical myelopathy in multilevel OPLL, offering effective decompression and preservation of spinal alignment and motion.

Keywords: *OPLL, Cervical Myelopathy, Laminoplasty, Spinal Decompression, Spinal Cord Compression.*

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* Corresponding author :

Address : Jakarta, Indonesia

Email : alfred@fk.untar.ac.id

INTRODUCTION

Ossification of the posterior longitudinal ligament (OPLL) is a chronic degenerative condition marked by heterotopic bone formation within the posterior longitudinal ligament, most frequently involving the cervical spine. Progressive ossification narrows the spinal canal, increasing the risk of spinal cord compression. Radiographically, OPLL is classified into segmental, continuous, mixed, and localized types. It is more prevalent in East Asian populations and is increasingly diagnosed through advanced imaging techniques such as MRI and CT. While often asymptomatic initially, OPLL may eventually lead to cervical myelopathy as the canal diameter becomes critically reduced.(Y.-C. Li et al., 2022; Wu et al., 2025)

Cervical myelopathy secondary to OPLL represents a major cause of neurological impairment in older adults. Clinical signs include upper limb weakness, gait disturbance, fine motor dysfunction, and sensory deficits. These arise from direct spinal cord compression and reduced perfusion. MRI serves as the primary modality for evaluating spinal cord involvement and detecting signal changes associated with myelomalacia, while CT provides detailed information about the extent of ossification. Once neurological symptoms progress, surgical decompression becomes essential.(Barrios-Anderson et al., 2021; Ledesma et al., 2023)

Surgical management options include anterior decompression and fusion, posterior laminectomy, and laminoplasty. The selection depends on the anatomical characteristics of the ossification, sagittal alignment, and spinal stability. Laminoplasty is often preferred in multilevel involvement as it allows canal expansion while maintaining motion and reducing the risk of postoperative instability. Intraoperative imaging plays a key role in verifying decompression and guiding implant placement.(Liu et al., 2022; Zhang et al., 2023)

The clinical course of OPLL

emphasizes the need for early diagnosis and individualized treatment planning. Despite its higher prevalence in East Asia, symptomatic OPLL remains clinically relevant worldwide due to its progressive nature and potential for severe disability. Multimodal imaging and timely intervention remain critical in preventing irreversible spinal cord damage and achieving optimal clinical outcomes.(Nakabachi et al., 2023; Tzerefos et al., 2022)

CASE REPORT

A 52-year-old male experienced severe bilateral arm pain for two weeks after falling down stairs, causing trauma to the upper back and cervical spine. No prior medical history or medication use was reported. He was obese, weighing 91 kg with a height of 169 cm. His symptoms progressed to include bilateral upper extremity weakness, numbness, and impaired fine motor function, particularly difficulty grasping small objects. The pain was constant and unresponsive to oral analgesics. Neurological symptoms worsened during both activity and rest. Examination revealed bilateral upper limb weakness (3/5), paraspinal rigidity, limited neck movement, hyperreflexia, and positive Lhermitte's, Hoffmann, and Babinski signs. Lower extremities showed no sensory deficits.

MRI of the cervicothoracic spine showed multilevel posterior longitudinal ligament ossification, predominantly from C3 to C6, causing spinal canal narrowing and anterior spinal cord compression. T2-weighted images revealed intramedullary hyperintensity consistent with cervical myelopathy. Axial views confirmed spinal cord indentation and reduced canal diameter. Diagnosis of cervical myelopathy due to OPLL was made based on clinical and radiological findings.

Differential diagnoses including spondylotic myelopathy, tumors, and inflammatory myopathies were excluded. Intraoperative fluoroscopy confirmed accurate decompression.



Figure 1. Sagittal and axial MRI images reveal cervical OPLL with anterior spinal cord compression

Cervical laminoplasty from C3 to C6 was performed to relieve spinal cord compression while preserving alignment. Plates and screws were placed to maintain laminar expansion. No intraoperative complications occurred. Postoperative care included analgesia, passive physiotherapy, and neurological monitoring.

Three months after surgery, upper limb strength improved to 4/5, with resolution of pain and paresthesia. Follow-up radiographs confirmed stable implant positioning without loosening, migration, or canal re-narrowing. The patient regained independence in daily activities, indicating successful decompression and recovery.



Figure 2. Postoperative cervical X-rays showing stable C3–C6 laminoplasty fixation with preserved alignment and no signs of implant complications

Discussion

OPLL induces a progressive narrowing of the spinal canal due to endochondral ossification within the posterior longitudinal ligament, commonly in the cervical region. This ossification alters the biomechanical

environment of the spinal column, producing sustained anterior compression on the spinal cord. Vascular insufficiency, mechanical shear, and chronic ischemia contribute to axonal degeneration and glial scarring, leading to myelopathy. In cervical segments, where spinal

cord tolerance is limited, this process results in motor and sensory dysfunction. T2-weighted MRI findings of intramedullary hyperintensity indicate spinal cord edema or myelomalacia, representing irreversible damage if decompression is delayed.(Joaquim et al., 2021; Nakabachi et al., 2023)

Neurological deficits in OPLL typically manifest when static compression exceeds the spinal cord's compensatory reserve or when dynamic insults aggravate pre-existing narrowing. Bilateral motor weakness, hyperreflexia, and pathological reflexes reflect corticospinal tract involvement. Segmental ossification from C3 to C6, as identified in this case, represents a high-risk zone due to the anatomical narrowness and frequent motion-related stress in mid-cervical segments. Axial MRI confirmed focal anterior compression compromising the spinal cord's anteroposterior diameter, explaining the upper limb dysfunction and rapid progression of symptoms following minor trauma.(C. Li et al., 2022; Xifeng et al., 2023)

Laminoplasty was selected as the surgical intervention due to its effectiveness in multilevel decompression while preserving posterior structures and cervical alignment. Compared to anterior corpectomy or discectomy, laminoplasty avoids manipulation of the anterior ossified mass and reduces the risk of dural tears, which are common in OPLL cases due to dural adhesion. The use of intraoperative fluoroscopy ensured precision in decompression and implant placement, minimizing residual stenosis. Maintaining spinal stability through instrumented laminoplasty allowed for functional recovery without compromising biomechanical integrity.(Hsu et al., 2021; Kong et al., 2021)

Postoperative recovery showed neurological improvement within two months, evidenced by increased muscle strength and resolution of paresthesia. Follow-up imaging confirmed proper alignment and intact implant fixation, indicating structural success. Absence of complications such as hematoma, infection, or hardware failure reflects the appropriateness of the chosen technique in addressing both neurological and mechanical goals. Early

intervention likely prevented further spinal cord deterioration and promoted remyelination in partially compromised tracts.(Doi et al., 2023; Joaquim et al., 2021)

Management of cervical myelopathy due to OPLL requires timely diagnosis, accurate anatomical mapping, and targeted surgical planning. This case demonstrated successful decompression of the spinal cord with preservation of motion segments through laminoplasty. Integration of radiographic severity, functional impairment, and anatomical feasibility guided the clinical approach. Effective symptom resolution and imaging correlation affirm the therapeutic role of posterior decompression in multilevel OPLL, particularly when the anterior approach poses greater operative risk.(Shetty et al., 2023; Sura et al., 2024)

CONCLUSION

Cervical myelopathy caused by multilevel ossification of the posterior longitudinal ligament (OPLL) requires early recognition and prompt surgical intervention to prevent irreversible neurological deficits. This case demonstrated that laminoplasty provides effective decompression while preserving spinal stability and alignment, particularly in extensive multilevel involvement. Clinical improvement and radiological stability observed during follow-up affirm the appropriateness of this approach. Comprehensive evaluation through imaging and neurological examination remains essential in guiding management. Precise surgical technique, supported by intraoperative imaging, enhances safety and outcomes. Laminoplasty represents a reliable option in managing complex cervical OPLL, balancing functional recovery and structural preservation.

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