

Cervical Myelopathy Secondary to Combined Ossification of Ligamentum Flavum and Posterior Longitudinal Ligament

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ABSTRACT

In the cervical spine, the combined ossification of the ligamentum flavum (OLF) and ossification of the posterior longitudinal ligament (OPLL) is rarely seen. Patients are usually treated with cervical laminectomy or laminoplasty with OLF resection. In most of the cases, OLF is adhered to the dura and there is a risk of dural tear or cerebrospinal fluid (CSF) leakage during its resection. In this case report, authors present results of laminectomy with debulking instead of complete excision of OLF for spinal cord decompression in a cervical myelopathy case where OLF was adhered to the dura. A 69-year-old man presented with insidious-onset weakness in bilateral lower limbs and unsteady gait since 1 month. He had a history of neck pain with left upper limb radiation for 2 years. Magnetic resonance imaging (MRI) showed C5 to C6 severe central canal stenosis with underlying myelomalacia. Computed tomography (CT) showed OPLL and OLF contributing to severe central canal stenosis at C5 to C6 level. Patient underwent C4 to C6 laminectomy, debulking of OLF, posterior instrumentation, and fusion with autogenous bone graft from C3 to C6. Histological specimen showed osseous tissue within the ligamentum flavum. After surgery, patient's symptoms improved, and no recurrence was observed at 4 years after surgery. The symptoms of myelopathy were successfully treated with debulking instead of complete excision of OLF, thus reducing the risk of dural tear or CSF leakage.

Keywords: Cervical myelopathy, Ossification of ligamentum flavum, Ossification of the posterior longitudinal ligament.

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INTRODUCTION

In cervical spine, the combination of ossification of the ligamentum flavum (OLF) and ossification of the posterior longitudinal ligament (OPLL) is rarely seen.¹⁻⁷ We describe a case of cervical myelopathy secondary to OPLL and OLF that required surgery. Patients are usually treated with cervical laminectomy or laminoplasty with

OLF resection.⁸⁻¹¹ In most of the cases, OLF is adhered to the dura, and there is a risk of dural tear or cerebrospinal fluid (CSF) leakage during its resection.⁹ We describe the result of debulking instead of complete excision of OLF to decompress the cervical cord with laminectomy and fusion, thus reducing the risk of dural tear or CSF leakage.

CASE REPORT

A 69-year-old man presented to our clinic with insidious-onset motor weakness and numbness in the bilateral lower limbs. He complained of frequent loss of balance due to unsteady gait since 1 month. He had a history of neck pain radiating to the left upper limb since last 2 years. On examination, motor weakness was noted mainly in the left upper limb and lower limb (4/5), deep tendon reflexes were elevated at and below biceps, Babinski's sign was positive, and Hoffman sign was present. Sensory tests showed hypesthesia below the level of C6. Tandem gait test was positive. Bowel and bladder functions were normal. The Japanese Orthopaedic Association (JOA) cervical myelopathy score was 7/17.

A cervical spine roentgenogram showed an almost normal lordotic alignment. Magnetic resonance imaging (MRI) showed severe central canal stenosis at C5 to C6 level on T1- and T2-weighted images (Fig. 1). The cervical cord at this level reveals high T2 signals consistent with myelomalacia. Computed tomography (CT) showed segmental OPLL from C4 to C6 and OLF at C5 to C6 contributing to severe central canal stenosis at C5 to C6 level (Fig. 2).

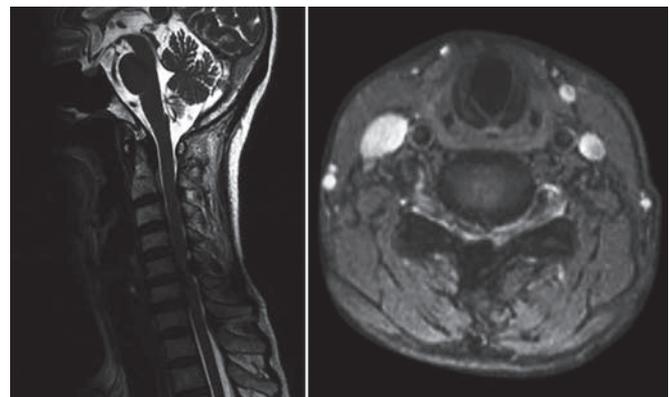


Fig. 1: Magnetic resonance imaging of cervical spine showing severe central canal stenosis at C5-C6 level

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Fig. 2: Computed tomography showing segmental OPLL from C4 to C6 and OLF at C5 to C6

SURGICAL TECHNIQUE

Surgery was performed under general anesthesia with patient in prone position. Dorsal midline cervical spine approach was used. Lateral mass screws were inserted at C3 to C6 levels using modified Magerl technique. The final construct was completed using rods (Fig. 3). The spinous processes from C3 to C6 were excised. Laminectomy was performed at C4 to C6 level using a Midas AM8 burr. Macroscopically, an ossified mass, measuring approximately 1.5 × 1.5 × 1 cm was noted at C5 to C6 level (Fig. 4). Adherence was noted between the ossified mass and the underlying dura. Using a sharp nerve hook, a plane was defined between ligamentum flavum and dura away from the ossified mass. Spinal cord was decompressed circumferentially by debulking the ossified mass from the periphery (Fig. 5). After debulking, cord was noted to be pulsating with remnant ossified mass floating over dura. The surgical wound was closed in a meticulous manner.

RESULTS

Histological examination showed fibrocartilage with large areas of degenerative calcification within the excised surgical specimen, which confirmed the diagnosis of

OLF. After surgery, the patient’s symptoms improved significantly. His gait was steady and he was able to walk independently. At 6 months postoperatively, his JOA score improved to 11/17. At 4 years postoperatively, he was walking independently with full power in upper and lower limbs, and his JOA score was 15/17.

DISCUSSION

Combination of OPLL and OLF is rare, with very few cases reported in the literature.¹ So far, only six cases of combined OPLL and OLF have been reported in the literature.¹ In three of the six cases, OLF was located at the OPLL margin, and in rest of the three cases, the OLF was located at the segment close to the end of the OPLL.¹ In our case, segmental OPLL was seen at C4 to C6, and OLF was seen at C5 to C6 mainly in the center and on the left side. There was no concomitant ossification of general ligaments or other spinal ligaments. Based on the literature review, cervical OLF tends to occur adjacent or close to the cervical OPLL margin, suggesting that the increased mechanical stress at the OPLL junction may

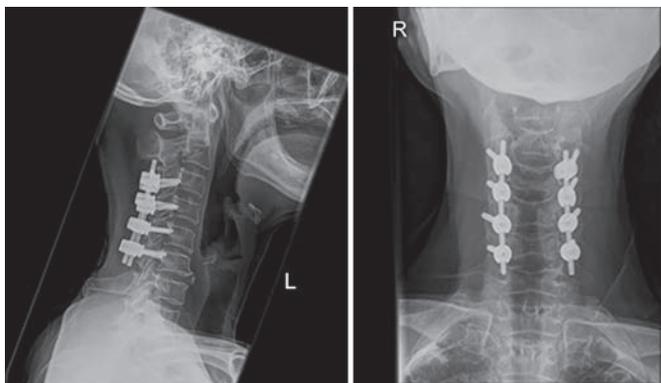


Fig. 3: Postoperative X-rays of cervical spine

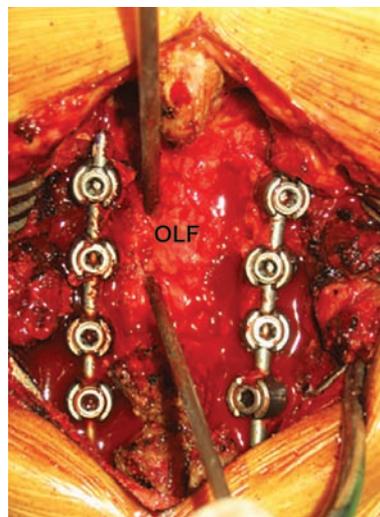


Fig. 4: Intraoperative picture showing ossified ligamentum flavum mass measuring approximately 1.5 × 1.5 × 1 cm

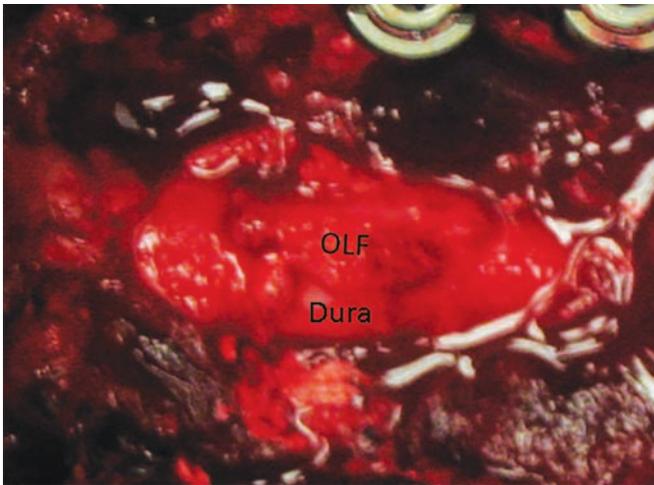


Fig. 5: Intraoperative picture showing debulking of OLF from periphery

be a causative factor.¹ Histological examination of the surgical specimen in our case showed osseous tissue, confirming the diagnosis as in other cases reported in the literature.^{1,8} Serum levels of fibronectin and bone morphogenetic protein thought to be responsible for proliferation of fibroblasts in Japanese patients were not determined in our patient.

Decompressive laminectomy or laminoplasty and excision of the OLF are the commonly performed surgical procedures.⁸ Limited surgery including foraminotomy or extended partial laminectomy is also described in the literature.¹⁰ Surgical technique of drilling and yellow ligament excision as described by Mohindra et al¹¹ requires precision and is technically demanding. Yang et al⁸ noted cervical OLF to be adhered to dura in 67.7% of all his cases. The OLF is adhered to the dura, and complete excision poses significant risk of dural tear, CSF leakage, spinal cord injury, or spinal cord herniation.^{8,9,11} Postoperative neurological deterioration is the most serious and unexpected complication with complete surgical resection of OLF. In our case, we excised the laterally extending OLF circumferentially leaving the central mass. At the end of decompression, the leftover central mass was floating over the bulged-out dura. Spinal cord was noted to be pulsating freely. There was no need to excise the ossified mass completely, as spinal cord was decompressed adequately. In the opinion of the senior author, it is easy to find the plane between the ossified mass and OLF at the periphery, making circumferential decompression safe. It also allows decompressing far laterally the nerve roots and radicular arteries. The central ossified mass is firmly adhered and, hence, difficult to dissect from dura. With circumferential excision of laterally extending OLF, the spinal cord is

adequately decompressed, making complete excision unnecessary.

CLINICAL SIGNIFICANCE

The authors think that debulking instead of complete excision of OLF may be effective and safer for spinal cord decompression in cases of cervical myelopathy secondary to combined OPLL and OLF.

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