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Surgical Treatments of Myelopathy Caused by Cervical Ligamentum Flavum Ossification

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Key words
- Cervical
- Ossification of the ligamentum flavum
- Surgical treatment

Abbreviations and Acronyms
CSF: Cerebrospinal fluid
CT: Computed tomography
JOA: Japanese Orthopaedic Association
MRI: Magnetic resonance imaging
OLF: Ossification of the ligamentum flavum
OPLL: Ossification of the posterior longitudinal ligament


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■ OBJECTIVE: **To present a small case series reporting the outcomes of surgical treatment for myelopathy caused by cervical ossification of the ligamentum flavum (OLF).**

■ METHODS: **The authors assessed 15 cases of myelopathy caused by cervical OLF. Patients were eight women and seven men 37–75 years old (mean age 59.7 years). All patients underwent bilateral laminectomy, and the lesions were removed. The decompression range was confined within the medial sides of the bilateral facets and within the involved segments. Intraoperative specimens were examined histologically to confirm the diagnosis. During the operation, the extent of adherence of the lesions to the dura was recorded. The patients were followed for 3–70 months. Neurofunctional improvements were evaluated with the Japanese Orthopaedic Association (JOA) score.**

■ RESULTS: **Definite adherences were present in 67.7% of all cases. JOA score showed a 71.5% improvement after operation from a preoperative score of 5–8 (mean 6.4) to a postoperative score of 10–14 (mean 13.5). The operative outcomes were satisfactory without extensive decompression of adjacent segments.**

■ CONCLUSIONS: **A high rate of adherence to the dura was observed in patients with myelopathy caused by cervical OLF. Bilateral laminectomy and removal of the lesions, without extensive decompression of adjacent segments, provides an optimistic prognosis.**

INTRODUCTION

Ossification of the ligamentum flavum (OLF) occurs most frequently in the lower thoracic spine and is extremely rare in the cervical region (3, 5, 10, 14, 23). Features of cervical OLF, associated morbidity, and treatment have been previously described in case reports (3, 8, 10, 13, 14). In the present study, we report the surgical treatment of 15 Chinese patients with cervical OLF.

Table 1. Characteristics of 15 Patients with Cervical OLF

No.	Gender/Age (years)	DC (months)	Level	Adhesion	Concomitant Diseases	Follow-up (months)	JOA Score Preoperatively/ Follow-up (improvement %)
1	M/37	8	C5-6	−	—	50	6/16 (90.9)
2	F/63	52	C4-5, C5-6, C6-7	+	Dorsal OLF	9	5/12 (58.3)
3	M/62	28	C6/7	+	—	12	8/15 (77.8)
4	F/50	20	C4-5, C5-6	−	Disc herniation	36	7/14 (70.0)
5	M/63	36	C2-3, C3-4, C4-5	+	Disc herniation	12	6/13 (63.6)
6	F/75	90	C3-4, C4-5, C5-6	+	Disc herniation	3	5/10 (41.7)
7	F/58	66	C6-7, C7-T1	+	—	70	7/13 (60.0)
8	M/65	45	C4-5	+	OPLL, dorsal OLF	20	5/13 (66.7)
9	F/74	38	C3-4, C4-5, C5, C6	+	OPLL	12	5/13 (66.7)
10	F/58	24	C3-4, C4-5	−	—	9	6/14 (72.3)
11	M/45	18	C6-7	−	—	12	7/16 (90.0)
12	M/58	22	C5-6, C6-7	−	—	54	8/14 (66.7)
13	M/55	28	C4-5, C5-6	+	Disc herniation	12	7/13 (60.0)
14	F/62	30	C6-7, C7-T1	+	Dorsal OLF	9	8/15 (77.8)
15	F/70	45	C3-4, C4-5, C5-6	+	Disc herniation	9	6/12 (54.5)

DC, disease course; JOA, Japanese Orthopaedic Association; OLF, ossification of the ligamentum flavum; OPLL, ossification of the posterior longitudinal ligament; −, no or slight adhesion; +, definite or severe adhesion.

MATERIALS AND METHODS

This study included 15 consecutive Chinese patients admitted to our department from 1999–2009. There were seven men and eight women 37–75 years old (mean age 59.7 years). Typical clinical features included sensory defect; decreased muscle strength; and disturbance in gait, urination, and defecation. The patients' courses were prolonged, and the histories of the main complaints ranged from 8 months to 7.5 years. The distributions of the involved segments are shown in **Table 1**. Concomitant diseases included disc degeneration and herniation in five patients (33.3%), ossification of the posterior longitudinal ligament (OPLL) in two patients (13.3%), and thoracic OLF in three patients (20%).

In our hospital, x-rays, computed tomography (CT), and magnetic resonance imaging (MRI) are obtained as routine preoperative imaging, and x-rays only are routinely obtained postoperatively. When planning each operation, preoperative images were studied to confirm the location and contour of the lesion and the degree of cord compression. Indications for operation included development of neurologic deficiency and definite imaging findings in accordance with the clinical manifestations. Nine patients underwent immediate operations, and six patients underwent conservative treatment for 3–6 months that was ultimately ineffective, and operations were then required.

Decompressive laminectomy was performed in all patients at the involved levels (**Table 1**). Operations were performed with a posterior approach and exposure of corresponding segments. The decompression range was the bilateral laminae within the medial sides of the facets and within the involved segments. A furrow was made along the range using a burr and a rongeur. The laminae were lifted from one side (from the intact side if the lesion was unilateral) to the other side to reveal the lesions. Care was taken to separate the adhesion. Lateral mass screws and rods were mounted in all the cases at one level above and below the involved segments.

Dural tear occurred in two patients. In one case, the dura was torn, but there was no defect, and the dura was repaired in situ. In the other case, the dura was torn with a defect 4 mm wide × 1 cm long. The defect was patched with deep fascia sewn to the dura, and fibrin glue was sprinkled on the surface of the dura. When closing the incisions, rigorous layered sutures were performed in all cases to prevent cerebrospinal fluid (CSF) leakage. No CSF leakage was observed.

A cervical collar was used for 3 months postoperatively in all patients. Histologic examination of the intraoperative specimens was performed routinely to confirm the diagnosis. During the operation, the extent of adherence of the lesions to dura was recorded. Neurologic state and radiologic parameters were evaluated at 3–70 months' follow-up. Neurologic deficiency was evaluated with the Japanese Orthopaedic Association (JOA) score, and x-rays were routinely obtained postoperatively.

RESULTS

There were 31 segments in 15 patients, including 1 in C2-3 (3.2%), 5 in C3-4 (16.1%), 9 in C4-5 (29.0%), 8 in C5-6 (25.8%), 6 in C6-7 (19.4%), and 2 in C7oT1 (6.4%) (**Table 1**). There were 11 cases with multiple segments and 4 cases with single segments. Preoperative imaging findings showed enlargement of the ligamentum flavum and compression of the spinal cord (**Figure 1**). The space-occupying lesions showed low-intensity signals on MRI T1-weighted and T2-weighted sequences and high-density sig-