The CT and MR Appearance of concomitant Ligamentum Flavum and Posterior Longitudinal Ligament Ossification in the Cervical Spine: a case report

JIAO-CHIAO YANG  JING-SHAN HUANG

Division of Neurosurgery, Department of Surgery, Cathay General Hospital

Ossification of spinal ligaments, such as ossification of ligamenta flava (OLF) and ossification of posterior longitudinal ligament (OPLL) in the cervical spine, is not common and usually asymptomatic. Once cervical myelopathy and radiculopathy due to the OPLL, OLF or both, surgical management are often required when conservative treatment is not effective. The diagnosis is based on computed tomographic (CT) scan or magnetic resonance (MR) imaging. The postoperative prognosis depends on the severity of the cervical myelopathy. We reported a 57-year-old female with concomitant OPLL and OLF in cervical spine and reviewed the literatures.

Key words: Ligamentum flavum; Ossification; Posterior longitudinal ligament

CASE REPORT

A 57-year-old woman was referred to the neurosurgery service with a history of progressive numbness at bilateral hands and feet for 2 months. She had spastic gait but no bowel or bladder dysfunction. No significant past medical history or trauma was found. She was formerly a housekeeper and occasionally demanded heavy lifting.

Physical examination revealed numbness and paresthesia at C5 and C6 sensory levels in both upper extremities and weakness in bilateral lower extremities, more severe on left side. Muscle strength was significant for grade 3-4 in the bilateral iliopsoas and quadriceps and grade 4-5 in the left biceps and deltoid muscle. She had hyper-reflexic dorsiflexion of both knee joints. The MR imaging (Figure 1.) and non-contrast CT scan (Figure 2.) showed ossification of posterior longitudinal ligament (OPLL) from C2 to C7 and marked ossification of ligamenta flava (OLF) from C5 to C7. Severe cervical spinal cord compression was noted from C3 to C7, most severe at the C5-6 level. No spondylolisthesis or abnormal kyphosis was noted. We considered two-stage operation for this patient. She underwent decompressive modified open door laminoplasty from C4 to C6 and removal of the ossified ligamenta flava. The dura was encountered immediately below the ossified ligament, revealing no remaining abnormal ligament. The dura expanded to

Reprint requests to: Dr. Jing-Shan Huang
Division of Neurosurgery, Department of Surgery, Cathay General Hospital.
No. 280, Sec 4, Jen Ai Road, Taipei 106, Taiwan, R.O.C.
fill the laminoplasty space defect and was noted to be pulsatile. One week later, anterior fusion with Caspar plate and Surgibone at C5-6 intervertebral space was performed to get complete decompression. The patient tolerated the procedure well and was noted to have improving muscle strength [within one week]. The symptoms of numbness and paresthesia gradually subsided postoperatively and resolved after 3 months. She was discharged to an inpatient rehabilitation facility. At the 3-month follow-up her strength and sensation were noted to be normal in her upper extremities.

**DISCUSSION**

The underlying etiology and pathogenesis of OLF and OPLL are still unknown. However, the association of OLF with other hyperostotic conditions, e.g., ankylosing spondylitis, Forestier disease, and OPLL may imply that these conditions share similar etiology and pathogenesis [1]. OLF usually occurs at the thoracolumbar junction and low thoracic spine (T9 to L2) and rare in cervical spine [5].

Most patients with OLF and OPLL presented with progressive myelopathy as manifested by motor and sensory deficit, gait disturbance, and urinary dysfunction [6]. Pain is not a feature of this disease. MR imaging has demonstrated cord edema induced by transient spinal cord compression. Administration of steroid will achieve a satisfactory neurological improvement [2].

Plain radiographs, CT scan, and magnetic resonance imaging studies achieve evaluation. In our experience, ossification of the posterior longitudinal ligament is visible as retrovertebral calcification on plain films in approximately one third of cases. Plain films, especially flexion-extension radiographs, are useful for assessing vertebral hypermobility or instability. Concomitant cervical OLF with OPLL is rare [4]. OPLL and OLF are well demonstrated by the CT scan. In MR imaging, both OPLL and OLF appear essentially as hypointense lesions in both T1- and T2-weighted images [2]. However, a high signal intensity area may appear in the T1-weighted image as a result of fat infiltration or bone marrow formation. CT scan is unable to directly demonstrate the spinal cord. MRI can demonstrate the spinal cord and its relationship with the surrounding spinal canal [2,3]. Moreover, MRI has another advantage of documenting the degree of cord compression. Edema appears as an ill-defined region of moderately low signal intensity on T1-weighted images and moderately high signal intensity on T2-weighted images. Cord edema is also better shown when Gadolinium-DTPA (Gd-DTPA) is used because it shortens examination time when the T2 weighted image procedure omitted [8]. Magnetic resonance studies show that both OPLL and OLF appear as a hypointense mass, whereas CT-based examinations show a hyperdense V-shaped calcified lesion. Spinal CT and myelo-CT examinations may better guide the surgeon to select the optimal surgical approach to be used when these lesions are to be removed [7].

We suggest that concomitant OLF and OPLL in the cervical spine is an uncommon pathology that can be responsible for cervical myelopathy. Both CT and MRI are necessary for complete evaluation. In this
patient, there is excellent correlation between the CT and MR image.

REFERENCES

1. Kudo S, Ono M, Russell WJ. Ossification of the tho-
racic ligamenta flava. Am J Roentgenol 1983; 141: 117-
121
cord compression due to ossification of ligaments: MR
imaging. Radiol 1990; 175: 843-848
examination of the thoracic radiculomyelopathy due to
ossification of the ligamentum flavum. Neuroradiol
1990; 32: 38-42
symptoms and X-ray findings of spinal canal ligament
5. Epstein N. Thoracic ossification of the posterior longi-
tudinal ligament, ossification of the yellow ligament
from T9-T12 with superimposed acute T10/T11 disc
herniation: controversies in surgical management. J
Spinal Disord 1996; 9: 446-450
Ossification of the ligamenta flava with severe
myelopathy in a black patient: a case report. Spine
1998; 23: 1607-1608
cau sed by ossification of the ligamentum flavum: clin-
copathologic study and surgical treatment. Spine 1991;
16: 280-287
8. Sugimura H, Kakitsubata Y, Suzuki Y, et al. MRI of
ossification of ligamentum flavum. J Comput Assist
Tomogr 1992; 16: 73-76
合併頸椎黃韌帶及後縱韌帶骨化在電腦斷層和磁振造影的影像學表現：病例報告

楊湛喬  黃金山

國泰綜合醫院  外科部  神經外科

脊椎黃韌帶的骨化通常是發生在胸椎下段，極少發生在頸椎，而合併同時存在頸椎的黃韌帶及後縱韌帶之骨化更是極為罕見，其通常會引起病人嚴重的頸髖病變。我們報告一57歲的女性病患，因為逐漸惡化的症狀性步態，上肢肢體麻痺及感覺異常而求診。電腦斷層和磁振造影顯現一多節的頸椎黃韌帶及後縱韌帶骨化。經由兩階段的減壓融合手術，病人的臨床症狀得到極大的改善。我們將對病人的臨床表現和影像學作一個簡單的討論。

關鍵詞：黃韌帶，後縱韌帶骨化