

## CURRENT PROBLEM CASE

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## Ossification of the yellow ligament causing thoracic cord compression

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**Abstract** Ossification of the yellow ligament (OYL) is not infrequent in the cervical and lumbar regions but is very rare in the thoracic spine, with no more than 40 cases reported in the literature. We describe a 50-year-old male with progressive paraparesis and sensory dysfunction, secondary to OYL at T10–T11, studied by computed tomography (CT) and magnetic resonance imaging (MRI). Decompressive laminectomy and removal of the ligament resulted in marked clinical improvement. Patients with OYL may initially develop sensory dysfunction associated with leg weakness. This pathological entity can be well defined by CT and MRI, and surgery by decompressive laminectomy is advised for all cases. The OYL should be removed both posteriorly and laterally to the dural sac to obtain sufficient decompression of the spinal canal.

### Introduction

Ossification of the yellow ligament (OYL) is not infrequent in the cervical and lumbar spine, where it may be isolated or associated with disc protrusion and osteophytes, and is a well-recognized cause of symptomatic compression of the spinal cord and nerve roots.

At level of the thoracic canal, a calcified yellow ligament may sometimes be associated with a protruded disc, or may occur in patients with generalized skeletal disorders. In contrast, cases of thoracic myelopathy caused by isolated OYL are rare. We report such a case investigated using computed tomography (CT) and magnetic resonance imaging (MRI) and verified pathologically.

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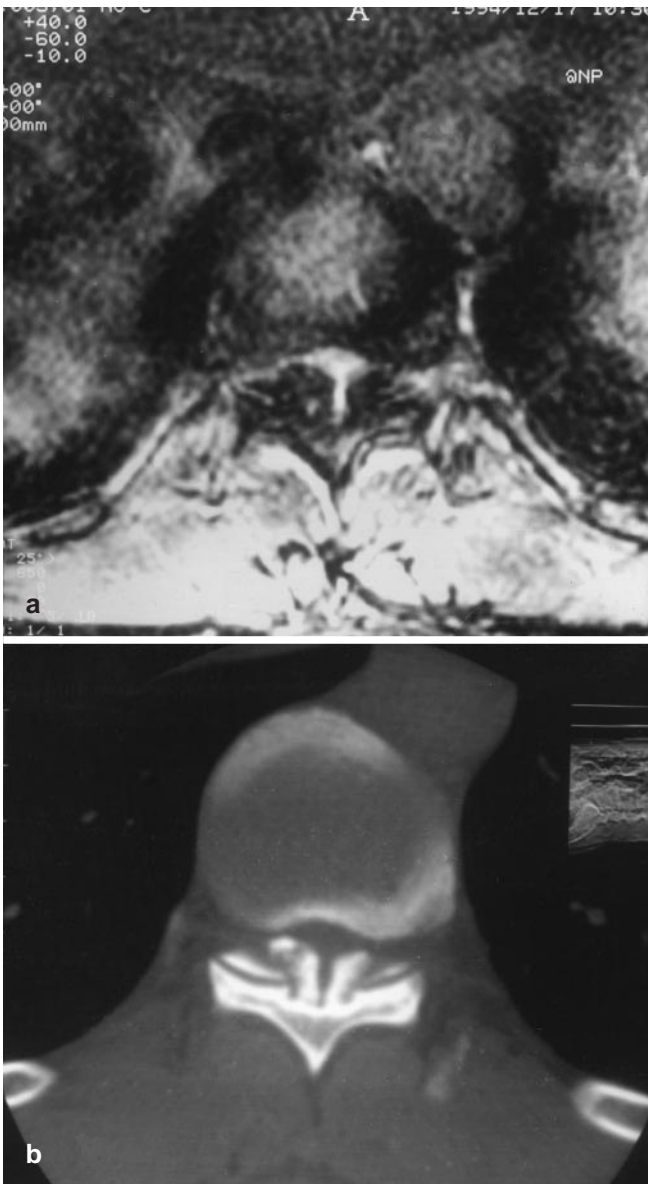
**Fig. 1** Magnetic resonance imaging of the thoracic spine, sagittal T1-weighted image: at the level of T10–T11, a round hypointense lesion, occupying the posterior part of the spinal canal and corresponding to the ossified yellow ligament can be seen; the spinal cord is markedly compressed and displaced anteriorly

### Case report

A 50-year-old man with a 2-year history of paresthesia and progressive weakness on both legs was observed in January 1995. In the last 2 months before the admission, paraparesis had markedly worsened, with severe difficulty in walking.

Neurological examination revealed severe spastic paraparesis, absence of the abdominal reflexes, and reduction of the sensory functions below the T10 level.

MRI of the thoracic spine (Figs. 1, 2a) showed, in the sagittal sequences, a round intraspinal lesion at the level of T10–T11, posterior to the spinal cord. It was inhomogeneously hypointense in T1-weighted images and more hypointense in T2-weighted images. Marked compression and anterior displacement of the spinal cord were evident. Axial MRI and CT at the T10–T11 level (Fig. 2) confirmed the severe spinal stenosis with a V-shaped ossified yellow ligament.



**Fig. 2** **a** Magnetic resonance imaging, axial T2-weighted image at T10–T11; **b** computerized tomography, axial scan with bone window at the same level. Severe stenosis of the spinal canal due to the V-shaped ossified yellow ligament can be seen

At surgery, the T10 and T11 laminae were removed en bloc to avoid the necessity of placing instruments below the laminae because of the marked spinal stenosis. The OYL was removed both posteriorly and laterally to the dural sac, using an air drill, after careful dissection of its dural adhesences. The diffuse ossification of the yellow ligament was confirmed histologically.

Postoperatively, leg weakness improved slightly. Now, 3 years after the operation, the sensory function has returned to normal and only episodic weakness on the leg during walking is noticed.

## Discussion

Although thoracic spinal cord compression secondary to OYL was first described in 1960 by Yamaguchi et al. [16],

no more than 40 cases have been reported until now [1–17], over a 37-year period, in spite of the widespread use of CT and MRI. In most of the cases reported, the patients were Japanese, although some patients have been observed in United States. There have been no reports from Italy or the rest of Europe on this pathological entity.

Common features of most of these reports are the localization of the OYL in the lower thoracic spine, from T9 to T12, and involvement of two to three vertebral levels. Only Miyasaka et al. [8] and Epstein et al. [2] described OYL involving the upper and middle thoracic regions. The greater mobility of the lower segments of the thoracic spine may favor hypertrophic and degenerative changes of the spinal ligaments, which are frequently seen in cervical and lumbar spine.

The clinical presentation consists initially in unilateral or bilateral sensory dysfunction associated with slowly progressive spastic paraparesis and sphincteric dysfunction. The localization of the ossified ligament posterior to the spinal cord accounts for the constant presence of posterior column signs and the worsening of the symptoms following hyperextension, which causes forward displacement of the ligament [10].

Plain radiographs may often show a calcified area adjacent to the lamina and projecting within the spinal canal [8]. A correct diagnosis of OYL can be obtained by MRI, which yields very hypointense T1- and T2-weighted images. The indentation is best seen on sagittal T2 sequences, whereas the signal of the cord at level of the compression is well illustrated by the T1 sequences (Fig. 1).

The OYL can be visualized using CT. In most reports, included our own, it appears as a V-shaped high-density mass within the spinal canal [7, 8, 13]; however, at some levels this calcification may only be noted in the midline [14]. Although some reports [7, 12] stress the usefulness of CT myelography in patients with involvement of the posterior ligamentous structures of the thoracic canal, this technique appears unnecessary if high-definition MRI is correctly performed.

Surgical treatment is recommended in all cases to prevent further deterioration of spinal cord function. The en bloc resection of the laminae and contiguous medial facet joints at level of the compression allows a sufficient posterior bone decompression, without the necessity of placing instruments below the lamina. This technique avoids further intraoperative cord compression. To obtain good posterior and lateral decompression of the dural sac, the yellow ligament must be removed up to its more anterior part. Laminoplasty according to the Hirabayashi technique has been performed by Okada et al. [9].

Postoperative results are variable and often unsatisfactory. The rapid and remarkable improvement and even recovery following decompression, observed in some patients [6, 10, 14], seem to be due to the posterior site of the compression, with sparing of the anterior spinal circulation.

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