MRI AND CT IMAGING OF SYMPTOMATIC CALCIFICATION OF THE LIGAMENTUM FLAVUM

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ABSTRACT

A 43-years old man with motor and sensation abnormality, involving left knee and the pedal extensor, was shown to have calcified or ossified ligamentum flavum on both sides of the thoracic levels. Epidural type of cord compression was shown. Images were of MRI and CT studies.

INTRODUCTION

Calcification or ossification of the ligamentum flavum causes spinal cord compression. It occurs mostly in the Japanese population, predominantly in men, and mostly affects the lower thoracic region. Calcification (or ossification) of the ligamentum flavum may be a prominent feature of degenerative spinal disease and it is rare in the cervical region (1).

We present a case of calcified ligamentum flavum in a symptomatic patient by MRI and CT studies.

CASE REPORT

A 43-year-old Thai male patient was requested for MRI study of the thoracolumbar spine. The patient had pain and numbness of left knee and leg for 10 days. There was a hyperreflexia of left knee, decreased pin-prick sensation and weakness of the pedal extensor.

MRI of the thoraco-lumbar spine was performed and showed no intrinsic cord lesion. Calcified ligamentum flavum is noted in multiple levels by MRI and CT studies as shown in the figures 1 and 2. Pressure effect was noted on the adjacent cord.

DISCUSSION

The ligamentum flavum (LF) or yellow ligaments are composed mainly of elastic connective tissue fibers in a longitudinal array. They are the most purely elastic tissue in the human body (2-5). The ligaments extend from the anterior/inferior aspect of the lamina above a disk space to posterior superior surface of the lamina below the disk space. Each half of the LF extends laterally from midline to the intervertebral foramen forming the posterior boundary and roof of the foramen. The ligaments then turn dorsally outside the foramina and fuse with the capsule of the articular facets. The thickness of the LF gradually increases from the cervical to the lumbar regions. The LF is approximately 1.5 mm in thickness at the C2-C3 level, 2.0 mm at the T11-T12 level and 4-6 mm in the lower lumbar region. Thickening of the LF was due to an increase in the amount of fibrous tissue within the ligaments, which is believed to be from a degenerative change or aging (6). Associated mucoid swelling and hyalinization of the interelastic fibrous connective tissue may contribute to a relatively radiolucent appearance of the involved noncalcified LF. LF thickening is also believed to be caused by a buckling

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of the ligaments secondary to degenerative facet-joint changes and spondylosis.

Myelopathy due to ossification or calcification of the ligamentum flavum was reported by Miyasaka K (7). Eighteen patients were described with 15 ossified LF and 3 calcified LF. Ossification was found most often in the lower third of the thoracic spine, particularly at the T9-T10 and T10-T11 levels. Certain histopathologic features were found in almost all the ossification cases. The ligamentum flavum was replaced by mature bone. Lamellar bone structure which reached to the edges of two laminae extended in places over the proliferated cartilage and fibrous tissue adjacent to the intervertebral joint. Bone tissue was definitely differentiated from cartilage in some parts but mingled with it in others. Islands of fibrous tissue of undetermined origin were seen in and around bone tissue, but there were no inflammatory cells. Calcification was seen less prominently. The ossification of the LF was considered to be endochondral in nature.

Calcification of the LF was found predominantly in the cervical spine at the C5-7 levels. On CT, this calcification presented in a unique fashion, as an oval calcified mass ventral to the lamina. The dense mass was seen in the interlaminar part of the ligament but not in the capsular part, and the unossified part of the ligament was thickened. On histologic examination, the ligamentum flavum was thickened and degenerated. Calcified granules were deposited within the degenerative ligamentous fibers. The superior layer was pushed toward the canal by the calcification and the degenerated fibers of the ligament. No mature bone was formed within the ligament.

It is assumed that ossification begins at the edges of the laminae near the capsular insertion of the ligament and extends medially, upward, and downward as it involves the ligament. General ossification diathesis in individuals and chronic mechanical stress on the site of ligamentous insertion might cause this ossification.

The calcification of the LF tends to occur within the degenerated and thickened ligament in the cervical spine. The calcified mass has no continuity with the lamina and the superficial and deep layers of the ligament are relatively preserved. The nodular shape of such lesions seems to be specific to the LF (8).

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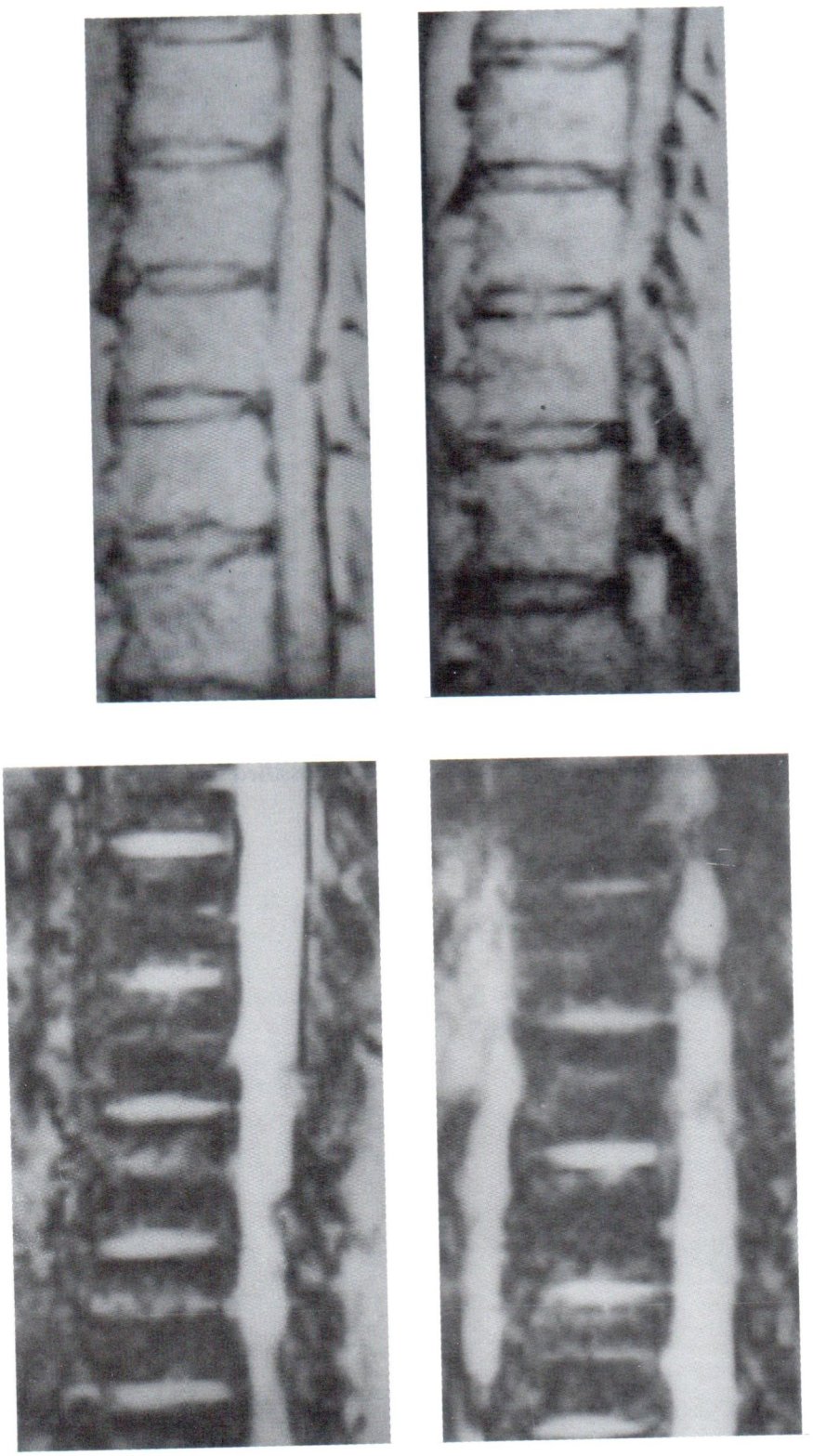

Fig. 1 T1WI, T2WI-sagittal view MRI study of the thoracic spine showed low signal ligamentum flavum on both T1WI and T2WI at multiple levels.

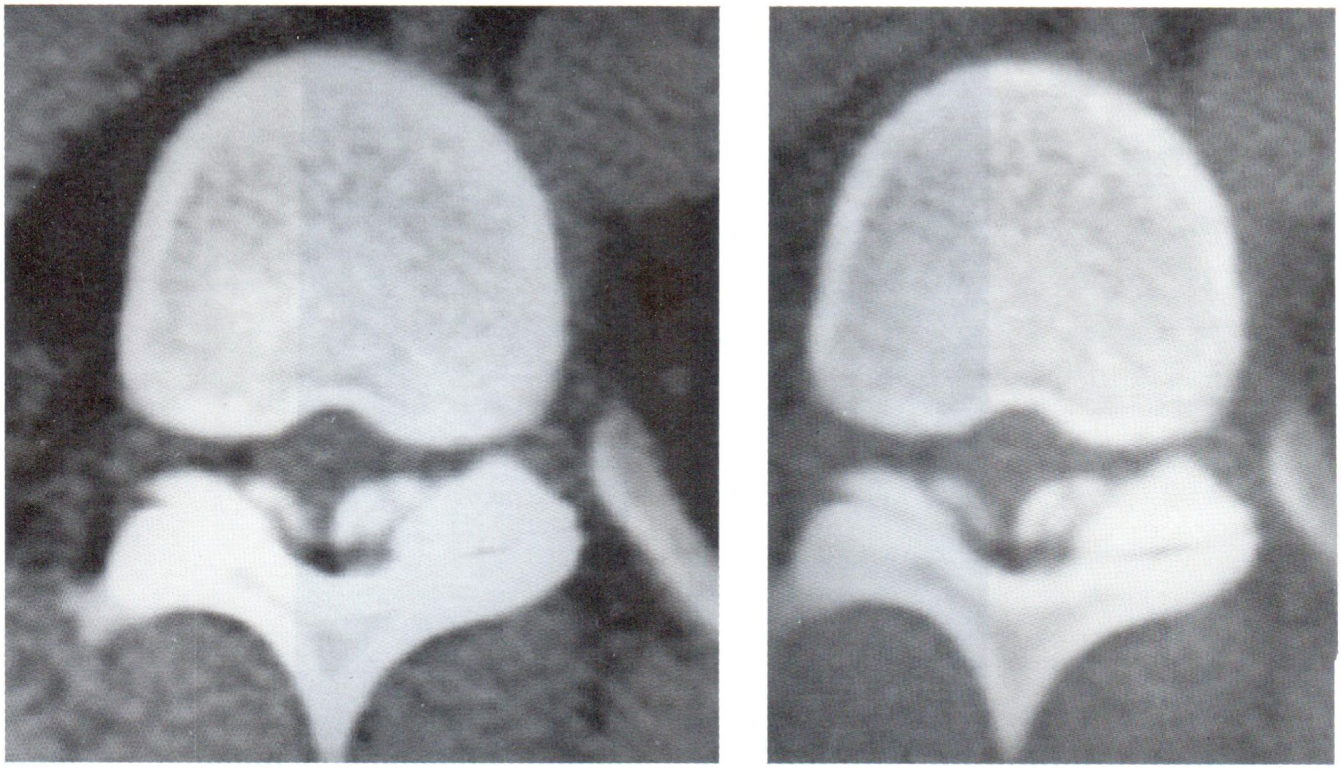

Fig. 2 Axial CT scan of the involved level showed calcified or ossified the thickened ligamentum flavum on both sides with cord compression.