Ossification of Posterior Longitudinal Ligament

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MJAFI 2004; 60 : 284-286

Key Words : Ossification; Posterior longitudinal ligament

Introduction

Ossification of the posterior longitudinal ligament (OPLL) is well demonstrated by plain radiography but is frequently overlooked. CT scan is a highly reliable modality for evaluating the extent of the lesion, in addition CT myelography images permit an analysis of the degree of encroachment on the spinal canal and compression of the cord. Magnetic resonance imaging noninvasively provides useful information about the degree and extent of spinal cord compression [1].

Case Report

An 80 year old male presented with spontaneous progressive weakness of all limbs of two months duration. There was no history of trauma. Power was grade IV in all muscle groups of the upper and lower limbs. Deep tendon jerks were exaggerated bilaterally in the upper and lower limbs. Plantars were extensor with no definite sensory level elicitable. Rhombberg's sign was positive. Routine laboratory investigations were within normal limits. Lateral radiograph of cervical spine revealed a thick, linear band like density on the posterior surface of vertebral bodies extending from C2 to C5 measuring between 9-10 mm along its entire length (Fig.1). CT scan showed similar findings with well defined focal ossification posterior to the vertebral bodies and discs with appreciable spinal cord compression (Fig.2). Patient was subjected to MR, which revealed on axial and sagittal T1WI, abnormal thickening seen as hypointense signal posterior to C2, 3, 4 & 5 vertebral bodies and discs effacing the anterior spinal subarachnoid space compressing the underlying spinal cord (Figs. 3, 4).

Discussion

OPLL is an uncommon entity having a higher incidence in the Japanese population. It is characterized by hyperplasia of cartilage cells with eventual endochondral ossification of posterior longitudinal ligament. The radiographic signs are characteristic and consist of a linear band of ossified tissue along the posterior margin of the vertebral body. OPLL can be associated with mild to serious neurological complications

due to spinal cord or nerve root compression or may be asymptomatic. Tsukimoto first recorded the association of chronic cervical myelopathy with ossification of the posterior longitudinal ligament in 1960. Terayama in 1964 introduced the term ossification of the posterior longitudinal ligament [2]. Subsequently, numerous report were published, largely Japanese, with incidence of 1 to 1.7% in Japanese population with cervical spine disorders [3]. Although previous reports have revealed a striking predominance in Japanese, increased awareness of this condition has revealed a more widespread distribution.

OPLL is more frequent in men than in women, occurring in a ratio of 2:1. The diagnosis of the disorder is usually established in the fifth to seventh decades of life, although occasionally encountered in fourth, eighth and ninth decades as seen in this case. Although OPLL may be entirely asymptomatic [1], a variety of symptoms and signs have been associated with this disorder. Ono and coworkers divided the principal neurologic symptoms into three groups: cord signs, manifested by dominant motor and sensory disturbances in the lower extremity (56%); segmental signs, manifested by dominant motor and sensory disturbances in the upper extremity (16%); and cervico brachialgia, causing no obvious neurologic deficits but associated with pain in the neck, the shoulder, and the arm (28%) [4]. There is a probable correlation between the thickness of the ossified ligament that is detectable on radiographs and the presence of neurologic manifestations; cord signs generally were noted in those cases in which the thickness of the ligament was greater than 30% of the sagittal diameter of the cervical spinal canal. On physical examination, patients may reveal muscle atrophy, fasciculations, hyperreflexia and sensory loss. Laboratory evaluation was usually unrewarding. With regard to treatment, both conservative and surgical methods have their advocates [5].

The cause of OPLL is not known. The suggested theories include an infectious aetiology, trauma, fluoride

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Fig. 1 : Radiograph lateral cervical spine shows a linear increased density on the posterior surface of vertebral bodies (arrows)

Fig. 2 : Axial CT section at the C3-C4 vertebral body and disc level showing a well defined focal ossification posterior to the vertebral body and disc with appreciable spinal cord compression

intoxication, diabetes mellitus and an immunological mechanism, perhaps related to a particular type of HLA antigen [3], although none has gained acceptance. OPLL may be apparent in as many as 50% of cases of diffuse idiopathic skeletal hyperostosis (DISH);

Fig. 3 : MR mid sagittal T1W1 cervical spine shows abnormal thickening revealed by hypointense signal posterior to the C2, 3, 4 & 5 vertebral bodies and intervening discs effacing the anterior spinal subarachnoid space compressing the underlying spinal cord

Fig. 4 : Axial T2WI through C3 level shows focal rounded hypointense signal posterior to the vertebral body compressing and displacing the spinal cord posteriorly in the spinal canal

conversely, DISH has been observed in over 20% of cases of OPLL [6]. Both these disorders are characterized by ligamentous abnormalities that may result in calcification or ossification. In addition, DISH is associated with hyperostosis, bony excrescences and osteophytosis at multiple skeletal sites, suggesting the presence of an underlying ossifying diathesis. Although fundamental pathologic differences between OPLL and DISH appear to exist, calcification and ossification of

the posterior longitudinal ligament may represent one additional manifestation of these ossifying diathesis[6].

The diagnosis of OPLL is established by its characteristic radiographic appearance. In the cervical spine (and rarely in the thoracic and lumbar spine), a dense, ossified strip or plaque of variable thickness (1 to 5 mm) is evident along the posterior margins of the vertebral bodies and the intervertebral discs. It is most common in the midcervical region (C3 to C5), although any cervical level may be affected. The intervertebral discs in the involved area generally are well preserved, without evidence of disc space narrowing; however, anterior vertebral osteophytes frequently are identifiable. Changes in the apophyseal joints are not a constant feature.

It has been suggested that clinical manifestations related to thoracolumbar ossification are more severe than those associated with cervical involvement [6], although patients with the former may be entirely asymptomatic. Often, OPLL in the thoracic and lumbar areas is associated by changes in the cervical spine [7].

MR imaging is the procedure of choice and the technique is well suited to the evaluation of patients with OPLL. In a large series [8], the MR features observed were: a band of low signal intensity between the vertebral body and the dural sac on T1- and T2- weighted spin echo images; an area of increased or intermediate signal intensity, corresponding to that of fat, within the area of ossification was observed in 56% of cases of the continuous type of OPLL and in 11% of the cases of segmental OPLL; the degree of spinal cord compression was more severe in the cases of continuous OPLL and disc degeneration frequently was an associated feature [8].

The distinctive radiographic findings of radiodense band posterior to the vertebral body associated with

OPLL should not be confused with bony outgrowths associated with spondylosis deformans or articular disorders such as ankylosing spondylitis. In spondylosis deformans, osteophytes are usually most common along the anterolateral aspect of the vertebral column; posterior excrescences are absent or of small size. In addition, osteophytes usually are triangular in shape, arising adjacent to the vertebral edge and extending in a horizontal direction. In ankylosing spondylitis, syndesmophytes initially form in the outer fibres of the anulus fibrosus. They are vertical in orientation and extend from one vertebral body to the next. Although they may involve the posterior portion of the disc, syndesmophytes are more prominent at anterior and lateral discal margins.

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