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Case Report

Rehabilitation Challenges and Outcome in a Patient with Thoracic Myelopathy due to Compression by Ossified Posterior Longitudinal Ligament in the Thoracic Spine: A Case Report

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Abstract

This study describes a 43-year-old woman with ossification of the posterior longitudinal ligament (OPLL) in the thoracic spine for several years that resulted in the compression of the thoracic spinal cord, causing lower limb paralysis. Posterior laminectomy with decompression was immediately performed for severe spinal stenosis. However, thoracic myelopathy with lower limb paralysis remained postoperatively. After an intensive 2-month rehabilitation therapy, the muscle strength of both lower limbs increased to grade 4, and she could walk with assistance of a quad cane. Activities of daily living and quality of life significantly improved at one-year follow-up. In this case, we discuss postoperative lower limb paralysis and subsequent rehabilitation. (Cheng Ching Medical Journal 2019; 15(2): 41-46)

Keywords : Ossification of the posterior longitudinal ligament, Postoperative paralysis, Rehabilitation, Thoracic spine

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Introduction

Ossification of the posterior longitudinal ligament (OPLL) is defined as an abnormal calcification of the PLL. Abiola et al. [1] published a review article to discuss multi- disciplinary opinions on OPLL; however, the pathogenesis and natural history of OPLL still varies. A small portion of these patients had undergone surgery due to neurological deterioration (e.g., paraplegia), and fewer had received more than one surgery for spinal decompression and stability. We describe a woman with postoperative paraplegia, who underwent intensive rehabilitation for post-operative OPLL and exhibited a gradual improvement in neurological deficits without a second operation.

Case Reports

A 43-year-old obese lady suffered from persistent numbness and weakness of bilateral lower extremities for many months, which motor deficit exacerbated to paraplegia in 2 weeks. She has hypertension and type 2 diabetes mellitus with medicine control for years. In 2011, weakness of bilateral lower extremities developed progressively. Neurological examination revealed impaired sensory level below T4 and paraplegia, where manual muscle testing showed grade 0/5 in the both legs. X-ray plain films, computer tomography, and magnetic resonance imaging (MRI) of the thoracolumbar spine showed OPLL extension and severe spinal cord

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compression at T3-T4 and T6-T7 (Fig.1-3). Posterior laminectomy with decompression was performed by the neurosurgeon at the exact site where displayed severer thoracic spinal stenosis (Fig.4).

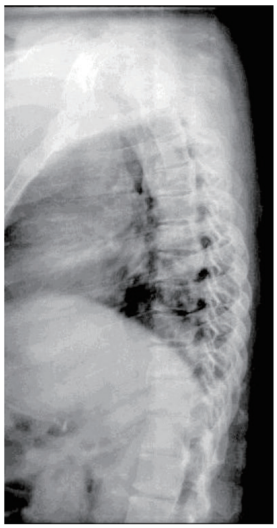

Figure 1

Figure2

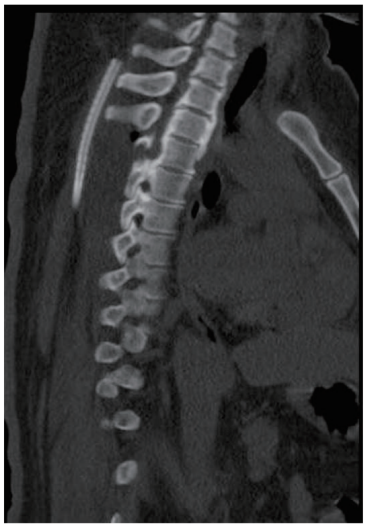

Figure2-1

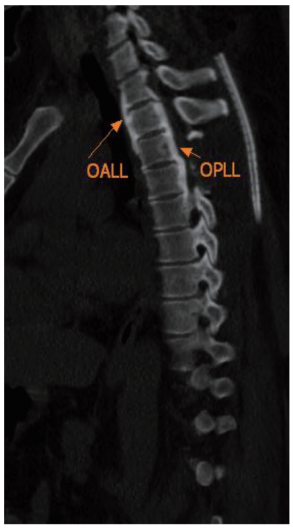

Figure 2-2

Figure 3

Figure 3-1

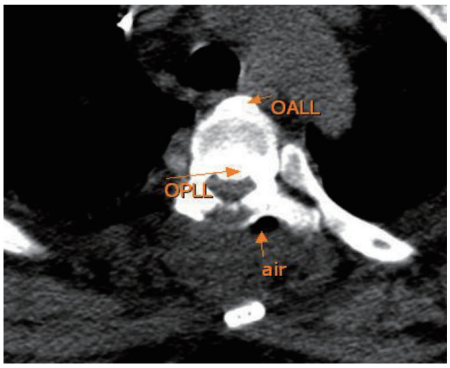

Figure 4

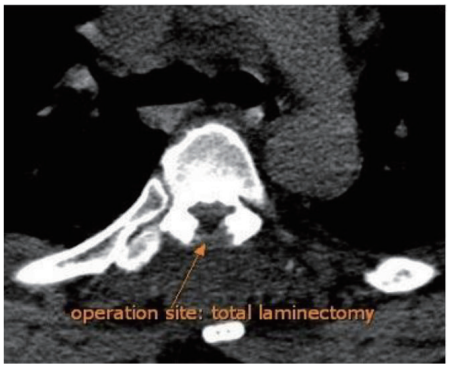

Figure 4-1

1.Figure 1(X-ray.): Plain films of thoracolumbar spine showed OPLL extension.

2.Figure 2, 2-1, 2-2(CT): Sagittal view, CT scan of the thoralumbar spine showed hypointense signal at thoracic spine, indicating severe spinal cord compression at T3-T4 and T6-T7 (upper panel). Sagittal view, CT scan of the thoracolumbar spine showed OPLL extension and severe spinal cord compression at T3-T4 and T6-T7 by OPLL (arrow, lower panel). The ossification of anterior longitudinal ligament (OALL) was also seen.

3.Figure 3, 3-1: Sagittal view, MRI scan of the thoracolumbar spine showed OPLL extension and severe spinal cord compression at T3-T4 and T6-T7 by OPLL in T1-weighted image (left panel) and T2-weighted image (right panel, arrow).

4.Figure 4, 4-1: Axial slices of CT scan of thoracic spine showed severer thoracic spinal stenosis (upper panel) and the exact site for posterior laminectomy with decompression (lower panel).

Postoperatively, paraplegia and hypoesthesia under the nipple region remained. The muscle stretch reflexes showed increased in the bilateral lower extremities. Ensuing computer tomography evidenced absence of spinal cord herniation, local infection, or hematoma. A second operation for her neurological deterioration was not absolutely indicated. She was then referred to our department for comprehensive rehabilitative therapy.

In our ward, the incomplete spinal cord injury was considered based on neurologic level of injury of T4 and an ASIA Impairment Scale of B according to the criteria of the American Spi-nal Injury Association (ASIA). Level of disability within motor and cognitive fields of Functional Independence Measure (FIM) was measured as 71/126, after examining 18 items including the functional areas of self-care, sphincter control, transfers, locomotion, communication, and social cognition. A thoracolumbar orthosis and intensive exercise programs were prescribed for trunk stability, weight-bearing training, and posture balance. Consideration of the fact of core musculatures weakness, we provided strengthening of those muscles, which are mainly the transversus abdominis, the internal and external obliques, the quadratus lumborum, and the diaphragm.

Following an 8-week of comprehensive rehabilitative therapy, muscle strength increased to grade 4/5 in bilateral lower extremities and sensory impairment revealed under bilateral inguinal region. The neurologic level of an injury of L1 and an ASIA Impairment Scale of D were noted. She was able to walk safely with a quadcane and perform most of the activities of daily living, such as grooming, feeding, dressing, locomotion, toileting and bathing with a minimal assistance. Therefore, the score of FIM increased to 117/126. She was content with the current condition and had participated well the rehabilitation by the 1-year follow-up.

Discussion

The incidence of OPLL varies from 0.16 to 2.4% worldwide and is higher in men, elderly, and Asian people [2]. Diabetes mellitus is a distinct risk factor for OPLL [2].Although the pathogenesis of OPLL remains uncertain and controversial, some studies have related it to genetic, hormonal, obesity, and environmental factors [1].A cohort study of 450 patients with OPLL has demonstrated that 17% of those develop myelopathy during a mean of 17.6-year follow-up [3]. Ehara et al. [4] found that OPLL occurs predominantly in the cervical spine. In comparison, our patient was an adult woman with a lesion in the thoracic spine.

Some reports have described patients who exhibited postoperative neurological deterioration or even paraplegia after thoracic OPLL laminectomy [5,6].The neurological deficit recurred, in case, after the first operation, the second operation is strongly indicated. Our case with OPLL at T3-T4 and T6-T7 presented as thoracic myelopathy with paraplegia postoperatively. The postoperative kyphotic changes probably contribute to the neurological deterioration observed after thoracic laminectomy [7]. However, the application of an orthosis in our case prevented the consequences of the lesion via immobilization.

The role of rehabilitation is uncertain. There was rare report to mention the outcome under the rehabilitation intervention after operation. Traditional concept has warned not to provide patient aggressive intervention because the OPLL associated with degenerative disc raises the high possibility of the increased risk of intradural disc herniation [8]. Even in the latest review article claimed insufficient evidence to make any evidence-based recommendations regarding postoperative physiotherapy use in degenerative cervical myelopathy, like OPLL [9]. In contrast, our patient did not undergo the second operation or receive any particular medicine. Instead, she received intensive rehabilitation programs, including core muscle strengthening, exercise training, and electric stimulation; her leg paralysis improved gradually within 2 months. Sadowsky et al [10] had demonstrated the activity-based restorative therapies included physical activity and exercise, as a therapeutic intervention to improve spinal cord injury related neurological deficits. Oudega et al. [11] suggested the corticospinal tract reorganization and plasticity might contribute to functional improvement after spinal cord injury. Therefore, we presume the rehabilitative therapy could improve postoperative paraplegia.

Intensive rehabilitative therapies for thoracic kyphosis include manual therapy, exercise therapy, postural re-education, and balance retraining. Manual therapy may help reduce kyphosis by restoring or increasing motion segment mobility and by stretching

the anterior vertebral soft tissues, allowing greater range of motion for active and passive thoracic extension [12]. Core muscle activation increases lumbar spinal stability [13]. All of these may decrease spinal deformity progression and avoid the complications of neurological deterioration. Therefore, we presume that spinal stabilization would be an important factor for the amelioration of thoracic kyphotic changes. A recent report from Japan showed a hybrid assistive limb training for postoperative patients enhances improvement in walking ability, even if severe impairment of ambulation and muscle weakness exists preoperatively [14].

Several previous reports described the possible predictive preoperative and intraoperative factors for good neurological recovery after PDF surgery for T-OPLL [15,16], but a latest research reported as no predictive preoperative or surgical factors could be determined for surgical outcome [17]. The discrepancy between the results of our case and the previous one might be attributed to the difference of surgical procedures, factors analyzed, and rehabilitation.

To our knowledge, this is the first case to discuss the rehabilitation effect and outcome in a patient with myelopathy due to thoracic OPLL and postoperative paraplegia.

Conclusions

We present a case of OPLL resulting in thoracic myelopathy and complicated by leg paralysis after operation. Rehabilitation intervention might play a role in enhancing trunk stability, avoiding postoperative kyphosis and improve the prognosis of function of ADL. The further rehabilitation program should be built in the field of postoperative neurological deterioration.

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胸椎後縱韌帶骨化壓迫造成胸髓病變的復健挑戰與成效：個案報告

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摘要

本報告描述一位 43 歲女性的病情，其罹患胸椎後縱韌帶骨化數年，該骨化現象發生於胸椎，進而壓迫胸髓，造成下肢癱瘓。她很快地接受胸椎椎板切除與減壓手術，但術後胸髓病變合併下肢癱瘓仍持續存在，轉至復健科接受兩個月的積極復健治療後，兩下肢肌力已增至四分，甚至能在四腳拐杖的協助下開始步行，一年後，她的生活品質大爲改善，可以獨立料理其日常生活。我們針對此案例的術後下肢癱瘓與後續復健加以討論。（澄清醫護管理雜誌 2019；15（2）：41-46）

關鍵詞：後韌帶骨化、手術後痿癱瘓、復健、胸椎

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