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Research Study

Surgical Outcomes of Thoracic Myelopathy Secondary to Ossification of Ligamentum Flavum in a Regional Hospital: A Primitive Report and Literature Review

在一所地區醫院用手術治療由黃韌帶骨化引起的胸椎脊髓病的效果 - 報告及文獻回顧

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ABSTRACT

Introduction: Symptomatic thoracic stenosis is an uncommon disease in contrast to cervical and lumbar stenosis. It has been reported that ossification of ligamentum flavum (OLF) is the most common cause of thoracic myelopathy in our locality.
Materials and methods: All patients with symptomatic thoracic spinal stenosis secondary to OLF who underwent operative treatment in our institution between January 1999 and December 2013 were retrospectively reviewed for demographic data, causes, complications and surgical outcomes.
Results: Twenty-six patients who underwent surgical treatment for symptomatic OLF were followed up for an average period of 71.3 months. All patients received decompression with concomitant instrumented fusion in 2 patients (7.7%). In our series, we had 2 cases (7.7%) of early post-operative neurological deterioration secondary to haematoma formation. Four cases (15.4%) were complicated with cerebrospinal fluid leakage. Operative outcome was reported in Frankel classification and modified Japanese Orthopedic Association (JOA) scale for thoracic myelopathy. After operation, 8 patients (30.8%) showed improvement in their Frankel grade, while 16 patients (61.5%) had no change and 2 patients (7.7%) reported deterioration. Mean JOA score showed significant improvement from 5.1 (range 2–8) to 6.9 post-operatively (range 2–11).
Discussion and conclusion: OLF is the most common cause of thoracic myelopathy in our locality. Early accurate diagnosis and adequate surgical decompression are important for favourable outcomes despite operative difficulties and possible complications.

中 文 摘 要

簡介: 相對於頸椎和腰椎管狹窄症,胸椎管狹窄是罕見的疾病。以前的研究指出,黃韌帶的骨化 (ossification of ligamentum flavum, OLF) 是在本地引致胸椎脊髓病的最常見原因。
材料和方法: 我們回顧了從 1999 年 1 月和 2013 年 12 月間, 因黃韌帶骨化引致胸椎管狹窄症而在本院接受手術治療的病人。我們回顧分析了病人資料數據,術後併發症和手術結果。
結果: 共有 26 位病人接受手術治療,平均隨訪週期為 71.3 個月。所有病人均接受減壓手術,當中有 2 例 (7.7%) 伴隨脊椎融合和內固定。在我們的病人中,有 2 例出現術後血腫形成引致早期神經功能惡化 (7.7%), 有 4 例 (15.4%) 出現腦脊液漏出。手術結果以 Frankel 分級和修訂版日本骨科協會分數 (JOA) 來作評定。手術後, 8 例 (30.8%) Frankel 分級有所改善, 16 例 (61.5%) 無明顯變化, 2 例 (7.7%) 有所惡化。平均 JOA 分數有著顯著的改善,從術前 5.1 分 (範圍 2-8 分) 升至術後 6.9 分 (範圍 2-11 分)。
討論和結論: 黃韌帶的骨化是在本地引致胸椎脊髓病的最常見原因。儘管技術困難和可能出現的併發症,早期準確診斷和適當的手術減壓對取得良好結果是非常重要的。

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Introduction

Symptomatic thoracic stenosis is uncommon in contrast to cervical and lumbar stenosis. Ossification of ligamentum flavum (OLF) is the most common cause of thoracic myelopathy in our locality. Complexity of symptomatology often leads to delay in diagnosis and subsequent treatment.[1,2] Surgical decompression is recommended for thoracic myelopathy.[3–8] Despite good posterior decompression of thoracic myelopathy, recovery rate varies widely from 25% to 100%.[4,9] The purpose of this retrospective review is to assess the clinical features and surgical outcomes of thoracic myelopathy secondary to OLF through a review of the available literature and to integrate a perspective of management in our institution.

Methods

Patients

The records of all patients with symptomatic thoracic spinal stenosis secondary to OLF who underwent operative treatment in our institution between January 1999 and December 2013 were retrospectively reviewed. Patients with thoracic stenosis secondary to infection, haemorrhage, tumour, or trauma were excluded. Patients with OLF with symptom onset after trauma were also excluded. Diagnosis of thoracic myelopathy was established on clinical symptoms, physical examination, and imaging studies. Relevant clinical features included tightness around the trunk, numbness and sensory deficitis in the lower extremities, weakness in the lower extremities, altered proprioceptive sensation,[2,10] gait disturbance, and sphincter dysfunction. Other positive physical examinations consisted of increased lower extremities muscle tone and deep tendon reflexes, and presence of pathological reflexes. Plain radiographs of the thoracic spine were performed to rule out fractures. Computer tomography was arranged to confirm the presence of OLF and the type of OLF (Figures 1 and 2), and to look for ossification of dura. Magnetic resonance imaging was used to detect signal changes in the spinal cord. Other clinical factors were also reported, such as sex, age, number of levels involved, and other combined spinal disorders.

Preoperative clinical evaluation

The preoperative duration between the onset of symptoms and time of surgery was determined from medical records. Patients were divided among the following groups: (1) duration of < 6 months; (2) from 6 months to 1 year; (3) from 13 months to 2 years; and (4) > 2 years. The neurological status was assessed by an independent observer with the Frankel classification (Table 1) and modified Japanese Orthopaedic Association (JOA) scale for thoracic myelopathy (Table 2). The maximum JOA score of 11 indicated normal function.

Figure 1. Nonfused-type ossification of ligamentum flavum (OLF).

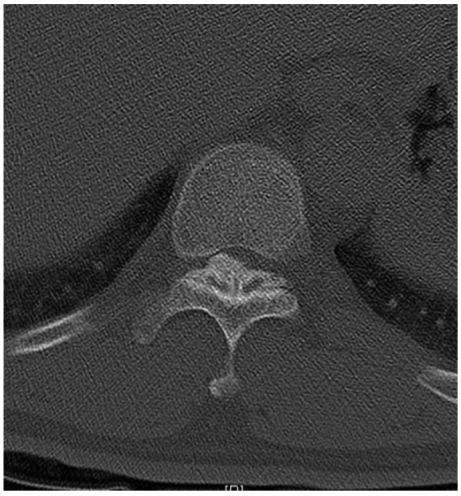

Figure 2. Fused-type ossification of ligamentum flavum (OLF).

Surgical approaches and outcomes

Information on levels of involvement, surgical procedures and complications, postoperative Frankel classification and JOA score, and history of additional spinal surgeries were extracted from medical and operative records. The levels included in decompression correspond to signal changes on magnetic resonance imaging. Decompression was performed in all patients by the same team of experienced spine surgeons. Concomitant posterior spinal instrumented fusion was also implemented in selected patients with the use of transpedicular screws and longitudinal rods to restore normal spinal alignment and maintain spinal stability. Surgical outcomes were presented as the recovery rate calculated from the Hirabayashi formula:

$$(\text{postoperative JOA score} - \text{preoperative JOA score})/(11 - \text{preoperative JOA score}) \times 100 \quad (1)$$

Table 1
Frankel classification

Grade A	Complete neurological injury—no motor or sensory function clinically detected below the level of the injury
Grade B	Preserved sensation only—no motor function clinically detected below the level of the injury; sensory function remains below the level of the injury but may include only partial function
Grade C	Preserved motor nonfunctional—some motor function observed below the level of the injury, but is of no practical use to the patient
Grade D	Preserved motor function—useful motor function below the level of the injury; patient can move lower limbs & walk with or without aid, but does not have a normal gait or strength in all motor groups
Grade E	Normal motor—no clinically detected abnormality in motor or sensory function with normal sphincter function; abnormal reflexes, & subjective sensory abnormalities may be present