Successful Treatment of Cervical Spondylolysis with Grade-II Spondylolisthesis using Single-Level ACDF: A Case Report

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Patient: Male, 52-year-old
Final Diagnosis: Cervical spondylolysis with Grade-II spondylolisthesis
Symptoms: Posterior neck pain and numbness of bilateral upper limb
Clinical Procedure: —
Specialty: Surgery

Objective: Rare coexistence of disease or pathology

Background: Cervical spondylolysis with spondylolisthesis is a rare disorder. According to previous reports, the spondylolisthesis is usually Meyerding Grade I, with only a limited number of cases receiving surgical treatment. We hereby report a special case of cervical spondylolysis with Grade-II spondylolisthesis, treated with single-level anterior cervical discectomy and fusion (ACDF), and present a literature review related to this problem.

Case Report: Here, we report the case of a 52-year-old man who complained of posterior neck pain and numbness of the bilateral upper limbs. Radiological examination showed bilateral spondylolysis of the C6 and Meyerding Grade-II spondylolisthesis of C6 on C7 with instability. The patient underwent a single-level C6/C7 ACDF surgery. The symptoms of neck pain and bilateral upper-limb numbness were relieved immediately after surgery. The immediate postoperative radiological examination showed successful restoration of sagittal alignment. At 3-month follow-up, the patient had returned to normal life without any symptoms. At 2-year follow-up, computed tomography showed that C6-C7 fusion had been achieved and alignment was maintained.

Conclusions: Cervical spondylolysis, as an uncommon spinal disorder, has been regarded as a congenital abnormality, and has unique radiological characteristics. For most of the cases with cervical spondylolysis, even with Grade-II spondylolisthesis, single-level ACDF can achieve good clinical and radiological outcomes.

Keywords: Spondylosis • Cervical Vertebrae • Spondylolisthesis

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Introduction

Cervical spondylolysis was firstly described by Perlman and Hawes in 1951 [1]. It is defined as a “corticated cleft between the superior and inferior articular facets of the articular pillar, the cervical equivalent of the pars interarticularis in the lumbar spine” [2]. Until now, there has been a lack of comprehensive knowledge of its pathophysiologic process and treatment standards. According to previous reports, spondylolisthesis is usually Meyerding Grade I, and only a limited number of cases have received surgical treatment [2,3]. Here, we report a special case of a patient with cervical spondylolysis and Grade-II spondylolisthesis treated with single-level anterior cervical discectomy and fusion (ACDF).

Case Report

A 52-year-old man complained of posterior neck pain for 1 year and numbness of his bilateral upper limbs for 3 months when flexing the neck, which seriously affected his daily living and work, including driving and working at a desk. The upper-limb numbness area encompassed mainly the radial side of the forearm and middle finger. He felt comfortable...
when he extended his neck, and the numbness was relieved. He had tried conservative methods to address his symptoms, including rest and oral nonsteroidal anti-inflammatory drugs (NSAIDs). However, the symptoms did not improve and displayed a tendency toward aggravation. There was no remarkable history of trauma. Physical examination showed that the range of motion of his neck was not restricted. Mild tenderness at the spinous process at the C6 level was present. The neurologic examination, including sensory, motor, and reflexes, was normal. No pathological reflexes were observed, including Hoffmann sign, Babinski sign, or ankle clonus. Visual analogue scale (VAS) score for neck pain was 4, and neck disability index (NDI) score was 11. Radiological examination of the patient’s cervical spine, including X-ray, computed tomography (CT), and magnetic resonance imaging (MRI) (Figure 1), showed bilateral pars interarticularis defects at the C6 level and Meyerding Grade-II spondylolisthesis of C6 on C7. A flexion and extension X-ray showed C6-C7 instability. On the anteroposterior X-ray and CT scan, spina bifida with midline bone cleft in the spinous process at C6 was present. MRI showed no cord compression and multilevel disc with degeneration sign. In addition, lumbar spine X-ray showed spina bifida of S1.

The diagnosis of “cervical spondylolysis with spondylolisthesis (C6/C7, Meyerding Grade II)” was made. Considering the fact that the symptoms were caused by the instability at the C6/C7 level, surgical treatment was adopted. Due to the bilateral C6 spondylolysis, the abnormal anatomical structure around the posterior lateral mass made a lateral mass screw or pedicle screw of C6 impossible. Therefore, ACDF surgery of C6/C7 was performed. The C6/C7 disc was removed and the posterior longitudinal ligament was preserved since there was no compression of the cord. An 8 mm-height polyetheretherketone (PEEK) cage was inserted in the intervertebral space and a small plate was attached to the front of the spine with fixation by 4 screws. The symptoms of neck pain and bilateral upper-limb numbness were relieved immediately after surgery. The immediate postoperative X-ray, CT scan, and MRI showed stable fixation and successful restoration.
of sagittal alignment (Figure 2). The patient was asked to wear a cervical collar for 1 month. At the 3-month follow-up, the patient had returned to normal life, without any symptoms, and the range of motion of his neck was not affected. The X-ray and CT scan showed that C6-C7 intervertebral fusion had been achieved, and alignment was maintained after surgery. The CT scan showed that the bilateral pars interarticularis defect at the C6 level had narrowed, and showed signs of fusion.

Discussion

To date, a limited number of cases of cervical spondylolysis have been reported in the literature. Cervical spondylolysis has
been regarded as a rare disorder, with no definite incidence reported in the literature [4]. Most of the reported cases are in adult men, but pediatric cases account for 25% of reported cases [5]. The proportion of cervical bilateral spondylolysis was reported as approximately 25%. In unilateral cases, the left side was more common. The etiology of cervical spondylolysis has not been established. It has been widely accepted that congenital cause is the predominante theory [6,7]. Cervical spondylolysis can occur in all subaxial levels [8,9]. However, C6 is the most commonly affected level in cases of cervical spondylolysis, an observation that can be explained by the role of C6 as a translational vertebra with more stress than other segments.

The presentation of cervical spondylolysis may manifest with different symptoms, ranging from a click following cervical movement to mild neck pain, stiffness, radiculopathy, and myelopathy. However, cervical pain without any neurologic deficit is most often seen. Many cases were discovered by incidental radiological finding after minor trauma [5,10].

The radiological characteristics of cervical spondylolysis are quite specific [11]. X-ray, CT scan, and MRI are all needed and necessary to comprehensively evaluate cervical spondylolysis [2]. According to previous reports, most cases of spondylolisthesis are Meyerding Grade I, and measure less than 3 mm [12]. The current reported case of cervical spondylolysis was associated with Grade-II spondylolisthesis. Cervical segmental instability was found in 30% of spondylolysis cases [11]. Spinal bifida at the involved level occurred in 60% of the cases [13]. It is important to recognize its characterized radiological features and differentiate it from acute traumatic cervical fracture or dislocation in patients with neck injuries [14]. Cervical spondylolysis can cause biomechanical alterations, especially in axial rotation, leading to increased disc stresses and range of motion [15].

The choice of treatment for cervical spondylolysis varies among different patients, depending on the symptoms and severity. Until now, there has been no definite standard available to follow for determining treatment options. In most of the cases in the literature, conservative treatments have been adopted to relieve the symptoms, including cervical collar, oral NSAIDs, and rehabilitation methods [16,17]. However, when there was instability on imaging or clinical neurologic deficits,
and failure of conservative measures, surgical management was often required [6,18].

Until now, only a limited number of cases receiving surgical treatment had been reported in the literature, including anterior, posterior, and circumferential cervical fusion [19,20]. Based on the anatomic view, the spondyloysis with pars interarticulare defect made it difficult to perform lateral mass screw and pedicle screw insertion. For the current case of C6 spondyloysis with spondylolisthesis, if posterior surgery had been adopted, C5-C7 fixation would be the only choice, which entails the loss of an additional cervical motion segment. Most of the surgical cases in the literature were treated with anterior fusion surgery. Except for the cases with serious cervical spinal injury, posterior surgery was not necessary [19]. Single-level ACDF is recommended as the choice of treatment. It can achieve good results of spondylolisthesis reduction and fusion, even for Grade-II spondylolisthesis, as in the current case. According to previous published case reports, there was no obvious difference in surgical technique, complications, and risks of ACDF for cervical spondyloysis compared with ACDF for other cervical spinal diseases.

Conclusions

Cervical spondyloysis, with or without spondylolisthesis, is an uncommon spinal disorder that has been regarded as a congenital abnormality. For most cases, even with Grade-II spondylolisthesis, single-level ACDF was able to achieve good clinical and radiological outcomes.

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References: