

## Anterior migration of spinal cord after cervical corpectomy

Yu Qian · Guojian Xu · Jun Zhang ·  
Xiaofeng Zhao · Dong Wen

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**Abstract** Posterior migration of spinal cord is a common complication of posterior cervical decompression, whereas anterior migration of spinal cord after anterior cervical decompression has not been reported previously. This report presents a case of anterior migration of spinal cord after cervical corpectomy. A 65-year-old male underwent a cervical corpectomy of the C4 and C5 for cervical spondylotic myelopathy. The postoperative MRI showed that spinal cord was decompressed. However, at 12 months postoperatively, the patient complained that improved gait aggravated again, and the MRI showed an anterior migration of the spinal cord at the level of the C4 and C5, and a compression of spinal cord at the level of caudal endplate of C3. Secondary surgery, laminoplasty of C3 and C4 was conducted. The postoperative MRI showed that the spinal canal increased at the C3 and C4 levels, and the spinal cord went through smoothly without sharp turning.

**Keywords** Corpectomy · Complication · Spinal cord migration · Cervical spondylotic myelopathy

### Introduction

Anterior cervical corpectomy has been commonly performed for cervical spondylotic myelopathy for decades, and the relevant complications of this procedure have been discussed extensively. The common ones included iatrogenic injuries of adjacent blood vessels, nerves and

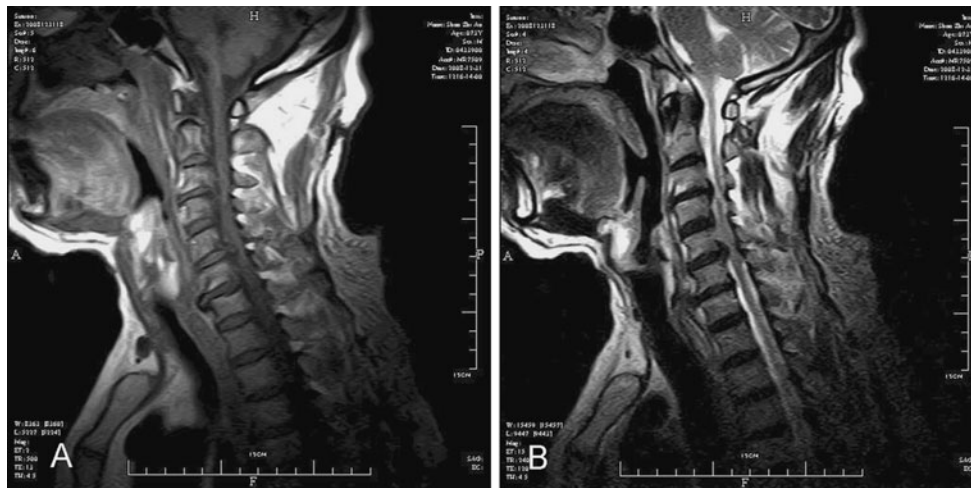
oesophagus [1–5]; bone graft related complications [6–8] and internal fixation related complications [2, 9]. However, spinal cord migration, a common complication in posterior cervical decompression procedure [10–12], has not been reported as a complication of anterior decompression surgeries. We describe a case of an anterior migration of spinal cord after anterior cervical corpectomy in a patient with cervical spondylotic myelopathy.

### Case Report

A 65-year-old male had a 6-month history of numbness in his fingers and “unbalance” gait. Neurological examination showed hyperreflexia, quadriparesis, and spasticity in all four extremities. The preoperative MRI showed the marked stenosis of the cervical spinal canal from C3 to C6 (Fig. 1). The patient was diagnosed with cervical spondylotic myelopathy and the JOA score was 9 points. Corpectomy of C4 and C5 and fusion from C3 to C6 via anterior approach was performed, and the posterior longitudinal ligament from C4 to C5 was removed as well. Numbness of upper extremities and unbalanced gait were gradually released after decompression procedure and the JOA score increased to 12 points at 3 months postoperatively. The postoperative MRI confirmed that spinal cord was decompressed. (Fig. 2).

The patient complained that the gait got “unbalance” again from 12 months postoperatively, and the JOA score dropped to 9 points again. X-ray showed that cervical fusion was achieved from C3 to C6 without migration of plate and screws, whereas MRI showed an anterior migration of the spinal cord at the level of the C4 and C5, and at the level of caudal endplate of C3, the spinal cord turned sharply, and high information in the spinal cord was

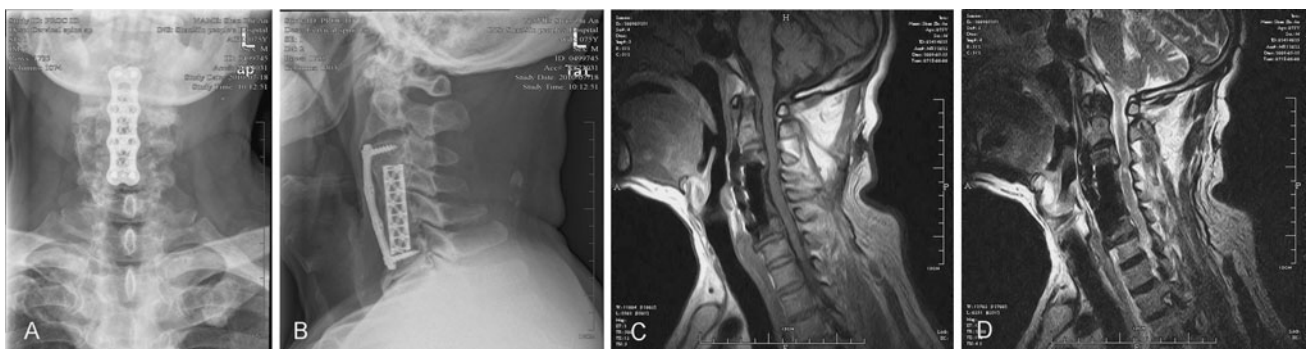
Y. Qian (✉) · G. Xu · J. Zhang · X. Zhao · D. Wen  
Department of Orthopaedic, Shaoxing People's Hospital,  
Shaoxing, Zhejiang 312000, China  
e-mail: doctor120@hotmail.com



**Fig. 1** The preoperative MRI showed the stenosis of spinal canal from C3 to C6 and the spinal cord was compressed



**Fig. 2** X-ray showed that the anterior corpectomy of C4 and C5 with cervical fusion from C3 to C6 was performed after primary surgery, and MRI showed that the spinal cord compression was released by corpectomy

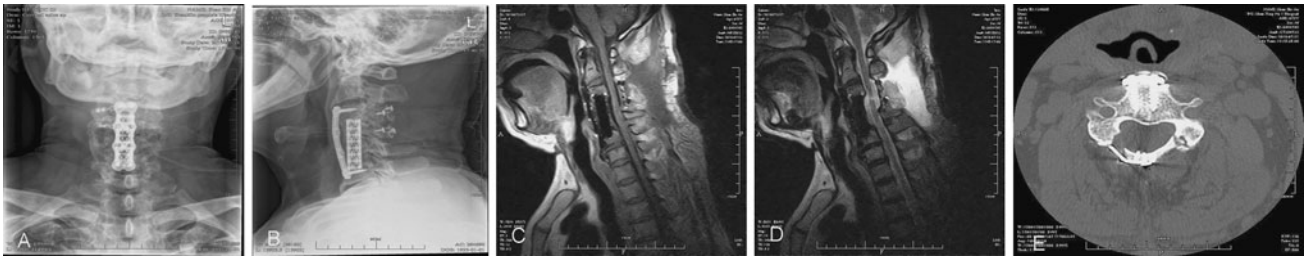


**Fig. 3** X-ray showed that cervical fusion was achieved from C3 to C6 without migration of plate and screws at 12 months postoperatively (a, b). MRI showed the anterior migration of spinal cord at the

level of C4 and C5, and at the level of caudal endplate of C3, the spinal cord turned sharply (c, d), and high information zone in the spinal cord was observed beneath the turning in T2 weight (d)

observed beneath the turning in T2 weight (Fig. 3). Secondary surgery, laminoplasty of C3 and C4 via posterior approach was conducted at 15 months after the primary surgery. The postoperative MRI showed that the spinal

canal increased at C3 and C4 levels, and the spinal cord went through smoothly without sharp turning (Fig. 4). The JOA score increased to 11 points 4 weeks after secondary surgical procedure.



**Fig. 4** X-ray, MRI and CT after secondary surgery showed that the spinal canal increased at the C3 and C4 levels (a–e), and the spinal cord went through smoothly without sharp turning (c, d)

## Discussion

The purposes of surgical procedure for cervical spondylotic myelopathy are decompression of spinal cord and reconstruction of cervical lordotic alignment. Basically, there are two approaches for cervical spinal cord decompression, anterior approach and posterior approach [13, 14]. Mostly, the compression such as herniated disc and/or osteophyma of vertebral bodies are from the anterior of spinal cord, and the discectomy or corpectomy via anterior approach is commonly believed to be able to achieve direct decompression for spinal cord, while laminoplasty or laminectomy via posterior approach is widely accepted as an indirect decompression and recommended for cervical myelopathy with multilevel spondylosis [15, 16].

The complications of decompression surgeries for cervical spondylotic myelopathy have been widely discussed, including approach relevant lesions [17, 18], decompression relevant nerve lesions [19, 20], fusion relevant adjacent segment disease [21] and others [22–24]. Migration of spinal cord is one of the complications of decompression surgical procedure which has been reported for years [10–12]. Due to the physiological lordosis of cervical spine, it is understandable that all the previous discussions focus on the posterior migration of spinal cord after posterior decompression, laminoplasty or laminectomy procedure [10–12], and according to the literature available, it has not been reported the anterior migration of spinal cord after anterior decompression procedure for cervical spondylotic myelopathy.

In this case, corpectomy of two segments via anterior approach was conducted in primary surgical procedure, and posterior longitudinal ligament was removed as well. Compared to the MRI view at 3 months postoperatively, significant anterior migration of spinal cord was observed at 12 months postoperatively, and the secondary surgery was necessary since the spinal cord compression occurred at the interface between decompression area and non-decompression area.

There are three possible causes of anterior migration of cervical spinal cord after anterior decompression in this case. The first one is corpectomy of multiple levels. In this

case the posterior wall of C4 and C5 vertebral bodies was removed, along with posterior longitudinal ligament at these two levels. It means that the anterior wall of cervical spinal canal was opened. Thus, there would be space for anterior migration of spinal cord. Secondly, the enlargement of spinal cord occurred after decompression. It was reported that the anteroposterior diameter of cervical cord enlarged after posterior decompression, and it was significantly correlated with spinal canal expansion [15, 25, 26]. Since the anterior wall of spinal canal had been opened, the enlarged spinal cord would herniate to the opened “window”. The third possible cause is lordotic alignment cervical spine. The study conducted by Baba et al. [25] demonstrated that the posterior cord migration was significantly correlated with spinal cord lordosis after posterior decompression procedures for cervical spondylotic myelopathy. In this case, the physiological curve of cervical spine decreased the preoperatively, and little lordosis was reconstructed after the primary procedure. As a result, the postoperative spinal cord with little lordosis increased the risk of anterior migration of cord.

Several lessons can be taken from this case. The awareness of anterior migration of spinal cord as a complication of anterior decompression for cervical spondylotic myelopathy should be raised by spine surgeons. Anterior migration of spinal cord might occur after multiple level corpectomy, especially when the posterior longitudinal ligament is removed during the procedure. Spinal cord compression might occur at the level between decompression area and non-decompression area. Adequate reconstruction of cervical lordosis and the removal of posterior osteophyma of adjacent vertebra might decrease the risk of the anterior migration of spinal cord and cord compression.

**Conflict of interest** None of the authors has any potential conflict of interest.

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