Unilateral foot drop caused by thoracic herniated intervertebral disc

Heng-Juei Hsu, James Sze, Chien-Kuo Wang, Jung-Shun Lee

ABSTRACT

Introduction: Among the spinal disorder, unilateral weakness of foot dorsiflexion (drop foot) usually arises from lumbar herniated intervertebral discs (HIVD), especially at the L4/5 level. In contrast, symptomatic thoracic HIVD is rare, and the most common symptoms are pain and sensory disturbance along the involved root dermatomes. Myelopathy below the affected spinal level has been reported with central and large thoracic disc herniation.

Case Report: We report a male patient with left drop foot, who was initially ascribed to lumbar spondylosis from magnetic resonance imaging (MRI) findings. After meticulous neurologic examination, the cause of drop foot was thoracic (T10/11) HIVD, which was completely recovered after surgical decompression.

Conclusion: We review the literature regarding single level of thoracolumbar herniated disc, detail the pathogenesis of drop foot caused by low thoracic HIVD, and remind the importance of correlating physical examinations and imaging findings.

Keywords: Foot drop, Thoracic herniated intervertebral disc, Upper motor neuron

INTRODUCTION

Symptomatic thoracic herniated intervertebral disc (HIVD) is rare because the tight connection of the rib cage to each level of the thoracic spine restricts the flexibility of the thoracic spine [1, 2]. The most common symptoms of thoracic HIVD are pain and sensory disturbance along the involved root dermatomes [3, 4]. Myelopathy below the affected spinal level has been reported with central and large thoracic disc herniation. In contrast, unilateral weakness of foot dorsiflexion (drop foot) usually arises from lumbar HIVD, especially at the L4/5 level. Herein, we report a male patient who presented with left drop foot caused by low thoracic (T10/11) HIVD, and completely recovered after surgical decompression. We also detail the pathogenesis of drop foot caused by low thoracic HIVD and the importance of correlating physical examinations and imaging findings.
CASE REPORT

A 69-year-old male with no underlying diseases presented with the insidious onset of back pain and bilateral lower extremity paresthesia (the left side was greater than the right side) one month before this presentation. Left foot weakness progressed over the following 4–5 days, and his ambulation was limited to walking with a quadricane. No bowel or bladder dysfunction was noted. Neurological examinations demonstrated weakness of left foot dorsiflexion (1/5) and increased ankle jerk and patellar reflexes (+++) (Figure 1A). Lumbar spine MRI demonstrated lumbosacral spondylosis and stenosis of L4–L5, with a higher degree of severity on the right side than the left (Figure 1B, C). These findings did not correspond to the clinical signs of left foot drop and upper motor neuron (UMN) injury. A subsequent thoracic spine MRI revealed extensive HIVD at the level of T10/11 with associated spinal cord signal changes (Figure 1D, E). Under the impression of T10/11 HIVD, he underwent T10/11 transfacet discectomy. Intraoperatively, a large ruptured disc at the axilla of the T10 root was noted, which was significantly compressed against the spinal cord and was subsequently removed (Figure 1F). Postoperatively, the numbness improved immediately, and the drop foot had completely resolved one month later (Figure 1G).

DISCUSSION

Foot drop is characterized by weakness of the tibialis anterior, extensor hallucis longus, and extensor digitorum longus, and can be caused by muscle, peripheral nerve, spine, and brain disorders. Regarding spinal disorders, lumbosacral HIVD or stenosis, especially at the L4/5 or L5/S1 level, is the most common etiology. A single-level herniated thoracic disc resulting in drop foot is rare, and the pathogenesis is thought to involve a combination of compression to both the spinal cord and cauda equina [5, 6]. Neurologically, drop foot elicited by compression of lumbosacral roots is considered to be a sign of low motor neuron (LMN) injury. Pain and sensory disturbance along the dermatomes of the involved roots are the classical signs of LMN, whereas UMN signs include weakness, spasticity, and increased deep tendon reflex below the lesion. Anatomically, the distal end of the spinal cord, conus medullaris, corresponds to vertebrae L1/2, while the T9–T12 vertebrae correspond to the T11-S1 myelomeres. Since individual variations are considerable, low thoracic HIVD may extend compression to the exiting nerve roots or the spinal cord itself, which contributes to UMN and/ or LMN signs.

In a literature review of cases of drop foot caused by single-level thoracic HIVD, T10/11 disc herniation mostly causes lower extremity weakness and increased patella and Achilles tendon reflex. T11/12 disc herniation also had lower extremity weakness but not patella hyperreflexia.
whereas T2/L1 disc herniation was reported to present with LMN signs and the absence of both patella and Achilles hyperreflexia [5, 6]. As mentioned, the discrepancies in deep tendon reflex with different levels of low thoracic HIVD were proportional to the dominant compression of the corticospinal tract or the exit roots and nuclei of the reflex arc [4].

Surgical decompression is mandatory for foot drop caused by lumbosacral/thoracic HIVD, and recovery of the affected foot has been reported to be higher in patients with thoracic HIVD (>90%) than in those with lumbosacral HIVD (41–65%) [5–10]. Lumbosacral MRI is conducted more frequently than cervical/thoracic MRI, which may include a certain number of asymptomatic lumbosacral spondylosis. Although unilateral foot drop with imaging findings of lumbosacral spondylosis is often suggestive of a lumbosacral lesion, meticulous neurological examinations to rule out any associated UMN signs are essential. Making a proper and early diagnosis of thoracic HIVD with early surgical decompression can result in complete recovery of the dorsiflexors.

CONCLUSION

This is an educational case report of a patient who initially presented with low extremity neurological symptoms accompanied by the MRI finding of lumbar spondylosis. Although the symptoms are partially similar between low thoracic HIVD and lumbar spondylosis, integrating clinical signs based on careful neurologic examinations with imaging findings is crucial in making a correct diagnosis and subsequent treatment strategies.

REFERENCES


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Author Contributions
Heng-Juei Hsu – Conception of the work, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

James Sze – Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Chien-Kuo Wang – Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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Guarantor of Submission
The corresponding author is the guarantor of submission.

Source of Support
None.

Consent Statement
Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest
Authors declare no conflict of interest.
Data Availability
All relevant data are within the paper and its Supporting Information files.

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