

## Thoracic Disc Herniation Presenting with Predominant Abdominal Pain

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### Abstract

**Introduction:** The incidence of symptomatic thoracic disc herniation (TDH) is quite low, and most patients present with either radiculopathy as pain in the chest wall or thoracic myelopathy involving the lower extremities. However, not only these typical symptoms, but also various other symptoms pointing to other general diseases can be the sole presenting complaints. We describe a rare case in which a patient presented with predominant abdominal pain caused by thoracic disc herniation.

**Materials and Methods:** Retrospective data analysis and review of the literature.

**Results:** A 45-year-old man experienced sudden onset of abdominal pain and presented to our internal medicine outpatient clinic. Due to obvious concomitant paraplegia, he was referred to our department. Physical examination revealed spastic paraplegia below the T10 dermatome level. Thoracic magnetic resonance imaging showed disc herniation at the T9-10 level. Herniotomy was performed, and abdominal pain completely disappeared immediately postoperatively.

**Conclusions:** Although the anatomical location within a given axial cross-section of the spinal cord where visceral pain is processed is still controversial, some reports have defined the visceral nociceptive pathway as ascending in the midline of the dorsal columns, particularly in the nucleus gracilis. Damage to this pathway seems to represent a cause of abdominal pain with TDH. Further investigations in this area are required to elucidate the exact mechanisms involved. Surgeons should be aware of atypical presentations of TDH, to prevent misdiagnosis and progression to irreversible myelopathy.

**Keywords:** Thoracic disc herniation; Abdominal Pain; Myelopathy; Nucleus gracilis; Greater splanchnic Nerve; Dorsal column; Visceral pain

### Introduction

The incidence of symptomatic thoracic disc herniation (TDH) has been reported as 1 per million per year [1]. Most patients present with either radiculopathy as pain in the chest wall or thoracic myelopathy involving the lower extremities. However, various other symptoms suggestive of other diseases such as coronary artery disease, aorta dissection, or visceral disease can be the sole presenting complaints [1-5]. Such confusing symptoms may lead to either unnecessary operations based on misdiagnosis or progressive neurological compromise. To avert such mishaps, an understanding of the atypical presentations of TDH is necessary. We describe herein a rare case of a patient who presented with predominant abdominal pain caused by TDH.

### Case Report

A 45-year-old man with a history of ulcerative colitis 16 years earlier presented with a 1-month history of melena. One morning when he woke up, he noticed weakness in the lower extremities. One hour later, he experienced sudden acute pain in the right hypochondrium and could not keep standing. He visited the Department of Digestive Organs at our institution the same day because of predominant abdominal pain and melena. As no abdominal tenderness with muscular defense or non-urgent laboratory data results were evident and the primary gastroenterologist noticed the concomitant paralysis in the lower extremities, he was brought to the Department of Orthopedic Surgery. He could maintain balance in a sitting posture, but could not keep a standing position or and keep bent-over position because of abdominal pain. Neurological evaluation showed hyperreflexia of both lower extremities. Pinprick sensation was decreased (6/10) below the level of the right T10 dermatome, but touch sensation remained intact. Muscular weakness was seen in the iliopsoas (2/2), quadriceps (4/4), tibialis anterior (4/3), extensor hallucis longus (3/2), gastrocnemius

(3/3), and gluteus medius (3/3) on manual muscle testing. When the patient was first seen, he was not aware of any bladder or bowel disturbances, but bladder and bowel dysfunction became evident with urinary retention after 12 h, and residual urine was found on urethral catheterization. The Japanese Orthopaedic Association (JOA) score for thoracic myelopathy (maximum, 11) (Table 1) [6] was 2 points (motor function of lower extremity, 0; sensory function of lower extremity, 1; sensory function of trunk, 1; bladder function, 0), and Frankel grade [7] was C. Radiography of the thoracic spine demonstrated spondylotic changes and disc space narrowing at the T9-10 level (Figure 1). Magnetic resonance imaging (MRI) showed disc herniation at the T9-10 level (Figure 2a) and axial sections showed compression of the thoracic spinal cord from the left side (Figures 2b and 2c). Although no definitive cause of the abdominal pain was clear, emergency surgery for TDH was performed due to obvious progressive myelopathy. T9-10 partial laminectomy and facetectomy on left side using a high speed drill was performed to achieve resection of the disc herniation. The herniation was extruded from the posterior longitudinal ligament and was excised from the dura mater without difficulty. Fortunately, complete relief of abdominal pain was obtained immediately postoperatively, with concomitant neurological recovery. On postoperative day 7, the

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Category	Score (Point)
Motor function	
Lower extremity	
Unable to stand and walk by any means	0
Unable to walk without a cane or other support on a level	1
Walks independently on a level but need support on stairs	2
Capable of fast but clumsy walking	3
Normal	4
Sensory function	
Lower extremity	
Apparent sensory disturbance	0
Minimal sensory disturbance	1
Normal	2
Trunk	
Apparent sensory disturbance	0
Minimal sensory disturbance	1
Normal	2
Bladder function	
Urinary retention and/or incontinence	0
Sense of retention and/or dribbling and/or thin stream and/or pollakiuria	1
Urinary retardation and/or pollakiuria	2
Normal	3

Table 1: Japanese Orthopaedic Association (JOA) scores for thoracic myelopathy.

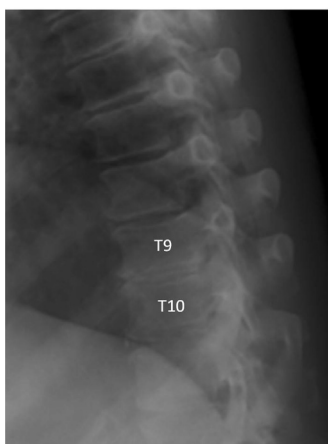


Figure 1: Radiography of the thoracic spine, demonstrating spondylotic changes and disc space narrowing at the T9-10 level.

patient showed no bladder or bowel disturbances, and independent gait. Postoperative MRI demonstrated decompression of the spinal cord and nerve root (Figures 2d-f). Follow-up neurological examination at 3 years postoperatively showed just only dysesthesia in both feet but no other abnormal findings. The JOA score had recovered to 10 (4-1-2-3), and Frankel grade had also recovered to D., and no recurring symptoms of the disc herniation was evident.

## Discussion

This patient showed predominant abdominal pain caused by TDH that was able to be promptly diagnosed and treated due to the concomitant severe myelopathy. TDH is commonly asymptomatic and the natural history has been reported to show little change in size and to remain asymptomatic [8]. Even in cases of symptomatic TDH, spontaneous resolution has been reported [9]. However, in rare settings, TDH presents with atypical symptoms such as chest or abdominal pain. According to several reports, patients with TDH

who present with symptoms mimicking chest or abdominal pain were treated unsuccessfully because of delayed diagnosis [3,10].

Although spinal cord disorders can be a cause of abdominal pain, the anatomical location within a given axial cross-section of the cord where visceral pain is processed remains controversial [11-16]. Visceral and somatic afferent fibers may attribute to different spinal locations, including dorsal columns, spinothalamic and spinocerebellar tracts, and the dorsal and ventral horns. Kim and Kwon [17] reported thoracic midline dorsal column myelotomy at the C7-T2 level as a successful treatment for severe visceral pain due to advanced stomach cancer. Nauta et al. [18] reported thoracic midline dorsal column puncture at the T8 level as an effective treatment for severe lower abdominal pain due to uterine cancer. They defined the visceral nociceptive pathway as ascending in the midline of the dorsal column, particularly in the nucleus gracilis. Further investigation in this area is required to elucidate the exact conducting pathways.

We deduced the following two mechanisms for predominant abdominal pain in this case. First, bony compression such as by a contralateral superior facet joint or pedicle could have induced contralateral friction radiculitis [19], because the symptom was contralateral to compression in this case. In addition, for ipsilateral symptoms, Jooma et al. [20] noted that radiculopathy associated with lower thoracic (T8-T12) lesions can present as surface or visceral abdominal pain. Simeone [21] reported that radiculopathy at the T7-10 level can be misdiagnosed as cholelithiasis and that at the T10-12 level can be misdiagnosed as acute appendicitis. Second, compressive myelopathy could have induced hypoperistalsis through disorder of the greater splanchnic nerve, or hyperperistalsis through relative parasympathetic stimulation. Ozaki et al. [22] reported that cutting the greater splanchnic nerve led to inhibition of the pathway of hyperalgesia in experimentally created gastric ulcers in rats.

On the other hand, in terms of diagnostic methods for differentiating between myelopathy and radiculopathy, Stetkarova et al. [23] recommended electrophysiological examinations such as electromyography (EMG). They reported lateral disc herniation causing compression of a thoracic root associated with unilateral segmental paresis of the abdominal wall. In that case, partial denervation and a neurogenic pattern in the oblique abdominal muscle and positive sharp waves in the multifidus muscle on needle EMG confirmed axonal root impairment, whereas somatosensory and motor evoked potentials were

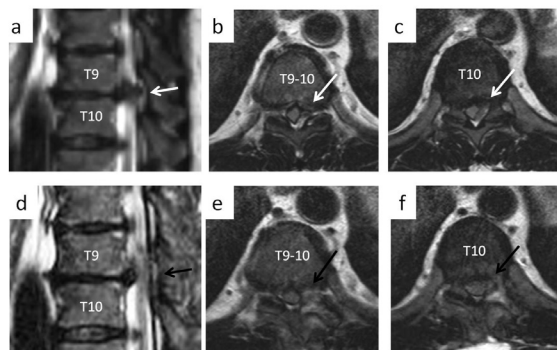


Figure 2: Magnetic resonance imaging (MRI) on T2-weighted image reveals disc herniation at the T9-10 level in the left parasagittal section (a) and compression of the thoracic spinal cord at the same level in the axial section (b, c) indicated by white arrows. Postoperative MRI demonstrates no compression of the spinal cord by any masses (d-f) indicated by black arrows.

within normal limits and excluded spinal cord involvement. In the present case, EMG testing could not be performed because the patient required emergency surgical treatment due to severe progressive myelopathy.

Treatment of herniated thoracic discs includes both operative and nonoperative options. Although symptomatic TDH is uncommon, a missed or delayed diagnosis can be problematic, potentially resulting in not only unnecessary surgical procedures based on misdiagnosis, but also progressive myelopathy and permanent paralysis. Thoracic disc herniation thus needs to be kept in mind as a cause of symptoms mimicking other non-spinal disorders. In addition to thorough neurological examination, MRI and electrophysiological examinations are helpful in achieving earlier diagnosis.

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