

## Case Report

# A case of thoracic disc herniation characterized by marked posture-related dynamic changes in neurological symptoms



Toru Funayama<sup>\*</sup>, Hiroshi Noguchi, Tetsuya Abe, Kousei Miura, Katsuya Nagashima, Hiroshi Kumagai, Kengo Fujii, Kentaro Mataka, Masao Koda, Masashi Yamazaki

Department of Orthopaedic Surgery, Faculty of Medicine, University of Tsukuba, 1-1-1 Tennoudai, Tsukuba 3058575, Ibaraki, Japan

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## ABSTRACT

Thoracic disc herniation is less common than lumbar and cervical disc herniations. It is usually accompanied by severe myelopathy, which often leads to surgery. Because the thoracic spine is less mobile, thoracic disc herniation is considered to be minimally affected by dynamic spine factors in cases with myelopathy. We experienced a case of thoracic disc herniation (T4/5 and T6/7) characterized by posture-related dynamic changes in neurological symptoms; that is, numbness extending from the trunk to the entire lower limbs was deteriorated in the standing and sitting positions, was relieved in the supine position, and disappeared in the prone position. In addition, the patient reported dysuria with a delay when attempting to urinate in the standing position. Computed tomographic myelography revealed diffuse idiopathic skeletal hyperostosis extending from T3 to T11, and the kyphosis angles at T1 to T11 levels were 68 degrees in the half-sitting position and 58 degrees in the prone position, showing posture-related changes. The patient underwent the posterior fusion in the prone position, by which symptoms disappeared, without undergoing disc herniotomy or laminectomy, and favorable outcomes were achieved. Thoracic disc herniation with marked posture-related neurological symptoms is extremely rare. Here we report a case presentation and literature review of pathophysiology observed in our patient.

## 1. Background

Thoracic disc herniation is less common than lumbar and cervical disc herniations [1]. It is usually accompanied by severe myelopathy, which often leads to surgery [2].

In addition, the thoracic spine, which forms the thorax with the ribs and sternum, is less mobile than the cervical and lumbar spines [3]. Thus, thoracic disc herniation is considered to be minimally affected by dynamic spine factors in cases with myelopathy in the thoracic spine.

We herein report our experience with an extremely rare case of thoracic disc herniation characterized by marked posture-related changes in neurological symptoms.

## 2. Case report

A 72-year-old man presented with a feeling of unsteady gait and numbness in the trunk for 3 months. His past history included cervical laminoplasty for spondylotic myelopathy at the age of 61 and lumbar laminectomy for canal stenosis at the age of 62. Subsequently, he began wobbling, and his gait disturbance gradually worsened. Then, he was

referred to our institution from a local clinic.

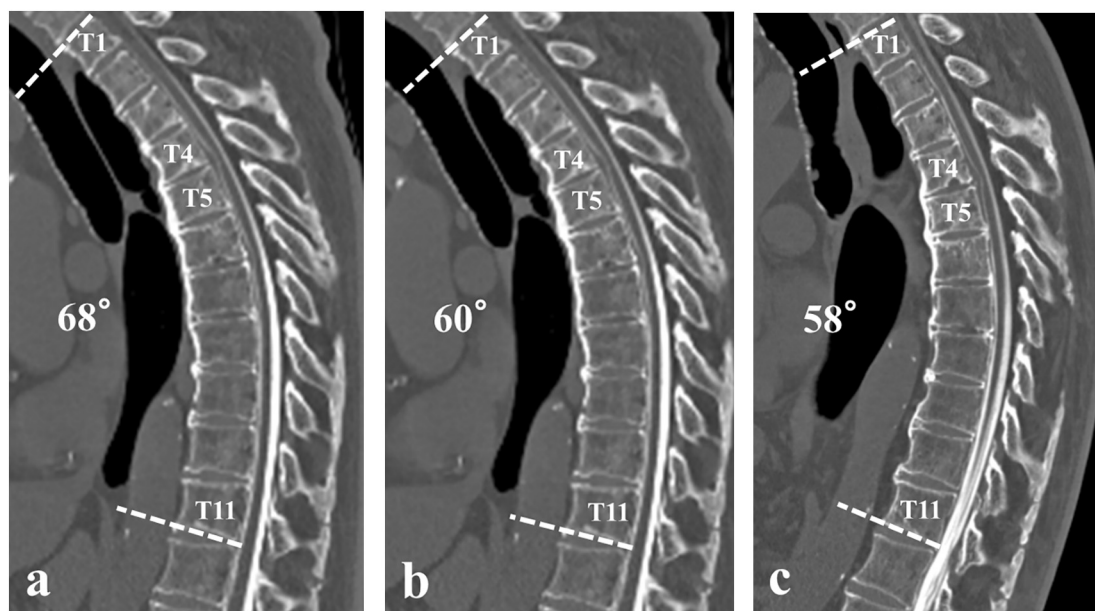
At the initial visit, he shuffled his feet and wobbled. Deep tendon reflex was enhanced in both lower limbs. Although manual muscle testing revealed no decrease, he felt weakness in lower limbs and was not able to go up the stairs. Posture-related symptom changes were characteristically observed; that is, numbness extending from the trunk to the entire lower limbs was deteriorated in the standing and sitting positions, was relieved in the supine position, and disappeared in the prone position. In addition, the patient reported dysuria with a delay when attempting to urinate in the standing position. Based on these neurologic findings, thoracic myelopathy was suspected. According to the Japanese Orthopaedic Association (JOA) score (maximum 11 points for thoracic myelopathy), his score was 5 points.

Magnetic resonance imaging (MRI) revealed disc herniation at T4/5 that compressed the spinal cord (Fig. 1). Moreover, small disc herniation was observed at T6/7. After the patient consented, computed tomographic myelography (CTM) was performed in three postures (i.e., the half-sitting, supine, and prone positions). It revealed diffuse idiopathic skeletal hyperostosis (DISH) extending from T3 to T11, and the anterior portions of vertebral bodies had been fused. Posture changes

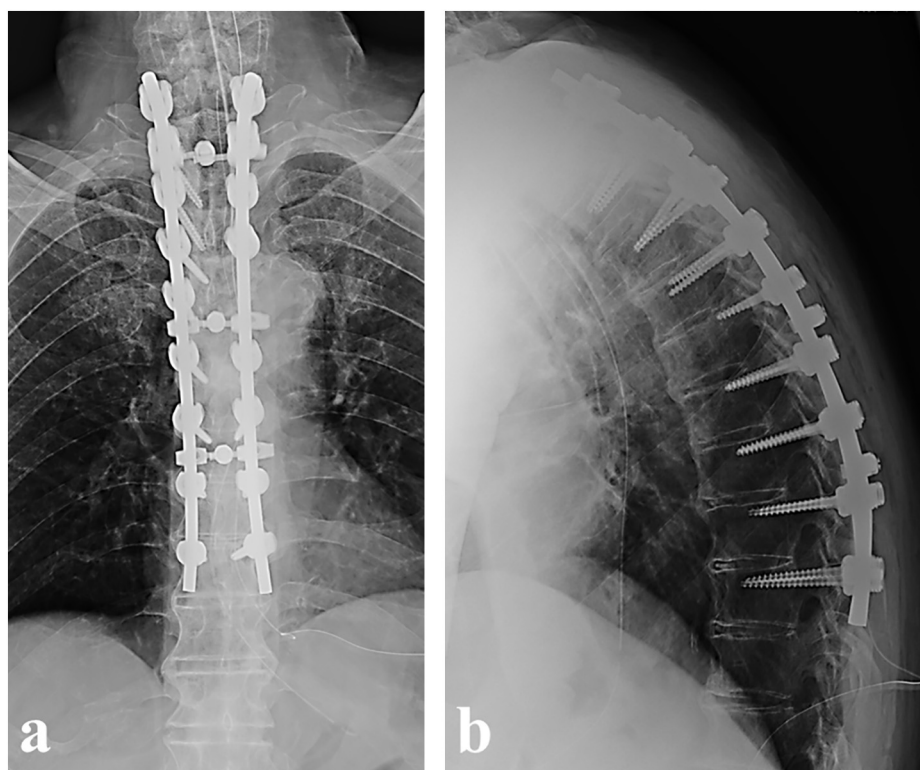
<sup>\*</sup> Corresponding author at: 1-1-1 Tennoudai, Tsukuba 3058575, Ibaraki, Japan.  
E-mail address: [funatoru3@md.tsukuba.ac.jp](mailto:funatoru3@md.tsukuba.ac.jp) (T. Funayama).



**Fig. 1.** T2-weighted MRI of the thoracic spine. (a); Mid-sagittal scan, (b); Axial scan at the T4/5 level, (c); Axial scan at the T6/7 level. MRI revealed that disc herniation at T4/5 that compressed the spinal cord and small disc herniation was also observed at T6/7.



**Fig. 2.** CTM of the thoracic spine. (a); Half-sitting position, (b); Supine position, (c); Prone position. CTM revealed DISH extending from T3 to T11. Posture changes did not affect the findings of disc herniation at T4/5 and T6/7. However, when the KA were measured at T1 to T11 levels, they were 68 degrees in the half-sitting position, 60 degrees in the supine position, and 58 degrees in the prone position, showing posture-related changes.



**Fig. 3.** Plain radiograph after surgery. (a); Antero-postero view, (b); Lateral view. Posterior fusion alone using pedicle screws and autologous bone graft was performed without herniotomy or laminectomy.

did not affect the findings of disc herniation at T4/5 and T6/7. However, when the kyphosis angles (KA) were measured at T1 to T11 levels, they were 68 degrees in the half-sitting position, 60 degrees in the supine position, and 58 degrees in the prone position, showing posture-related changes (Fig. 2).

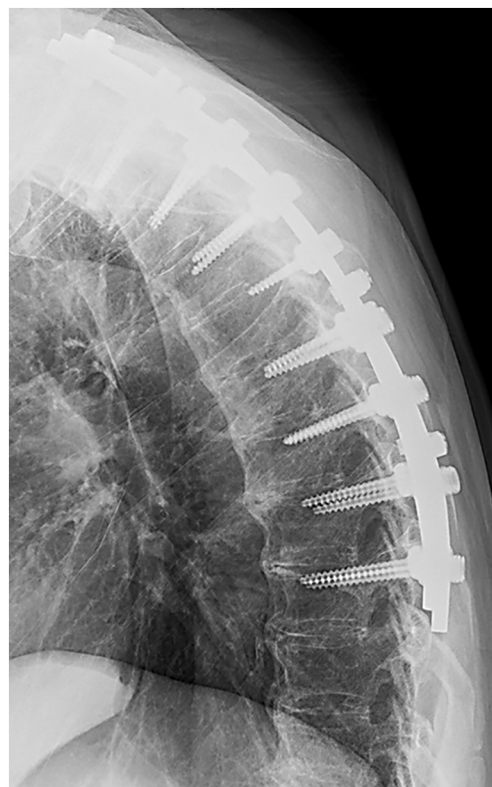
We thought that posterior fusion in the prone position, by which subjective symptoms would disappear, may allow symptom relief. While neither disc herniotomy nor laminectomy was performed, posterior fusion using pedicle screws and autologous bone graft was performed without decompression (Fig. 3). The fusion levels were from T1 to T9. Cobalt chrome rods with a 6-mm diameter were selected for fixation strength.

No particular postoperative complications occurred. Numbness of the trunk resolved soon after surgery. The gait speed increased, and the patient became able to walk smoothly within 2 weeks after surgery. As of one year after surgery, the spinal alignment was maintained and the posterior fusion was successfully achieved (Fig. 4). Numbness of the trunk disappeared, and numbness of the lower limbs and dysuria were alleviated. He had no trouble with daily life.

### 3. Discussion

A pathological condition called “flexion myelopathy” is known to exist in not only the cervical spine but also the thoracic spine [4,5]. According to these reports, neurological symptoms are deteriorated in the standing or lordotic position, and CTM reveals that compression of the anterior portion of the spinal cord is enhanced in the position of flexion and is attenuated in the supine position. Symptom improvement is reportedly achieved only by posterior fusion in the prone position.

In middle-aged and older patients, DISH often causes ossification of the anterior longitudinal ligament on the anterior side of contiguous vertebral bodies and fusion of many vertebral bodies. Fused thoracic vertebral bodies due to DISH are almost immobile. However, because the entire vertebral bodies including the posterior elements are not



**Fig. 4.** Plain radiograph one year after surgery. The spinal alignment was maintained and the posterior fusion was successfully achieved.

completely fused, the occasional occurrence of disc herniation has been reported [6,7].

In our case, posture-related symptom changes were characteristic including weakness, numbness and dysuria in the standing position. Dynamic CTM revealed that the thoracic KA was reduced by 10 degrees when posture was changed from the half-sitting to the prone position. Based on the clinical and imaging findings, in addition to static compression of the anterior portion of the spinal cord due to thoracic disc herniation, slight dynamic changes in the spinal column associated with different postures, such as the standing and sitting positions, might have further affected the spinal cord in a similar mechanism as that of “flexion myelopathy”. This may explain the reason why relief of neurological symptoms was achieved only by posterior fusion in the prone position, even though neither disc herniotomy nor laminectomy was performed. Although other procedures such as posterior microdiscectomy and anterior spinal fusion surgery were considered, there were 2 levels of thoracic herniation which compressed the spinal cord. Therefore, in our case we believed that posterior long spinal fusion was the most appropriate procedure to maintain the spinal alignment in the prone position, by which symptoms disappeared.

#### 4. Conclusion

Posterior fusion in the prone position that allows symptoms to disappear was effective in the management of thoracic disc herniation characterized by marked posture-related dynamic changes in neurological symptoms.

#### Conflicts of interest/disclosures

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#### Source of support

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