

Case Report

Upper thoracic disc herniation followed by acutely progressing paraplegia

S Sasaki¹, K Kaji¹ and K Shiba¹

¹Department of Orthopaedic Surgery, Japan Labour, Health and Welfare Organization, Spinal Injuries Center, Iizuka-shi, Fukuoka, Japan

Study design: Case report.

Objective: To report a rare thoracic intervertebral disc herniation followed by acutely progressing paraplegia.

Setting: Spinal Injuries Center, Fukuoka, Japan.

Method: A 37-year-old man presented with sudden severe backache and acutely progressing motor impairments of both lower extremities after antecedent backache lasting about 5 days. Neurological examination showed analgesia and hypoesthesia below the T4 dermatome level, dysesthesia to pinprick below right inguinal level, and severe motor impairments of the lower extremities (Frankel classification C). Magnetic resonance (MR) imaging demonstrated spinal cord compression due to a postero-laterally existing epidural mass at the T2–T3 level. After laminectomy at the T2–T3 level, the sequestered disc material was detected and excised as one piece through the right side of the dura. The excised herniated mass had a ring-like form and was thought to originate from the annulus fibrosis.

Result: After the emergency surgery, he had complete relief from the backache and control of both lower extremities recovered gradually. At 4 weeks after the emergent operation, motor power of both lower extremities recovered almost completely. He was able to walk without any assistance. MR imaging study after surgery did not reveal the sequestered mass, except for a mild disc bulging at the T2–T3 level.

Conclusion: Accurate diagnosis of acute symptomatic thoracic disc herniation is occasionally difficult. However, timely and successful surgery could result in complete symptom relief and satisfactory results.

Spinal Cord (2005) 43, 741–745. doi:10.1038/sj.sc.3101781; published online 5 July 2005

Keywords: thoracic disc herniation; acutely progressing paraplegia; upper thoracic

Introduction

Thoracic disc herniations are rare compared with herniations at cervical or lumbar disc levels, and they are mainly located at a lower thoracic level.¹ When it does occur, symptomatic thoracic disc herniation is a slowly progressive disease.² To our knowledge, acutely developing disc herniation at the upper thoracic level has not been previously reported in the English literature. We describe a case of the upper thoracic disc herniation (T2–T3) with rapidly progressing paraplegia due to a dorsally sequestered herniated disc, which could be successfully removed by posterior surgery.

Case report

Presentation

A previously healthy 37-year-old man (height: 177 cm, weight: 100 kg) presented with a sudden backache and motor impairments of both lower extremities after antecedent backache lasting for about 5 days. He did not report any previous trauma. Motor impairments of both lower extremities deteriorated gradually, and about 3 h after the onset of the motor impairments, he could not stand without assistance. He was admitted to another hospital and magnetic resonance (MR) imaging study of the whole spine was performed, revealing compression of the thoracic spinal cord at the T2–T3 level. At 6 h after the onset of motor impairments, he was transferred to our hospital.

Examination

On physical examination, there was tenderness in the upper part of the back. He did not have fever. On

Correspondence: S. Sasaki, Department of Orthopaedics, Tokyo Medical and Dental University, 1-5-45 Yushima, Bunkyo-ku, Tokyo 113-8519, Japan

Table 1 Motor evaluation of both lower extremities made at the time of admission, showing severe motor impairments, especially in the right lower extremity

	R	L
Hip flexors	2	3
Knee extensors	3	5
Ankle dorsiflexors	0	5
Long toe extensors	0	4
Ankle plantar flexors	2	5

Motor functions were assessed based on ASIA scale. 0 = total paralysis, 1 = palpable or visible contraction, 2 = active movement, gravity eliminated, 3 = active movement, against gravity, 4 = active movement, against some resistance, 5 = active movement, against full resistance

neurological examination, hyperreflexia of both lower extremities was observed and both Babinski reflexes were positive. He had analgesia and hypoesthesia below the T4 dermatome level, dysesthesia to pin prick below the right inguinal level, and motor impairments of both lower extremities. Motor functions were assessed in five key muscles in the lower extremities, based on the international American Spinal Injury Association (ASIA) scale (Table 1). Anal wink was lacking and anal tone was flaccid but anal sphincter motion was preserved (Frankel classification C). Motor and sensory examination of both upper extremities was normal. MR imaging revealed the localized compression of the thoracic spinal cord at T2–T3 level (Figure 1). Axial MR imaging showed the mass was located postero-



Figure 1 Magnetic resonance images at the time of admission, showing postero-laterally existing mass compressing spinal cord at T2–T3 level. The mass showed slight enhancement. sagittal T1 weighted (upper left), T2 weighted (upper center), T1 weighted image with gadolinium (upper right), axial T1 weighted (lower left), T2 weighted (lower center) and T1 weighted image with gadolinium (lower right)



Figure 2 The excised sequestered disc was a ring-like form. Total length was about 5 cm. Macroscopic examination showed no calcification in the sequestered disc itself. The white bar indicates 1 cm

laterally and compressed the dural sac. MR imaging with gadolinium showed slight enhancement of the lesion. Plain X-ray and computerized tomography (CT) of thoracic spine showed no calcification in any intervertebral disc.

Operation

MR imaging showed the mass was located posterolaterally in the spinal canal and the spinal cord was compressed mainly from the posterior site. Acute idiopathic epidural hematoma, abscess or thoracic disc herniation could be suspected from the primary clinical and imaging diagnosis. Posterior surgery was thus performed to remove the mass. After laminectomy of T2–T3, hematoma or abscess could not be detected in the epidural space. However, the terminal end of the sequestered disc could be detected. The sequestered disc materials were excised successfully through the right side of the dura without any damage to it. The extracted herniated mass was a ring-like form and thought to originate from the annulus fibrosis (Figure 2).

Postoperative course

Soon after the emergency surgery, he had complete relief of his backache. He could stand up without aid on the second postoperative day and he started walking with assistance on the fifth postoperative day. At 4 weeks after the operation, motor power of both lower extremities had recovered almost completely. He was able to walk without assistance. Sensation also recovered except mild hypoesthesia below the right inguinal level and he could control his bladder-rectal function well. At 2 months after the operation, he had no complaints in activities in daily living (Frankel classifi-

cation E). MR imaging study after surgery did not show a sequestered mass, but only mild disc bulging at the T2–T3 level. There was no residual spinal cord compression (Figure 3).

Discussion

The incidence of symptomatic thoracic disc herniation has been reported to be one per million per year and occurs in only 0.25–0.75% of all intervertebral disc herniations.¹ Our present case, is especially unique in that the upper thoracic disc herniation resulted in acutely progressing paraplegia, and the herniated mass which migrated posteriorly in the spinal canal, was successfully excised by posterior surgery without fusion. The rarity of thoracic disc herniation probably results from the fact that the thoracic vertebrae are mechanically stabilized by the rib head joints and, as a result, they avoid dynamic stress.³ Our review of the literature showed that the symptoms of thoracic disc herniation were mainly *backache*, slowly progressive myelopathy, thoracic nerve radiculopathy and bladder dysfunction.^{2,4–6} Some cases in which acute paraplegia developed from thoracic disc herniations have been reported;^{7,8} however, the present case is unique in that the sequestered disc migrated posteriorly in the high thoracic spinal canal toward the dorsal side of the dura.

The majority of thoracic disc herniations have been reported to be of the posterior or postero-lateral bulged type.² Furthermore, some authors had reported that thoracic disc herniation was mostly associated with radiological calcification of the disc.^{9–11} In our case, however, preoperative X-ray, CT scans and macroscopic examination of the herniated disc showed no calcification. One report in which the thoracic disc herniation was sequestered to the postero-lateral side of spinal canal could be found.¹² In the reported case, X-ray and CT examination showed no calcification of the herniated disc, similar to our patient.

There have been several reports about the surgical procedures for thoracic disc herniations. Stillerman *et al*² reported four surgical approaches for thoracic disc herniations: (1) transthoracic, (2) transfacet pedicle-sparing, (3) lateral extracavitary, and (4) transpedicular approaches. Some authors reported that anterior or antero-lateral discectomy may be the simplest and most effective method for disc excision and relief of spinal cord.^{4,13,14} Furthermore, Vanichkachorn and Vaccaro⁶ reported that posterior laminectomy was controversial for the treatment of symptomatic thoracic disc protrusions and recommended that the operative procedure must be chosen carefully among the anterior, lateral and posterior approaches. The avoidance of the posterior approach might be related to the fact that posterior laminectomy of the thoracic spine characterized by kyphosis would not successfully lead to decompression of the spinal cord compressed by posterior bulged disc and, furthermore, the spinal cord could be easily damaged when performing disc removal via posterior

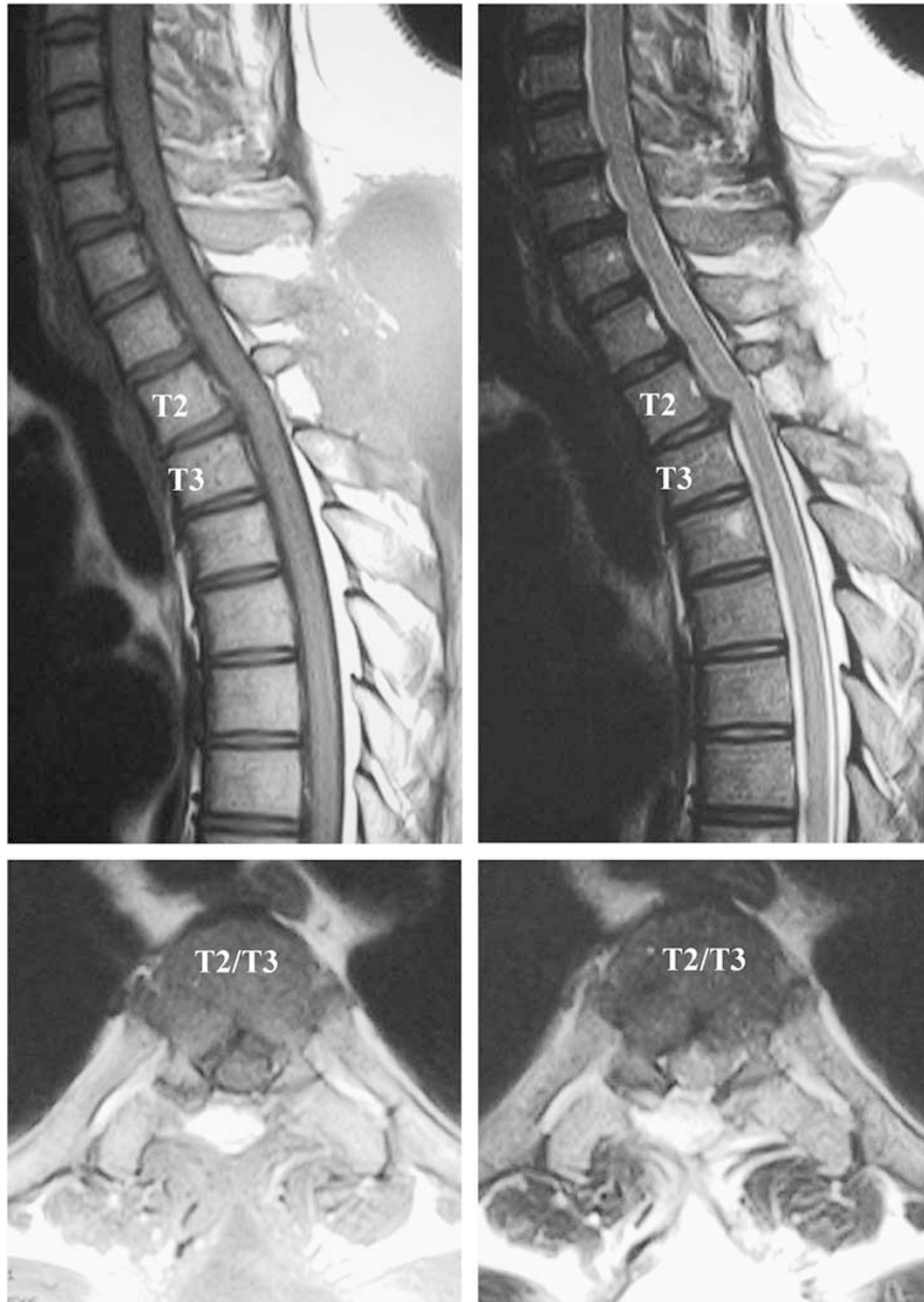


Figure 3 Magnetic resonance images made postoperatively, showing slight posterior bulging at T2–T3 level. However, there was no residual spinal cord compression. sagittal T1 weighted (upper left), T2 weighted (upper right), axial T1 weighted (lower left) and T2 weighted (lower right)

laminectomy. In the present case, however, axial MR imaging showed that the mass was located posterolaterally and compressed the dural sac mainly from the posterior site, and acute idiopathic epidural hematoma or abscess also could be suspected from the primary clinical and imaging diagnosis, therefore posterior surgery was performed. After laminectomy at the T2–T3 level, the terminal end of the herniated disc material could be detected in the epidural space, so we were able

to perform an excision easily, without any damage to the dura. In the present case, paraplegia developed after antecedent backache lasting several days. The pathogenesis of this thoracic disc herniation could, therefore, be speculated as follows: Preceding intrinsic disc degeneration due to obesity (height: 177 cm, weight: 100 kg) caused disc budging, then rapid and momentary rise of the intra-discal pressure due to body twisting, etc, occurred and, as a result, annulus fibrosis ruptured the

posterior longitudinal ligament and migrated posteriorly in the spinal canal.

Generally, characteristic neurological patterns for symptomatic thoracic disc herniation are lacking and the localization of pain induced by thoracic disc herniation is sometimes ambiguous. For these reasons, accurate diagnosis of symptomatic thoracic disc herniation has been reported to be considerably difficult. These facts can lead to delay in diagnosis, which may result in progressive neurological impairments. Previous reports have shown, however, that postoperative results of acutely developing thoracic disc herniation are generally satisfactory.¹⁵ Therefore, appropriate diagnosis and earlier treatment based on accurate neurological examination and diagnostic imaging, such as MR imaging, can lead to excellent recovery of neurological function.

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