

Case Report

Multi-Level Spondylolisthesis Required Transdiscal Screws Due to The Rare Vertebral Deformities

Fumitake Tezuka*, Toshinori Sakai, Yoichiro Takata, Kosaku Higashino and Koichi Sairyo

Department of Orthopedics, the University of Tokushima Graduate School, Japan

***Corresponding author**

Toshinori Sakai, Department of Orthopedics, Institute of Health Biosciences, The University of Tokushima Graduate School, 3-18-15 Kuramoto-cho, Tokushima 770-8503, Japan; Tel: +81-88-633-7240; Fax: +81-88-633-0178; E-mail: norinori@clin.med.tokushima-u.ac.jp

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- Spondylolisthesis
- Pedicle screw

Abstract

Study Design: Retrospective case review.

Objective: To report a technique of transdiscal screwing applied in a patient with multi-level spondylolisthesis.

Summary of background Data: Although a technique of transdiscal screwing is sometimes used in patients with severe L5-S1 spondylolisthesis in clinical practice, it has been rarely reported. The concept of transdiscal fixation for severe L5-S1 spondylolisthesis was first reported by Bohlman, and the transdiscal L5-S1 screw was first introduced by Minamide et al., who performed a biomechanical study using a cadaveric model of L5-S1 spondylolisthesis. However, due to the rareness of cases requiring this technique in clinical practice, there has been no clinical report using this technique, except for L5-S1 spondylolisthesis.

Methods: The clinical and radiologic findings are discussed in the case report.

Results: The patient was a 72-year-old woman who had undergone partial laminectomy of L3 and L4 due to lumbar spinal canal stenosis at another hospital. Radiographical studies showed multi-level spondylolisthesis of L3-L4, L4-L5, and vertebral deformities of L4 and L5. The vertebral body of L4 had a common wedged deformity, while that of L5 whose anterior wall height was diminished, had a reverse wedged deformity. Preceded by fixation, laminectomy of L3, L4, and L5 was performed to decompress L4 and L5 nerve roots. The L3 pedicle screws were placed as usual, L5 screws were placed through the L5 pedicles, through the superior endplate of L5, and through the inferior endplate of L4, to terminate in L4 body. As a result, double-level fixation of L3-L4 and L4-L5 was performed. Immediately after the operation, the patient experienced relief from pain. Thereafter she could walk unaided.

Conclusions: We present a rare case of multi-level spondylolisthesis requiring the transdiscal screws due to unique deformities at L4 and L5 vertebral bodies.

INTRODUCTION

Although a technique of transdiscal screwing is sometimes used in patients with severe L5-S1 spondylolisthesis in clinical practice, it has rarely been reported. [1,2]. To the best of our knowledge, there has been no clinical report using this technique except L5-S1 spondylolisthesis. We applied this technique in a patient with multi-level spondylolisthesis (L3-L4, L4-L5) and unique vertebral deformities of L4 and L5.

CASE PRESENTATION

The patient was a 72-year-old woman who had diabetes mellitus, bronchial asthma, and hypertension. Thirteen years previously, she had undergone partial laminectomy of L3 and L4 due to lumbar spinal canal stenosis at another hospital. She was doing well until 6 months before admission to our hospital because of left leg pain. Her leg pain had gradually worsened until she was not able to walk independently.

On admission, the patient had muscle weakness; the strength of the left tibialis anterior was 2+/5, and that of left extensor hallucis longus was 3-/5. Sensory disturbance was noted in both legs below the knee joint. Patellar and ankle jerks were absent. Laboratory data did not show any inflammatory sign. Roentgen graphical studies showed multi-level spondylolisthesis of L3-L4, L4-L5, and vertebral deformities of L4 and L5 (Figure 1). The vertebral body of L4 had a common wedged deformity, while that of L5 whose anterior wall height was diminished, had a reverse wedged deformity. Myelographs showed a complete block at L3 and grade II slip of L3-L4 and grade I slip of L4-L5 (Figure 2). Magnetic resonance images revealed an L4 wedging deformity and a rounding deformity of the upper endplate of L5, as well as low intensity on T1-WI and high intensity on T2-WI in L4-5 disc space, which indicate fluid collection (Figure 3).

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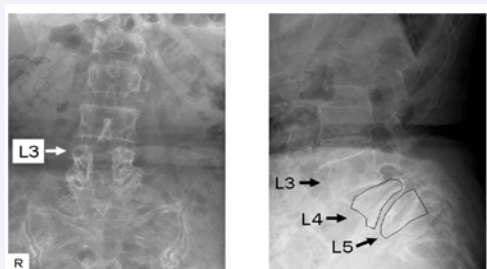


Figure 1 Plain X-ray films showing multi-level spondylolisthesis of L3-L4, L4-L5, and vertebral deformities of L4 and L5.

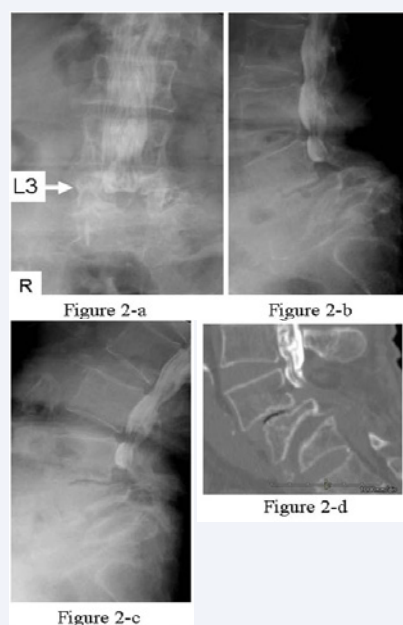


Figure 2 Myelographs showing a complete block at L3 level (2-a) and grade II slip of L3-L4 and grade I slip of L4-L5 (2-b, c). The reconstructed sagittal CT myelographs delineating the vertebral body of L4 showed a common wedged deformity, while that of L5 whose anterior wall height was diminished showed a reverse wedged deformity (2-d).

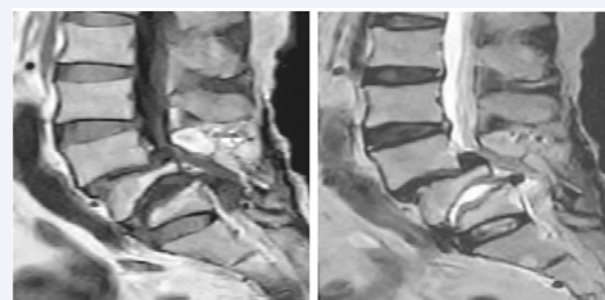


Figure 3 Magnetic resonance images showing L4 wedging deformity and rounding deformity of the upper endplate of L5, as well as low intensity on T1-WI and high intensity on T2-WI in L4-5 disc space, which indicate fluid collection.

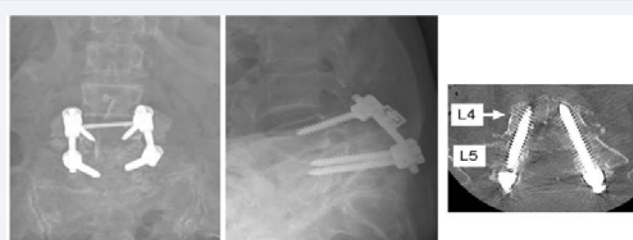


Figure 4 Postoperative radiographs showing the successful transdiscal screwing. The L3 pedicle screws were normally placed as usual, L5 screws were placed through the L5 pedicles, and through the superior endplate of L5, through the inferior endplate of the L4 to terminate in L4 body.

L5 pedicles, through the superior endplate of L5, and through the inferior endplate of L4, to terminate in L4 body. As a result, double-level fixation of L3-L4 and L4-L5 was performed (Figure 4).

Immediately after the operation, the patient experienced relief from pain. Thereafter she could walk unaided.

DISCUSSION

The concept of transdiscal fixation for severe L5 spondylolisthesis was first reported by Bohlman, [3] and the concept was used to develop the surgical procedure. [1,4-8] The transdiscal L5-S1 screw was first introduced by Minamide et al. who performed a biomechanical study with this screw using a cadaveric model of L5-S1 spondylolisthesis. [2] They reported that transdiscal L5 fixation produced a 1.6-1.8 times stiffer construct than traditional pedicle fixation and the stiffness of the transdiscal construct equaled that of the combined interbody/pedicle screw construct in all tested. However, due to the rareness of cases requiring this technique in clinical practice, there have been very few reports about this procedure. This is the first report using of the use of this procedure for L4 spondylolisthesis.

A transdiscal screw allows fixation through three different cortices (biotical fixation of L5 and inferior endplate of L4 in this case), it tends to be placed more perpendicularly oriented to the endplates and is in a better mechanical position to resist shear and capture more bony elements. According to the study by Minamide et al., the higher the slip angle is technically easier

to place the transdiscal screw. [5] In this case, it was not difficult to place the transdiscal screws.

The vertebral deformities observed in our patients are very rare. The pathological mechanism of the deformities was unclear. Wedging deformity is usually seen at L5 in a spondylolytic spine, and rounding of the upper end plate is usually seen in the sacrum, and may occur subsequent to spondylolysis. [9] Our patient had undergone partial laminectomy of L3 and L4 due to lumbar spinal canal stenosis at another hospital 13 years previously. Unfortunately, we could not obtain the clinical records. We speculated that she had had L4 spondylolysis, which had caused the subsequent deformities.

In the present case, using the transdiscal screw, we obtained good results without neurological complications.

CONCLUSION

We present a rare case of multi-level spondylolisthesis requiring the transdiscal screws due to unique deformities at L4 and L5 vertebral bodies. Using the transdiscal screw, we obtained good results without neurological complications.

CONFLICT OF INTERESTS

All authors confirm that is no conflict of interest with other people or organizations that could bias the nature of this report.

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