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# L5–S1 SPONDYLOPTOSIS TREATED BY A SINGLE-STAGE POSTERIOR APPROACH: AN ALTERNATIVE TECHNIQUE

## *TEK SEANS POSTERİOR YAKLAŞIMLA TEDAVİ EDİLEN L5-S1 SPONDİLOPİTOZİS: ALTERNATİF BİR TEKNİK*

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**SUMMARY**

A 21-year-old male patient without any history of trauma applied to our clinic with complaints of lower back pain and limited spine mobility. On neurological examination, bilateral straight leg raising tests were positive. There were no motor and/or sensory deficits. A lumbar MRI revealed spondyloptosis at the L5–S1 level. A surgical intervention was planned, in which an S1–L5 transcorporeal polyaxial titanium alloy screw and a fibular strut graft were used, in order to establish interbody fusion. No surgical complications were observed and the patient was discharged without any complaint. Interbody fusion was observed at the twelfth month postoperatively.

L5–S1 spondyloptosis is a rare spinal disease, and treatment modalities are challenging. Efforts to establish reduction may result in neurological deficits and neuropathic pain, due to bilateral traction of L5 nerve roots. This study presents the successful use of an *in situ* fusion method in this case.

**Key Words:** Spondyloptosis, L5–S1fusion, *in situ* fusion, transcorporeal screw

**Level of evidence:** Case report, Level IV

**ÖZET:**

21 yaşında erkek hasta, bel ve her iki bacak ağrısı, omurga hareketlerinde kısıtlılık yakınmaları ile kliniğimize başvurdu. Hikayesinde travma öyküsü yoktu. Nörolojik muayenesinde bilateral düz bacak germe testleri pozitifti. Kas gücü ve duyusal muayenesi normaldi. Çekilen lomber manyetik rezonans incelemede L5-S1 spondilopitoz tespit edildi. Hasta cerrahi olarak tedavi edildi. L5-S1 insitu füzyon amacı ile hastaya operasyonda S1-L5 transkorporal poliaksiyel titanyum alaşımlı vida ve fibular uzun kemik şaft allografti kullanıldı. Hasta cerrahi komplikasyon olmadan şifa ile taburcu edildi. Birinci yıl kontrolünde L5-S1 mesafesinin füze olduğu görüldü.

L5-S1 spondilopitozis nadir görülen bir omurga hastalığı olup cerrahisi zorluklar içermektedir. Redüksiyon çabaları nörolojik defisit ve bilateral L5 kök traksiyonuna bağlı nöropatik ağrılara neden olabilmektedir. Sunmakta olduğumuz hastada uyguladığımız insitu füzyon yöntemi cerrahi olarak başarılı bulunmuştur.

**Anahtar Kelimeler:** Spondilopitozis, L5-S1 füzyon, insutu füzyon, transcorporal vida

**Kanıt Düzeyi:** Olgu sunumu, Düzey IV

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## INTRODUCTION

Spondyloptosis or grade V spondylolisthesis is the complete anterior dislocation of the L5 vertebral body from the sacrum. The entire L5 vertebral body is located caudal to the most superior portion of the S1 vertebra, and the sagittal rotation or slip angle varies significantly.

The suggested treatments for spondyloptosis, other than benign neglect, have included fusion *in situ*[2,10,20], and reduction and fusion with instrumentation[3,14]. Most authors agree that fusion *in situ* is a safe and reliable method for the treatment of high-grade spondylolisthesis.

However, others have suggested that the reduction of severe anterior displacement and lumbosacral kyphosis may prevent persistent lumbosacral deformity[5,17].

We report a case of spondyloptosis treated with a fusion in situ method. A single-stage operation, including posterior decompression, posterolateral and trans-corporal fusion, and posterior stabilization was performed. We used a long trans-corporal screw and allogenic strut graft to stabilize the L5 vertebral body to the S1 vertebra for fusion.

## CASE REPORT

A 21-year old male patient with no history of trauma was admitted to our clinic, with lower back and bilateral leg pain and limited spine mobility. His pain increased when walking a short distance. Examination found no motor or sensory deficits, bowel or bladder incontinence, or sexual dysfunction. His Visual Analog Scale (VAS) score was 8 for the lower back and leg pain.

On lumbosacral radiographs, there was L5–S1 spondyloptosis. Lumbosacral computerized tomography (CT) sections showed bilateral prominent elongation of the pars interarticularis, and a sagittal reconstruction CT clearly showed the vertebral slip. On examination with lumbosacral magnetic resonance imaging (MRI), there was bilateral L5–S1 foraminal and lateral recess stenosis at the L5–S1 level due to the slip (Fig.-1,2).

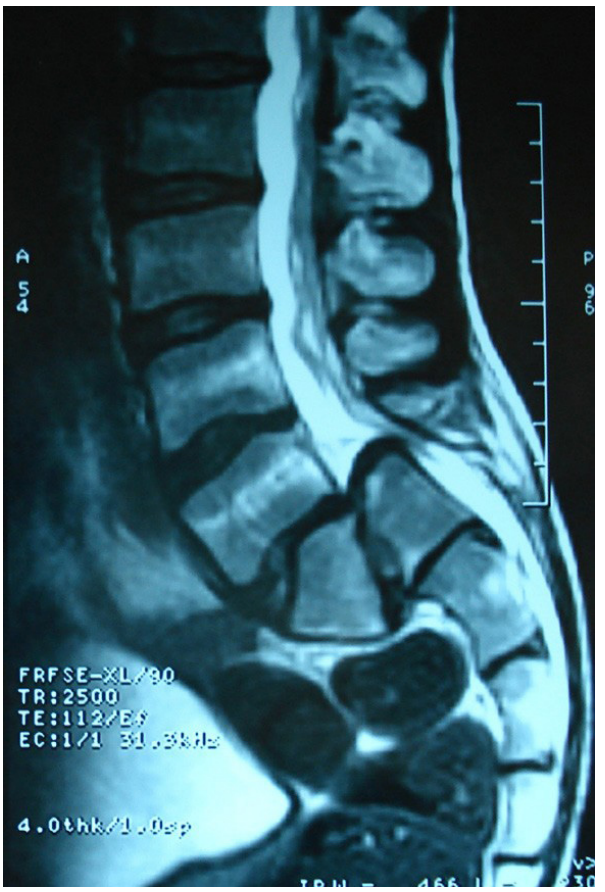


**Figure-1.** T2-weighted serial sagittal lumbar MRI revealing L5–S1 spondyloptosis with a spherical shape of the S1 dome.

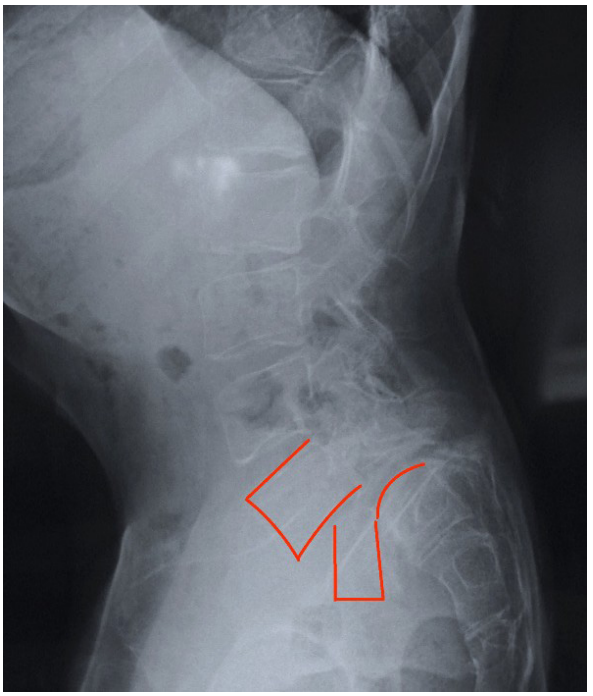

**Figure-2.** Lateral X-ray shows spondyloptosis at L5–S1.

## OPERATION

We performed L5 and S1 decompressive total laminectomy and bilateral L5 and S1 total facetectomy with bilateral extensive L5 foraminotomy. Thus, the L5 root was relieved by following it up to the ganglia. The posterior part of the S1 body was drilled by a high-speed drill, and the sacral S1 and S2 roots were decompressed and made visible. Then, posterior trans-pedicular screw fixation was performed at the bilateral L4 and right S1 vertebrae. We used a long trans- corporal screw (8–80 mm) for fixation of the L5 and S1 vertebrae, through the S1 corpus left side. After that, a fibular strut allograft was inserted into a tunnel prepared in the S1 corpus through the L5 corpus from the left side for fusion by a posterior approach. Then, rods were fixed with screws. We performed posterolateral fusion with an autograft taken from the spinous processes and laminae (Fig.-3,4).

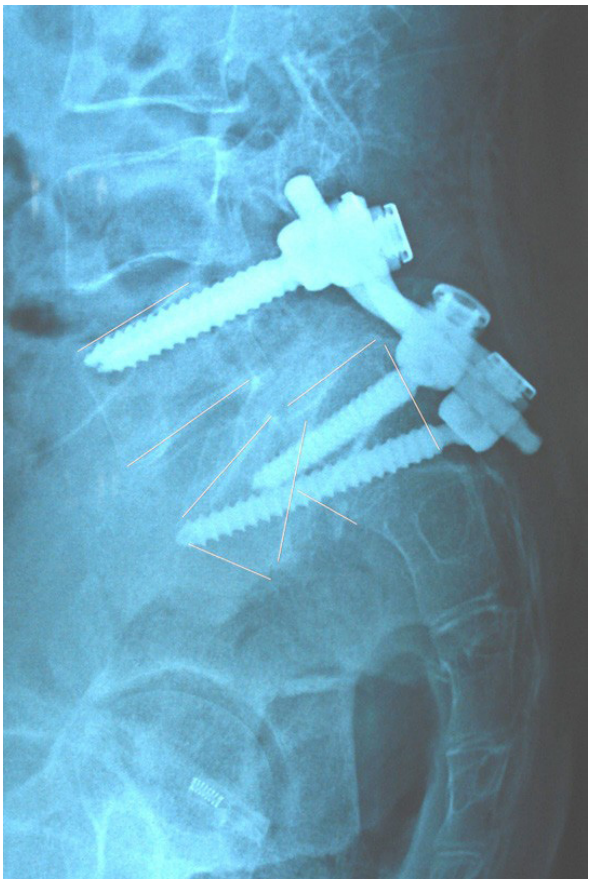

**Figure-3.** Postoperative lateral X-ray.

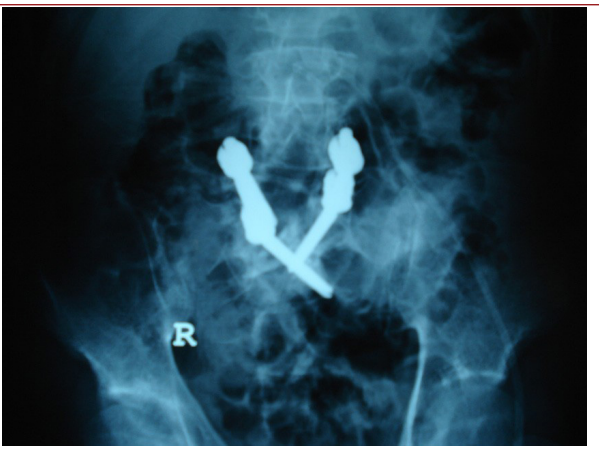


**Figure-4.** Postoperative AP X-ray, bilateral L4 pedicular screws and S1 pedicular screw on the left side, S1 to L5 transcorporeal screw on the right side.

The patient had no deficits postoperatively. The patient was mobilized after the first postoperative day with a lumbosacral corset. During the early

postoperative period, the patient's complaints of radiculopathy improved, and he had only back pain. In the postoperative third, sixth and twelfth month follow-ups, he had no complaints other than mild lower back pain. Postoperative radiographs and CT examination showed the fibular allograft in the L5 corpus from the S2 corpus. At the third, sixth, and twelfth month, the VAS score was 4, 3, and 2, respectively (Fig.-5).

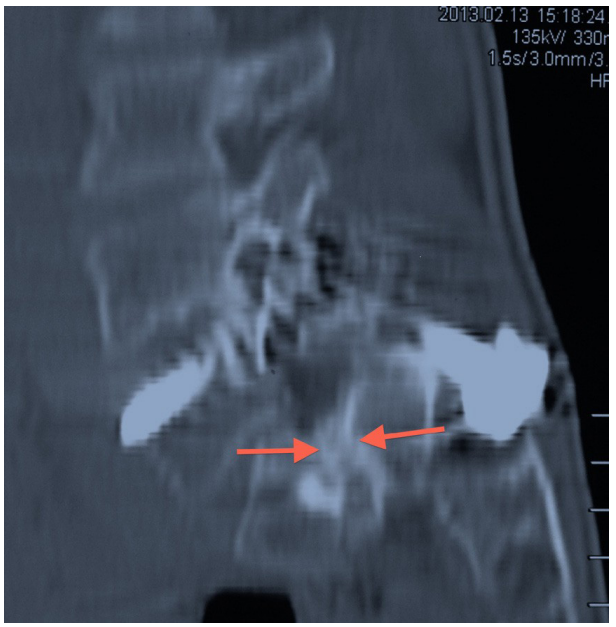


**Figure-5.** Sagittal CT shows solid bone fusion, the red arrows show the fusion area of the fibular allograft strut bone.

## DISCUSSION

Spondyloptosis defines the condition where the L5 vertebral body has completely dislocated from the sacrum anteriorly, and descended into the pelvis[3]. The etiopathogenesis of this disease is unclear. A few cases of traumatic acute spondylolysis have been reported in the literature[9,16]. Developmental spondylolysis shows some kind of dysplasia in the posterior elements, such as spina bifida of the S1 and S2 segments and frequently the L4 and L5 segments, unsegmented lumbosacral articular facets, hypoplastic L5–S1 facets and elongated isthmus[3]. The presence of this dysplasia raises a question as to whether these changes are congenital, as described by Newman[16].

The natural history of untreated spondyloptosis is not clear, because it is an unusual condition and most studies place it with high-grade (grades III–V) spondylolisthesis. Patients with spondyloptosis have back pain, radicular pain, motor and sensory deficits in the lower extremities, and symptoms resembling intermittent claudication or cauda equina syndrome[3,6,19].

Physical examination may show flattening of the buttocks, loss of trunk height, tight hamstrings, and an associated structural scoliosis[3,19]. Urinary incontinence has not been often reported in wide studies of severe spondylolisthesis[4,11], except for the study by Smith and Bohlman[19]. They reported that four of their 11 cases with severe spondylolisthesis had urinary incontinence, and there was evidence of a return to function in all four patients six weeks to two years after surgery. In the patient presented here, the prominent symptom was urinary incontinence, and sphincter function was normal after six months of surgery.

Treatment of patients with spondyloptosis is a challenge. The goal of treatment is to relieve the pain and the neurological deficit, to prevent the progression of deformity, and to provide long-term stabilization by solid fusion[4,10]. The suggested methods of treatment for spondyloptosis, aside from benign neglect, have included fusion in situ with or without decompression[2,7,8,10], and reduction and fusion (posterolateral and/or anterior, single, double

or triple-staged)[3,5,9]. Most authors agree that fusion in situ methods are safe and reliable for the treatment of high-grade spondylolisthesis.

The two-stage approach has been performed for spondyloptosis[9], whereas a combined posterior and anterior surgical procedure is recommended for spondylolisthesis grades II–V. Posterior decompression, corpectomy and fusion were performed in a three-stage operation[1]. Severe spondylolisthesis can be treated by a reduction and pedicular fixation method[3].

Bohlman and Cook described a one-stage posterior approach, applicable to a completely dislocated lumbosacral joint, which includes posterior neural decompression, bilateral posterolateral fusion, and interbody fusion using a fibular strut graft[2]. With this technique, after a wide fifth lumbar and first sacral, and if necessary, a fourth lumbar laminectomy, and a wide fifth lumbar and first sacral foraminotomy, the dura is gently freed from the posterosuperior prominence of the first sacral vertebral body, and the sacral prominence is osteotomized to decompress the dura anteriorly. Next, posterior interbody fusion is performed with bilateral fibular strut grafts inserted into bilateral holes drilled into the L5 and S1 bodies. In 1990, Smith and Bohlman[19] reported 11 cases of Grade III–V spondylolisthesis treated by the same procedure, of which six were cases of spondyloptosis. They reported that a solid fusion was obtained in all patients, and all had major or complete neurological recovery between two to twelve years of follow-up. None of their patients had complications or major changes in the position of the vertebrae, despite early mobilization two or three days after surgery, and osseous union was achieved in all of them.Fusion *in situ* may be performed with or without decompression in spondyloptosis. Fusion *in situ* without decompression may cause postoperative neurological deficits, especially in the presence of preoperative deficits. L5 nerve root deficits are frequent in reduction methods, presumably caused by intrathecal bleeding from decortication trauma or progression of the deformity during positioning[6,15,18]. Extended L5 foraminotomy may be necessary to prevent this complication.

We performed a single-stage operation with posterior decompression. Then, we performed L4–S1 instrumentation with a long S1 to L5 trans-corporal screw, and posterior L5–S1 *in situ* fusion with a fibular strut allograft and posterolateral fusion. This procedure reproduces the procedure described by Bohlman et al.[2,19]. We performed posterior transpedicular fixation in addition to posterior strut graft in this case, to provide stronger construction. The lower back pain and leg pain were nearly completely improved. The preoperative VAS score was 8, and this regressed to 4 after surgery.

The method presented here may be a technically reliable and safe method providing adequate decompression, solid fusion and long-term stabilization in L5–S1 spondyloptosis. To provide long-term stabilization and solid fusion, the L5 vertebra must be added to the fusion. We performed this with the use of a posterior strut graft.

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