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TRANSFORAMINAL INTERBODY FUSION AT CONUS LEVEL OF OUR EXPERIENCE AND CLINICAL RESULT

KONUS SEVİYESİNDE TRANSFORAMİNAL İNTERBODY FÜZYON UYGULAMALARIMIZ, KLİNİK SONUÇLAR

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SUMMARY:

Introduction: Via the application of the interbody fusion, the height of the disc is reconstructed, sagittal contour is preserved and the long term stabilization of the operated segment is ensured. The support to the anterior coloumn is helpful in increasing stability, reducing the stress on the pedicul screws, and incresing the fusion rates. The level of L1-2 and above are considered to be in relation with the conus and cord. The application of the transforaminal interbody fusion is done with the fusion material via a far lateral posterior approach.

Material-Method: This study was a retrospective case series and was approved by Department of Neurosurgery, Bakırkoy Research and Training Hospital for Neurology, Neurosurgery and Psychiatry. The eligible cases were the patients who underwent posterior decompression on the first one or two levels on the lombar vertebrae using TLIF with wide decompression for 1 or 2 level spinal stenosis with or without spondylolisthesis, between 2012- 2014.

Results: The preoperative and postoperative VAS score of the patients were calculated to be 6.53(5-8) and 3.2(2-5) respectively. Also, the preoperative and postoperative ODI value of the patients were calculated to be 68%(55-80%) and 26%(10-40%) respectively.

Discussion: With the right technique, neurologic damage risk of the posterior TLIF application on the conus level is very low. Also because there will be no need for an anterior approach, there will be no second incission or a second surgery which lowers the morbidity and mortality of the added second abdominal incission.

Keywords: Transforaminal interbody fusion, conus, spinal stenosis, spinal listesis

Level of evidence: Cohort study, Level III

ÖZET:

Giriş: Lomber interbody füzyon ile disk mesafesinin yüksekliği yeniden sağlanır, sagital kontür korunur, opere segmentin uzun dönemli stabilitesi sağlanır. Anterior kolonun yapısal desteği stabiliteyi güçlendirir, vidalar üzerindeki stersi azaltır, füzyon oranlarını arttırır. L1-2 disk seviyesi ve bu seviyenin yukarısında yer alan disk seviyeleri konus ve kord ile ilişkili disk seviyeleri olarak tanımlanabilir. Transforaminal interbody füzyon uygulamasında Füzyon materyali posterior yaklaşımla far lateralden hazırlanmış disk mesafesine yerleştirilmektedir.

Materyal-Metot: Bu çalışmamızda Bakırköy Prof. Dr. Mazhar Osman Ruh Sağlığı ve Sinir Hastalıkları Eğitim Araştırma Hastanesinde yapmış olduğumuz vakaları retrospktif olarak inceleyeceğiz. Vakalarımız 2012-2014 yılları arasında spinal stenozlu veya spinal listezisi olan hastalardan oluşmaktadır. Bu hastalara stabilizasyo,posterir dekompresyon ve transforaminal interbady füzyon uyguladık

Sonuçlar: Preoperatif VAS skoru 6.53 (5-8) ve postoperatif VAS skoru 3.2 (2-5) olarak hesaplandı. Preoperatif ODI değeri %68 (%80-55) ve postoperatif ODI değeri %26 (%10-40) olarak hesaplandı.

Tartışma: Konus seviyesinde posteriordan yapılacak TLIF uygulamasının nöral hasar oluşturma ihtimali uygun teknik ile çok azdır. Ayrıca anterior yaklaşım olmayacağı için ikinci bir seans yada ikinci bir insizyona gerek duyulmaz, cerrahi süre uzamaz, ilave olarak abdominal cerrahinin getireceği morbidite ve mortalite riski olmaz.

Anahtar Kelimeler: Transforaminal interbody füzyon, konus, spinal stenoz, spinal listezis

Kanıt Düzeyi: Olgu serisi, Level III

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INTRODUCTION:

The traditional way to operate on the spine is through a posterior approach. The main aim of the implantation is to create a stable fusion. Posterior instruments tries to maintain a mechanical stabilization on the spine[20]. Although the pedicul fixation systems are highly resistant to translational and scoloiotic deformations, they're not strong enough for high axial load[1]. Via the application of the interbody fusion, the height of the disc is reconstructed, sagittal contour is preserved and the long term stabilization of the operated segment is ensured. The support to the anterior coloumn is helpful in increasing stability, reducing the stress on the pedicul screws, and incresing the fusion rates[3,17].

Transforaminal interbody fusion (TLIF) was first used in 1982 as being described as a modified PLIF[5]. Fusion material is applied to the interbody space prepared from a far lateral approach. The traditional advise was to not us for levels above lumbar 2-3.

With a normal embryological maturation the conus is at level L2-3 at birth. At 3 months, the conus moves up to the adult level of L1-2 [2,4,12,14,15]. L1-2 disc level and levels above are described as levels related to the conus and the cord.

In the upper lumbar and thoraxic region, interarticulary pars is small and the inferior border of the lamina usually goes along to the disc level. This is why posterior interbody fusion operations have a higher risk of neurological damage. On the other hand, anterior approach gives way to disc clearance without retraction of the neural components. Anterior approach has its limitations on the basis of the approach. The fusion application is harder, reconstruction of the lordosis is much limited and there is a considerable higher risk of greater vascular injuries. Transforaminal interbody fusion gets most the advantages of these both approaches which makes it a better option for using the levels of conus and the cord.

In our study, we analysed the outcome of the patients whom we operated for spinal stenosis and listesis on the levels of the conus and the cord with transforaminal interbody fusion.

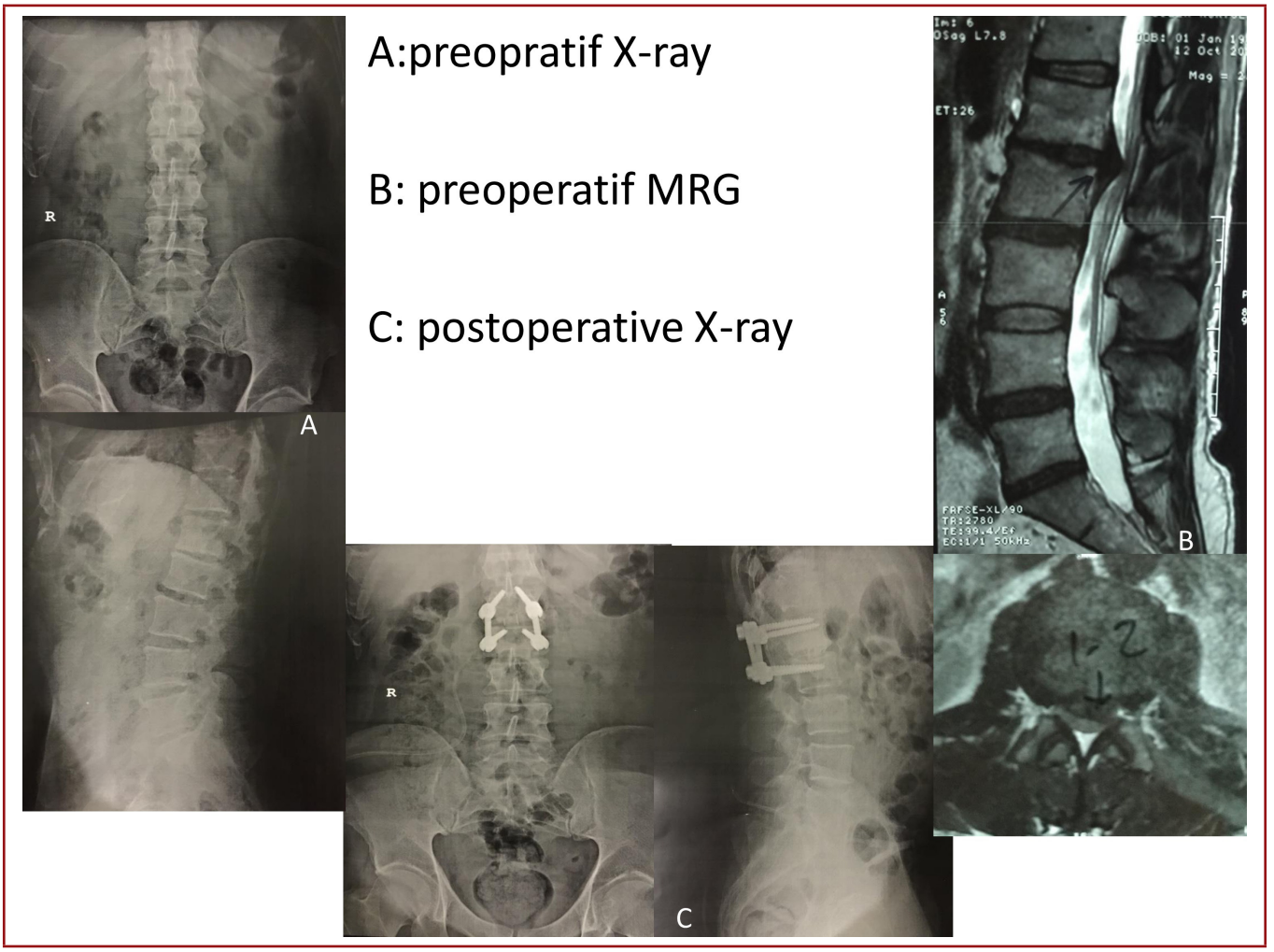
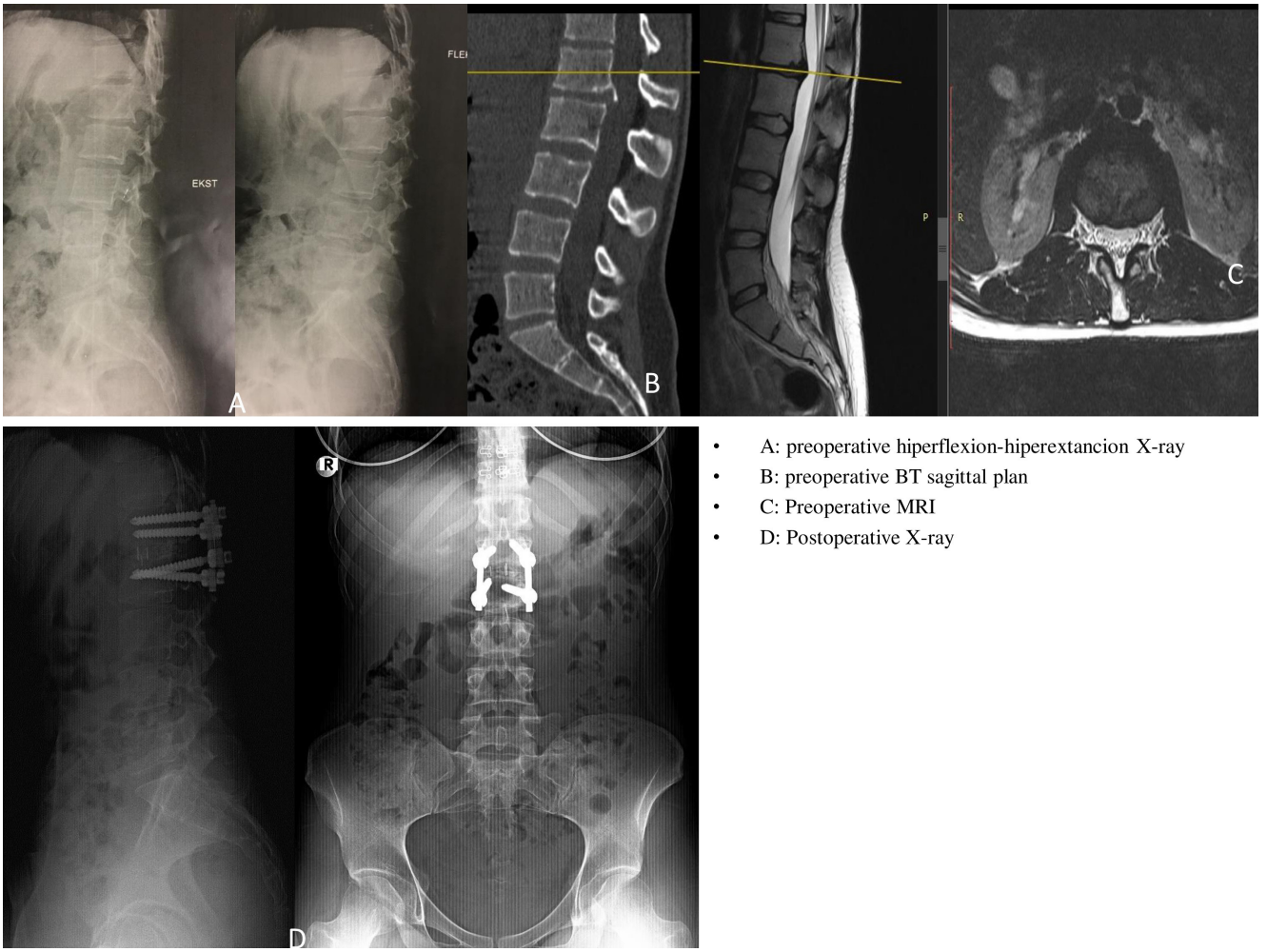


Figure-1. Case one



- A: preoperative hiperflexion-hiperextancion X-ray
- B: preoperative BT sagittal plan
- C: Preoperative MRI
- D: Postoperative X-ray

Figure-2. Case two

MATERIAL-METHOD:

This study was a retrospective case series and was approved by Department of Neurosurgery, Bakirkoy Research and Training Hospital for Neurology, Neurosurgery and Psychiatry. The eligible cases were the patients who underwent posterior decompression an one or two level lumbar üst seviye TLIF with wide decompression for 1 or 2 level spinal stenosis with or without spondylolisthesis, between 2012- 2014. Ultimately, cases were included in the current study.

The main symptoms of the patients on admitance were back pain, radicular pain, and neurological claudication, and these sympsomts were present on all of our patients. All our patients has full muscle strength on neurological examination and some had sensory loss on some dermatomes. All retained the normal sphincter function.

Surgical Procedure; All patients were operated under general anestesia in prone position. All related segments were stabilizied via transpedicular screws from posterior approach. Decompression was done on necessary levels. Posterior osteotomy(facetectomy and pars interarticularis resection) was performed on the side of the level which TLIF was going to be applied. Upper and lower roots were identified. Fusion was prepared through radical discectomy and curetation of the end plates. Disc level then was retracted using the posterolateral screws. Appropriate size PEEK cage which are filled with autogreft tissue is applied. Distraction of the screws and manual kiphosis through surgical table position was then applied to reduce the disc height posteriorly. Posterolateral stabilization was then lock permenantly. No need for retraction of the neural elements were necessary during these procedures. Our patients were all mobilized on postoperative first day with lumbosacral corset.

Pre- and post-operative clinical outcomes were compared between the groups by using the scores obtained with the visual analog scale (VAS) and Oswestry disability index (ODI).

We also compared the clinical outcomes pre- and post-surgery by using a paired t-test and Wilcoxon signed-rank test. Descriptive data were presented as mean±SD, and statistical significance was accepted as $p<0.05$.

Table-1. Demografic data

Number of patients	15
Sex (Male/Female)	5/10
Main age	52.3 (24-71)
Diagnosis (Spinal stenosis / Spondylolisthesis)	10/5
Level (T12-L1/L1-2)	11/4
Follow-up	18.2 (8-40)

Table-2. Results ODI and VAS (p<0.001)

Preoperative VAS	6.53
Postoperative VAS	3.2
Preoperative ODI	68
Postoperative ODI	26

RESULTS:

15 patients were included in our study with 5 of them male and 10 female. The median age was 52.3 (24-71) and average follow up was 18.2 (8.40) months. 10 spinal stenosis and 5 spinal listesis was diagnosed in our patients from thoracolombar degenerative disease. The preoperative diagnosis, extent of the operation, and operative levels are presented in Table-1.

The preoperative and postoperative VAS score of the patients were calculated to be 6.53 (5-8) and 3.2 (2-5) respectively. Also, the preoperative and postoperative ODI value of the patients were calculated to be 68% (55-80%) and 26% (10-40%) respectively. Postoperative improval on VAS score ODI value shows that our technique renders acceptable results. Our results came statistically meaningful (p<0.001) (Table-2).

DISCUSSION:

In the posterior stabilization on conus level, it is healthier to include anterior fusion on patients which decompression was necessary. Transforaminal approaches enables anterior fusion from a posterior approach on these patients. With the right technique, neurologic damage risk of the posterior TLIF application on the conus level is very low. Also because there will be no need for an anterior approach, there will be no second incission or a second surgery which lowers the morbidity and mortality of the added second abdominal incission. Also, since the posterior approach is better excersized by spinal surgeons it is more practical fort he operator.

To prepare the level of the fusion, a lateral approach should be done through facetectomy; and, both the upper and lower roots should be identified prior to the application. If done with this technique there no further retraction of neural elements are necessary. Operation can then continue with discectomy and the application of the fusion material.

The fusion rate of posterolateal fusion (PLF) is known to decrease as the number of fusion levels increases[9]. It has also been reported that the fusion rate of PLF is lower than that of posterior lumbar interbody fusion[4,13].

Sahn Jin Wang et al.[19] reported their 18 patient TLIF series with no cases on the conus level, Chong Suh Lee et al.[11] reported their 74 patient anterior approach series with no cases of TLIF application. Seok Ki Lee et al.[10] reported their 17 patient series with only 1 patient with the appliaction on the conus level, and they reported it as a posterior lumbar interbody fusion. PLIF application on this level is not advised by us since it will give way to more complications. TLIF application would render same results through lower risks.

Akira Hioki et al.[7] reported in their 17 patient TLIF series that only 7 of them were on the conus line and no above. He also reported like us that TLIF application on these levels gives less complication risks and lesser mortality and morbidity than alternative techniques.

Suhel et al.[18] reported their series of interbody fusion from a transpsoas approach on patients with degenerative lumbar scoliosis. We believe that through TLIF approach a need to create a second surgical corridor is not necessary therefore gives out better results.

There are numerous disadvantages for ALIF some of them being, abdominal organ and vascular damage, retrograd ejaculation risk through hypogastric plexus damage and anterior tension loss through anterior longitudinal ligament damage[16]. We favor the TLIF because of the less disadvantages it has.

Earlier studies have reported that TLIF is less invasive than conventional techniques, as evidenced by shorter operating time, less blood loss, shorter hospital stay, and lower incidence of complications[6,8].

Retrospective analysis of the clinical outcomes of the TLIF procedure for patients with upper lumbar degenerative diseases showed that TLIF provided satisfactory amelioration of clinical symptoms, sagittal alignment, and solid bony union, without any neurological complications.

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