



## Our Experience with 67 Cases of Percutaneous Transforaminal Endoscopic Lumbar Discectomy

### 67 Vakalık Perkütan Transforaminal Endoskopik Lomber Diskektomi Tecrübemiz

Endoscopic Lumbar Discectomy

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#### Özet

**Amaç:** Teknoloji ve cerrahi aletlerdeki gelişmelerle birlikte minimal invaziv girişimler giderek daha popüler hale gelmektedir. Bu yazıda 67 vakalık perkütan transforaminal endoskopik diskektomi tecrübemiz sunulmuştur. **Gereç ve Yöntem:** 2004-2010 yılları arasında, foraminal ve extraforaminal yerleşimli disk hernisi nedeniyle endoskopik olarak opere edilen toplam 67 olgu bu çalışmada retrospektif olarak incelendi. **Bulgular:** Olguların preoperatif ortalama VAS skorları 8,13' dü. Olguların postoperatif ortalama VAS skorları 1. ayda 2,4, 12. ayda ise 2,01 olarak saptandı. 12. ayda Macnab kriterlerine göre memnuniyet derecelerinin değerlendirilmesinde; 35 (52,2%) hastada mükemmel, 18 (26,9%) hastada iyi, 11 (16,4%) hastada orta, 3 (4,5%) hastada kötü olduğu saptandı. 3 hastada devam eden şikayetler nedeniyle mikrodiskektomi yapılması gerekti. 3 hastada geçici dizestezi saptandı. **Tartışma:** Perkütan endoskopik diskektomi; hem teknolojik ve cerrahi aletlerdeki gelişmeler hem de artan cerrahi tecrübeyle foraminal ve extraforaminal diskler için mikrocerrahiye iyi bir alternatif oluşturmuştur. Ayrıca kullanım alanı sadece bu lokalizasyonla sınırlı kalmayıp kanal içi serbest fragman, nüks diskler ve dar kanallara doğru da genişlemektedir.

#### Anahtar Kelimeler

Endoskopik Diskektomi; Perkütan Endoskopik Diskektomi; Transforaminal Endoskopik Diskektomi

#### Abstract

**Aim:** Minimally invasive interventions have become increasingly popular with the developments in technology and surgical tools. In this article, we present our experience with 67 cases of percutaneous transforaminal endoscopic lumbar discectomy. **Material and Method:** A total of 67 cases that underwent endoscopic surgery for foraminal and extraforaminal disc hernia between 2004 and 2010 were retrospectively examined. **Results:** The mean pre-operative VAS score was 8.13. The mean post-operative VAS score was 2.4 in the 1st month and 2.01 in the 12th month. Satisfaction according to MacNab criteria in the 12th month was excellent in 35 (52.2%) patients, good in 18 (26.9%) patients, fair in 11 (16.4%) patients, and poor in 3 (4.5%) patients. Microdiscectomy was required due to continuing symptoms in 3 patients (4.5%). Temporary dysesthesia was found in 3 patients. **Discussion:** Percutaneous endoscopic discectomy has become a good alternative to microsurgery for foraminal and extraforaminal disc herniations because of the developments in technology and surgical tools as well as the increased experience of surgeons. The technique is not limited to these localizations; it can also be used for free fragments within the channel, recurrent disc herniations, and narrow channels.

#### Keywords

Endoscopic Discectomy; Percutaneous Endoscopic Discectomy; Transforaminal Endoscopic Discectomy

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## Introduction

About 3.8% of all disc hernias consist of far lateral disc hernias. They are most commonly seen at the L3-4 and L4-5 levels [1]. Transforaminal endoscopic discectomy (TFED) for far lateral disc hernias has been described by Kambin and Gellman in 1983 [2,3].

TFED is less invasive, and is safe and efficient compared to the significant damage to the spine structure caused by conservative surgery for far lateral discs [1]. The interest of patients in minimal invasive spinal surgery has gradually increased in parallel with the opportunity to return to work earlier, because disc hernias lead to significant work-related and economic losses. Endoscopic surgery is now used not only for far lateral but also for midline and extruded discs, and even in lumbar stenosis surgery with the help of a new generation of surgical tools and the increased experience of surgeons. In this article we present our experience with 67 cases of percutaneous transforaminal endoscopic lumbar discectomy.

## Material and Method

A total of 67 cases that underwent endoscopic surgery for foraminal and extraforaminal disc hernia between 2004 and 2010 were retrospectively examined.

The radiology diagnosis was made with lumbar MRI in all cases. Lumbar vertebra tomography with reconstruction was used for disc hernias at the L5-S1 level due to the high iliac wing. In all cases, the patient was informed before the procedure that the procedure would be performed with sedoanalgesia but could be converted to microsurgery under general anesthesia. All cases underwent surgery with the joimax TESSYS endoscopic spinal system.

The demographic data along with changes in the pain state and the satisfaction state of the cases were recorded. The satisfaction with the surgical procedure was determined using the pre-operative and post-operative visual pain score (VAS) records and the 12-month satisfaction with the MacNab classification records [4,5].

## Results

A total of 67 cases consisting of 37 females (55.2%) and 30 males (44.8%) underwent endoscopic discectomy. The mean age of the patients was 52.3 (23-65) years. All cases had ra-

dicular leg pain. Mean pre-operative VAS score was 8.13. The disc hernia was at the L2-3 level in 10 (15%) cases, L3-4 in 16 (24%) cases, L4-5 in 33 (49%) cases, and L5-S1 in 8 (12%) cases. The endoscopic procedure was completed successfully without the need to convert to microsurgery with general anesthesia in all patients (Figure). No patients had a new neurological deficit in the post-operative early neurologic examination. The 61 patients whose symptoms disappeared completely were discharged on the same day post-operatively. Microdiscectomy was performed in 2 patients whose pain had decreased post-operatively but then increased again and in 1 patient who was found to have decreased ankle dorsal flexion strength. The pain disappeared after the second surgery in all 3 patients (complication rate 4.5%).

Entry site or deep tissue infection was not observed in any of the patients. Post-operative temporary dysesthesia was observed in 3 cases. Their dysesthesia recovered completely with medical treatment (Gabapentin) in 4 weeks. The post-operative mean VAS score was 2.4 in the 1st month and 2.01 in the 12th month. Degree of satisfaction in the 12th month according to MacNab criteria was excellent in 35 (52.2%) patients, good in 18 (26.9%) patients, fair in 11 (16.4%) patients, and poor in 3 (4.5%) patients.

## Discussion

Minimally invasive methods have gradually become preferable with the developments in endoscopic tools and techniques, increased surgical experience, and increased public awareness. The field is also gradually expanding in terms of surgical indications. Percutaneous endoscopic lumbar discectomy (PELD) can be performed through the transforaminal (TFED) or trans-laminar route. The standard indications for TFED are foraminal and extraforaminal disc hernias that are not calcified and that cause discogenic leg pain [6-9]. Exploration is difficult in central localized herniation with TFED. The presence of accompanying spinal stenosis or lateral recess stenosis decreases the success rate [9,10]. The transforaminal approach can be difficult at the L5-S1 level due to the iliac wings, big facet, and narrower foramen. Using pre-operative lumbar tomography with reconstruction in surgical planning, as we did in 8 patients with L5-S1 disc hernia, will increase the success rate. The presence of severe neurological deficits such as advanced paresis or cauda syn-

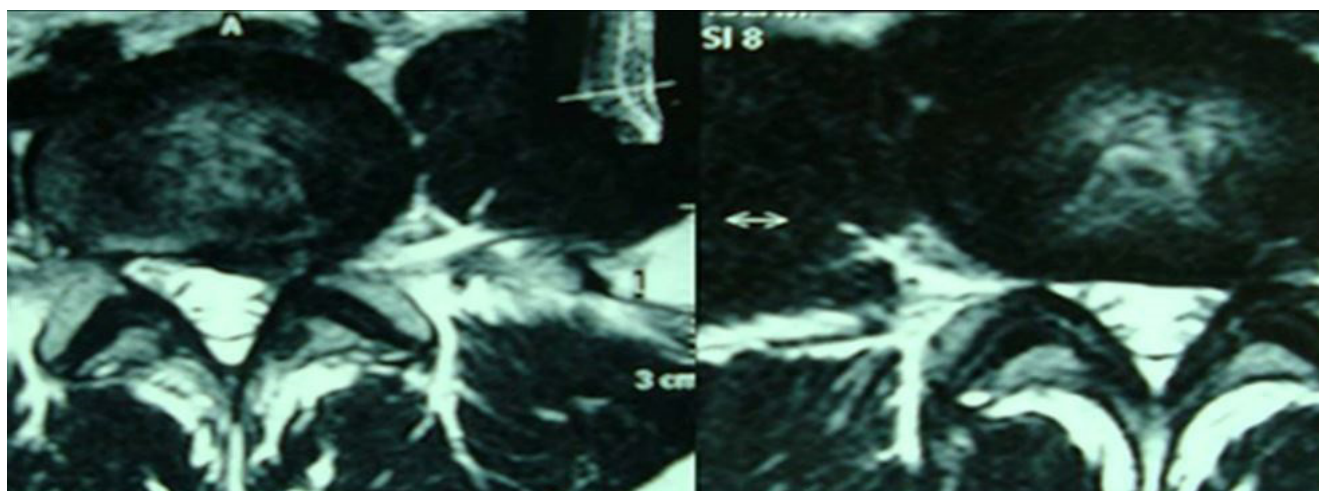


Figure: Axial MRIs obtained preoperatively showing the left L4-5 foraminal disc herniation and obtained 3 months post-operatively showing resolution of the pathology.

drome; presence of segmental instability, fibrosis, instability or spondylolisthesis due to previous surgery; severe deformities disturbing the normal anatomy; infection; and excessive migration of the disc upwards or downwards make the case inappropriate for TFED [11-13]. However, there are series claiming that the technique can be used in many case types including recurrence, migrated discs, and central discs that were previously not considered indications. It can even be used in lumbar spinal stenosis together with interlaminar approaches [14].

The significant advantages are that it is a minimally invasive method with less paravertebral muscle injury, preservation of bone structures, less post-operative pain and fibrosis, no instability risk, and shorter duration of hospitalization and recovery [15,16]. In our series, we discharged 95.5% of our patients from the hospital the same day. Although traditional surgery has good results, clinical findings develop in 10% of the patients due to the scar tissue that develops post-operatively in the epidural area, requiring repeat surgery [12]. Less scar tissue develops after endoscopic surgery as ligamentum flavum and canal structures are not removed [16,17]. The disadvantages are the need for special surgical tools, the duration of training and gaining experience, and the length of the surgery.

The TFED complication rate is 2.7% to 3.5. This rate is reported as 6% in conventional surgery [9,12]. Complications of TFED include infection, cerebrospinal fluid leak, dysesthetic leg pain due to root and ganglion compression injury, vascular injuries, thrombophlebitis, operative failure, and recurrence [2]. Yeung et al. [18] reported the dura injury risk in TFED as 0.3% in their study of 307 cases. No dura injury was observed in our study. Post-operative temporary dysesthesia was seen in 3 patients in our series of 67 cases (4.5%). Surgical failure was detected again in 3 patients and microdiscectomy was required. No other complication was observed.

The satisfaction of the cases from the surgical procedure was determined with the pre-operative and post-operative visual pain score (VAS) records and the satisfaction at 12 months was evaluated according to the MacNab classification [4,5]. Evaluation of the literature showed that excellent results have been reported with the VAS and MacNab evaluation of single level endoscopic surgery. The recovery rate was reported as 83.9% after a single level procedure and 69.7% after a multiple level procedure by Jasper et al [19]. It has been reported that the success rate can be increased by ensuring correct localization in multiple level discs with a selective nerve root block. Using the MacNab criteria, Tzann et al. [9] reported a success rate of 89% (134 cases), Hoogland et al. [16] 84.6% (142 cases), and Reutten et al. [8] 81% (463 cases). Our ratio of patients with an excellent or good result was 79.1%, a fair result 16.4%, and a poor result 4.5% with the MacNab criteria. The mean pre-operative VAS was 8.13 and the mean post-operative VAS was 2.01 in our series. Hoogland et al. [16] reported a mean pre-operative VAS of 8.2 and a mean post-operative VAS of 2.6 in a series of 142 cases. Kim et al. [20] reported a success rate of 81% according to the MacNab criteria in 26 recurrent disc hernias that underwent endoscopic surgery. The mean pre-operative VAS was  $7.8 \pm 1.8$  and the mean post-operative VAS  $2.5 \pm 2.6$ .

There are anatomic difficulties with PELD surgery at the L5-S1

space. Interlaminar endoscopic discectomy has started to become popular for the L5-S1 and even the L4-5 spaces recently [15]. Choi et al. [15] compared interlaminar and transforaminal endoscopic discectomies for the L5-S1 space. They report that the wide interlaminar distance at L5-S1 distance, the fact that the iliac wings make it difficult to reach the foramen and the narrow foramen have made the interlaminar endoscopic approach the better choice. They state that interlaminar endoscopic interventions are appropriate for axillary and migrated discs while transforaminal endoscopic interventions are appropriate for the shoulder, and central and recurrent discs. They emphasized that foraminoplasty was needed for transforaminal access to central discs. The transforaminal endoscopic discectomy success rate for the L5-S1 space was reported as 85% by Ruetten et al. [12] and 81.4% by Yeung et al. [18]. In addition to these high success rates reported for L5-S1, all lumbar disc spaces were accessible endoscopically [15,18].

There is also controversy about the indications of endoscopic surgery for migrated discs. The use of foraminoplasty in discs with marked migration increases the surgical success rate. However, it is reported that disc remnants can be seen in 5-13% of cases and post-operative temporary dysesthesia in up to 13% of cases, even in experienced hands [20,21].

Another disorder where PELD has become popular recently is recurrent disc herniation. Kim et al. [20] recommend PELD as an alternative method for recurrent disc hernias. They report that re-traumatization of the posterior spinal elements and problems due to scar tissue can be prevented in this way. The recurrent disc hernia could be removed in all 26 of their patients and a satisfactory result was obtained in 81% of the patients, with recurrence developing in 2 (8%) patients. Fusion surgery was required only in 1 patient. The dural injury risk in microendoscopic discectomy has been reported to be higher than in microsurgery [20,22]. Ruetten et al. [23] reported in their article that satisfactory results were obtained in 90% of their patients, with a re-recurrence rate of 5.7% and no difference with open surgery. The re-recurrence rate was reported as 4.6% by Hoogland et al [17]. Severe complications in open surgery were emphasized as being more common than in endoscopic surgery [17,20]. Despite the increase in surgical experience and developments in technology, re-operation rates vary between 5.7% and 24% [23,24].

### Conclusion

Percutaneous endoscopic discectomy has become a good alternative to microsurgery for foraminal and extraforaminal discs with the developments in technology and surgical tools as well as the increased experience of surgeons. The technique is not limited to these localizations and can also be used for free fragments within the channel, recurrent disc herniations, and narrow channels.

### Ethical Statement

Ethics committee approval was received for this study.

### Informed Consent

Written informed consent was obtained from patients who participated in this study.

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## Competing interests

The authors declare that they have no competing interests

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