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Effectiveness of Surgical Treatment for Far-lateral Lumbar Disc Herniation: A Single Surgeon's Perspective

Far-lateral Lomber Disk Hernisinde Cerrahi Tedavinin Etkinliği: Tek Cerrahın Bakış Açısı

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ABSTRACT

Objective: Far-lateral lumbar disc herniation (FLLDH), also called extraforaminal or intraforaminal disc herniation, affects nerve roots located outside the boundaries of the spinal canal, unlike central or posterolateral disc herniation. Only 10% of patients with FLLDH benefit from conservative treatment. In this study, we aimed to explore the experiences and mid-term surgical outcomes of patients who underwent extraforaminal microdiscectomy for FLLDH via a midline incision.

Methods: The study data were retrospectively extracted from medical records between April 01, 2020 and February 1, 2023. Patients were assessed according to age, gender, pain localization, preoperative motor deficits, reflex changes, symptom duration, FLLDH level, preoperative visual analog scale (VAS) score, and 3- and 6-month postoperative VAS scores.

Results: In this study, we enrolled a total of 12 patients, comprising 6 females and 6 males, with a mean age of 53.8±12.6 (range, 25-67) years. The mean preoperative duration of symptoms was 35.5±14.5 (range, 17-65) days. Although the mean VAS score of our patients was 9.25 before the operation, it was 0.3 at 6 months postoperatively.

Conclusion: Although FLLDH is less prevalent, surgical intervention is more commonly used because of the indications of increased pain severity. Microdiscectomy is the gold standard for effectively managing distant lateral disc herniation and consistently demonstrates remarkably superior outcomes compared with conventional lumbar disc hernia surgery.

Keywords: Microdiscectomy, lumbal disc herniation, pain, extraforaminal

ÖZ

Amaç: Ekstraforaminal veya intraforaminal disk herniasyonu olarak da adlandırılan far-lateral lomber disk herniasyonu (FLLDH), daha yaygın olan merkezi veya posterolateral disk herniasyonlarının aksine, spinal kanalın sınırları dışında bulunan sinir köklerini etkiler. FLLDH'si olan hastaların sadece %10'u konservatif tedaviden fayda görmektedir. Çalışmamızda FLLDH nedeniyle orta hat kesisinden ekstraforaminal mikrodiskektomi uygulanan hastaların deneyimlerini ve orta dönem cerrahi sonuçlarını araştırıyoruz.

Gereç ve Yöntem: Çalışma verileri, hastaların 01 Nisan 2020 ile 1 Şubat 2023 tarihleri arasındaki tıbbi kayıtlarından retrospektif olarak elde edildi. Hastalar yaş, cinsiyet, ağrı lokalizasyonu, ameliyat öncesi motor defisitler, refleks değişiklikleri, semptom süresi, düzeyine göre değerlendirildi. FLLDH, ameliyat öncesi vizüel analog skala (VAS) skorunun yanı sıra ameliyat sonrası 3 aylık ve 6 aylık VAS skorlarına göre değerlendirildi.

Bulgular: Çalışmamıza ortalama yaşları 53,8±12,6 (25-67) yıl olan 6'sı kadın, 6'sı erkek olmak üzere toplam 12 hasta dahil edildi. Ameliyat öncesi ortalama semptom süresi 35,5±14,5 (aralık, 17-65) gündü. Hastalarımızın ameliyat öncesi ortalama VAS skoru 9,25 iken ameliyat sonrası 6. ayda 0,3 olarak tespit edildi.

Sonuç: FLLDH daha az görülmekle birlikte, ağrı şiddetinin arttığına dair belirtiler nedeniyle tedavisinde cerrahi müdahale ön plana çıkmaktadır. Mikrodiskektomi, far-lateral lomber disk hernisinin etkili bir şekilde yönetilmesinde altın standart olarak duruyor ve geleneksel lomber disk hernisi cerrahisine kıyasla sürekli olarak dikkat çekici derecede üstün sonuçlar ortaya koyuyor.

Anahtar Kelimeler: Mikrodiskektomi, lomber disk hernisi, ağrı, ekstraforaminal

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INTRODUCTION

Far-lateral lumbar disc herniation (FLLDH), also referred to as extraforaminal or intraforaminal lumbar disc herniation, occurs when the nucleus pulposus protrudes through the annulus fibrosus and extends toward the outermost lateral aspect of the spinal column. Unlike the more frequently encountered central or posterolateral disk herniation, the far-lateral herniation typically impacts the nerve roots located outside the confines of the spinal canal (1,2).

Studies have demonstrated that distant lateral disc hernias account for 7-12% of all lumbar disc herniations (3,4). These hernias are most frequently observed at the L3-4 and L4-5 levels, whereas their occurrence is rare at the L2-3 and L5-1 levels (5).

Symptoms arising from FLLDH are contingent on the specific nerve root affected and can exhibit variability from one individual to another. Common manifestations include localized back pain, sciatica, numbness, tingling, and weakened lower limb sensations. Diverging from central disc herniations, which may exert pressure on the cauda equina, far lateral disc herniations tend to evoke more focal symptoms that are confined to a distinct root level (6).

In the context of treatment, akin to all lumbar disc herniations, the primary approach revolves around conservative measures, including rest, anti-inflammatory medication, and physical therapy, when managing distant lateral lumbar disc herniation (7). Regrettably, a significant proportion of patients do not experience favorable outcomes through these interventions. The decision to pursue surgical intervention for distant lateral disc herniation is influenced by several factors, such as the precise location of the disc and the surgeon's individual expertise and background (8,9).

In this study, we aimed to explore the experiences and mid-term surgical outcomes of patients who underwent extraforaminal microdiscectomy for FLLDH via a midline incision. We also examined the benefits of the surgical technique employed, as reported by these patients.

METHODS

The study, which was designed as a retrospective cohort investigation, was initiated after obtaining approval from the University of Health Sciences Türkiye, Bursa City Hospital Clinical Research Ethics Committee (decision no: 2023-14/4, date: 16.08.2023). The study data were retrospectively extracted from the medical records of patients between April 01, 2020 and February 1, 2023.

Patients were assessed according to age, gender, pain localization, preoperative motor deficits, reflex changes, symptom duration, FLLDH level, preoperative visual analog scale (VAS) score, as well as 3-3-month and 6-month postoperative VAS scores. Notably, no perioperative or postoperative complications were observed among any of the patients. Comprehensive follow-up was conducted over a period of 12 months for all participants.

Surgical Procedure

After anesthesia administration, the patient is positioned appropriately. Prior to commencing the procedure, C-arm fluoroscopy is used to precisely determine the level and extent of the skin incision. After creating a midline skin incision of approximately 3 cm, the fascia is incised along the midline, and the paravertebral muscles are meticulously detached subperiosteally. Subsequently, a Taylor retractor was positioned adjacent to the facet joint, and its placement was verified under fluoroscopic guidance. After visualizing the upper edge of the transverse process, the lateral edge of the pars interarticularis, and the facet joint complex, the operative field is further magnified using a microscope. Depending on the region of the extruded disc, a section of bone is excised from the lateral aspect of the pars interarticularis using Kerrison rongeur. In cases where appropriate, bone is removed from the upper-lateral surface of the facet joint. Then, meticulous dissection around the transverse ligament exposes the root and dorsal root ganglion, enhancing their visibility after the surrounding adipose tissue is gently cleared. To ensure unimpeded root movement, adjacent tissues are meticulously excised, and fragmentectomy was performed to access and remove the extruded disc segment. If necessary, microdiscectomy is performed to access the disc space. After confirming the relaxation of the root and establishing hemostasis, the procedure was concluded.

Statistical Analysis

IBM SPSS 21.00 packaged software was used for data analysis. Descriptive statistics were used to evaluate the data. Categorized data are presented as frequency-percentage ratios, and quantitative data are presented as mean and standard deviation.

RESULTS

In our study, we enrolled a total of 12 patients, including 6 females and 6 males, with a mean age of 53.8±12.6 (range, 25-67) years. The distribution of lesions among the patients was as follows: 50% (6 patients) had lesions at the L4-L5 level, 25% (3 patients) at the L3-L4 level, and another 25% (3 patients) at the L5-S1 level. The mean preoperative duration of symptoms was 35.5±14.5 (range, 17-65) days, and the mean operative time was 77.9±17.5 (range, 70-90) minutes.

A 12-month follow-up period was maintained for all patients (Table 1). Notably, no complications emerged during the perioperative and postoperative phases, and no recurrence was observed. All patients were discharged within 1 day after surgery.

Before surgery, patients reported a mean VAS score of 9.25±0.8 (range, 8-10), which significantly decreased in the early postoperative period. Assessment of the VAS score at the third and sixth postoperative months revealed that most patients achieved a VAS score of 0 by the sixth postoperative month.

DISCUSSION

In 1974, Abdullah et al. (10) described the clinical features of FLLDH. The mean age of the patients was 53 years, which was consistent with the study of Abdullah et al. (10).

Distant lateral disc herniation places direct pressure on the dorsal root ganglion, resulting in notably intense radicular pain within the dermatome. This phenomenon is attributed to ganglion compression and subsequent sensory nerve pressure, which distinguishes from medial disc herniation (Figure 1) (10).

Table 1. Demographic and clinical characteristics of the patients

	Mean ± SD/n (%)	Min-max
Age (years)	53.8±12.6	25-67
Gender		
Female	6 (50%)	
Male	6 (50%)	
Pain location		
Knee	2 (16.6%)	
Above the knee	1 (8.4%)	
Below the knee	6 (50%)	
Ankle	3 (25%)	
Hernia level		
L3-4	3 (25%)	
L4-5	6 (50%)	
L5-S1	3 (25%)	
Preoperative symptom duration (days)	35.5±14.5	17-65
Surgical approach		
Fragment excision	9 (75%)	
Fragment excision + disc excision	3 (25%)	
Operative time (minutes)	77.9±17.5	70-90
VAS score		
Preoperative	9.25±0.8	8-10
Postoperative	3.41±1.6	2-8
Postoperative 3-month	1.08±0.9	0-3
Postoperative 6-month	0.3±0.4	0-1

SD: Standard deviation, min-max: Minimum-maximum, VAS: Visual analog scale

The symptoms exhibited by our patients generally correlated with the specific level of lumbar disc herniation. One patient reported leg pain radiating below the knee, two experienced knee pain, three described ankle pain, and six complained of pain beneath the knee.

In our patient cohort, FLLDH predominantly occurred at the L4-5 level, which aligns with existing literature findings. However, it is noteworthy that the occurrence of FLLDH at the L5-S1 level was relatively more frequent than that reported in the literature (5).

As with all lumbar disc herniations, the primary treatment option is conservative. However, it is important to note that approximately 90% of far lateral disc herniations do not respond positively to conservative treatment, necessitating surgical intervention (11,12).

The relatively shorter preoperative duration of symptoms can be attributed to the increased severity of pain in cases of FLLDH compared with classical lumbar disc herniation. This finding also underscores the increased risk of developing chronic neuropathic pain (13). Our study revealed that patients underwent surgery, on average, 35.5±14.5 days after the onset of their initial symptoms.

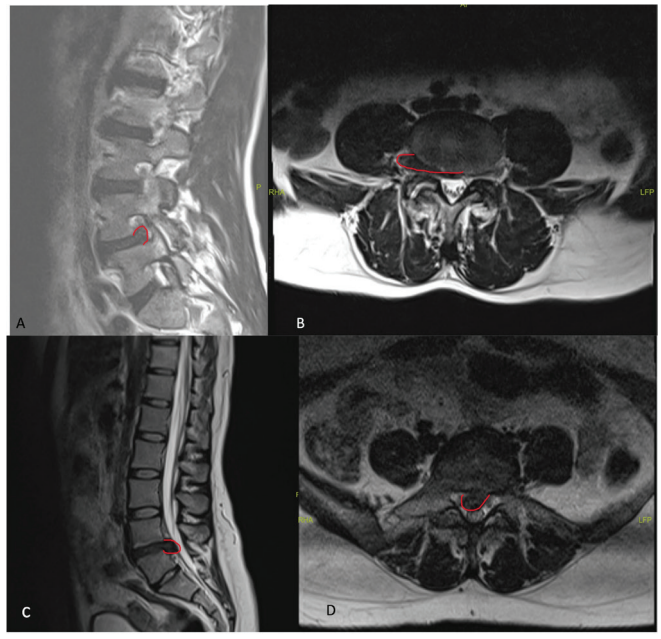

Figure 1. A: T2 saggital MRI, L4-5 right far-lateral lumbar disc hernaition; B: T2-axial MRI, L4-5 right far-lateral lumbar disc herniation; C: T2-saggital MRI, L4-5 right clasic lumbar disc hernaition; D: T2-saggital MRI, L4-5 right far-lateral lumbar disc herniation
MRI: Magnetic resonance imaging

In the literature, research into approaches for treating far lateral disc hernias gained significant momentum through the mid-1980s. During this period, hemilaminectomy was demonstrated to facilitate access to the far lateral disc hernias (14,15). As time has progressed, the significance of maintaining spinal stability has become increasingly apparent in various spinal surgical techniques. Consequently, numerous techniques have been delineated for surgery involving far lateral disc herniation over the years. Of note, the extraforaminal microsurgical approach, which we also used, was initially introduced by Reulen et al. (16).

The overarching goal of the approaches described thus far is to execute discectomy while minimizing tissue damage. In recent years, microdiscectomy has emerged as the gold standard for the surgical management of distant lateral disc herniations (17,18). For surgeons which are in the early stages of gaining experience, a keen grasp of anatomical orientation is of paramount importance. Anatomical orientation is effectively achieved by dissecting the paravertebral muscles from the spinous process following a median incision-a technique common to all lumbar disc surgeries. This approach is particularly harnessed in FLLDH surgery, thereby leveraging the familiarity of surgeons with this technique. This exposure facilitates visualization of the lateral and pars interarticularis facets, thereby enhancing surgical orientation and minimizing potential complications.

In contrast, Al-Khawaja et al. (19) suggested that the subperiosteal approach is associated with reduced discomfort compared with the intramuscular approach, owing to its influence on only a single muscle (20).

Recent surgical procedures employed for addressing far lateral disc herniation include the conventional midline approach, as well as partial or complete resection of the pars interarticularis and/or inferior facet. Although the operative time might appear somewhat extended based on existing literature, it is suggested that this is relatively manageable for surgeons who have accrued newfound expertise (20,21). We applied this approach, which has been used recently, to all our patients. In addition, Kotil et al. (22) similar to the study, fragment excision alone was performed in 75% of patients, whereas both fragment excision and disc excision were performed in 25% of patients.

Contemporary studies have predominantly assessed the advantages of FLLDH surgery through metrics like the Oswestry disability index or VAS score (1,20,23,24). In our investigation, we used the VAS score. Notably, the mean VAS score before surgery stood at 9.25±0.8, which substantially improved to a mean score of 0.3±0.4 during the 6-month postoperative evaluation. Intriguingly, our study demonstrated the most noteworthy enhancement in VAS score, as per the available literature.

CONCLUSION

Although FLLDH is less prevalent, surgical intervention takes precedence in its management because of the indications of increased pain severity. Microdiscectomy is the gold standard for effectively managing distant lateral disc herniation and consistently demonstrates remarkably superior outcomes compared with conventional lumbar disc hernia surgery.

ETHICS

Ethics Committee Approval: The study, which was designed as a retrospective cohort investigation, was initiated after obtaining approval from the University of Health Sciences Türkiye, Bursa City Hospital Clinical Research Ethics Committee (decision no: 2023-14/4, date: 16.08.2023).

Informed Consent: Retrospective study.

Authorship Contributions

Surgical and Medical Practices: D.B., Concept: D.B., Design: D.B., Data Collection or Processing: M.Z.Ç., Analysis or Interpretation: M.Z.Ç., Literature Search: M.Z.Ç., Writing: D.B.

Conflict of Interest: No conflict of interest was declared by the authors.

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