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MODIFIED PARAMEDIAN APPROACH FOR FAR LATERAL LUMBAR DISC HERNIATION: RETROSPECTIVE ANALYSIS OF A STABILITY-PRESERVING, FACET/PARS-SPARING SERIES

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ABSTRACT

Objective: Far lateral lumbar disc herniation (FLLH) is a rare entity (about 7-12% of lumbar disc herniations) but causes severe radicular pain. Traditional midline approaches to FLLH frequently require facet resection, which increases the risk of postoperative segmental instability. A paraspinal (Wiltse) approach offers an alternative corridor that may preserve posterior elements.This study aimed to evaluate a modified paramedian approach for FLLH that avoids resection of any facet or pars.

Materials and Methods: Fourteen patients with single-level FLLH at L2-L5 (L5-S1 excluded) were retrospectively reviewed. All patients underwent microsurgical fragmentectomy via the paramedian intermuscular (Wiltse) approach without bone removal. Leg and back pain were assessed using the visual analog scale (VAS) preoperatively and on postoperative day 10. Preoperative motor deficit, early motor recovery, neuropathic complaints, and perioperative complications were recorded.

Results: Severe radicular leg pain was the chief complaint in all patients and resolved by postoperative day 10. The mean leg pain VAS score decreased from 9.0 to 0.7 (92% reduction; p<0.001). The mean back pain VAS score decreased from 3.0 to 1.5, representing a 52% reduction (p=0.002). Six patients (42.9%) had preoperative motor weakness; by day 10, three (50%) regained full strength and three (50%) regained nearly full strength. Four patients (28.6%) developed transient postoperative dermatomal paresthesia, which resolved with conservative management. No major complications occurred, and there were no early clinical signs of instability.

Conclusion: The modified paramedian approach provided safe and effective decompression for FLLH without any facet or pars removal. Early outcomes showed marked pain relief and neurological recovery, supporting this stability-preserving "zero bone resection" technique as a viable option.

Keywords: Far lateral, lumbar disc herniation, paramedian approach, facet/pars sparing

INTRODUCTION

Far lateral lumbar disc herniation (FLLH) is a very painful clinical condition in which the exiting nerve root and dorsal root ganglion (DRG) are compressed lateral to the foraminal boundaries. It was first described by Abdullah et al.[1]. Although its incidence is low (approximately 7-12% of all lumbar disc herniations), it is seen most frequently at L4-L5 and less often at L3-L4. Clinically, FLLH presents with severe radicular pain and therefore usually requires prompt treatment[2]. Cases that show no improvement after a few weeks of conservative management are directed to surgery.

Historically, attempting to reach a far lateral fragment via a midline approach often required resection of the facet joint, a step that carries a well-known risk of instability[3-5]. For this reason, the paramedian (paraspinal/Wiltse) approach emerged as an alternative aimed at preserving the posterior elements[6]. However, even in many descriptions of the paramedian approach in the literature, it is noted that drilling and partial resection of the lateral facet or pars are performed to improve the surgical view[5,7,8].

At the L5-S1 level, a special situation exists: obtaining sufficient space for herniation removal via Kambin's triangle is only possible with some resection of the facet joint and iliac wing. Therefore, L5-S1 FLLH cases were excluded from this study. At more cranial levels, using a paramedian approach, it is possible to achieve safe and effective decompression without any bony resection of the superior facet or pars. This original study presents the early clinical outcomes of such a strategy, which was standardized by a single surgeon.

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MATERIALS AND METHODS

This study was a retrospective, single-arm, single-center series, with all surgeries performed in a standardized manner by the same surgeon. Besides, the study was approved by the Non-interventional Clinical Research Ethics Committee of İzmir Bakırçay University (approval no: 2549, date: 03.12.2025). Written informed consent was obtained from all patients included in this study.

Inclusion Criteria

Patients aged 18 years or older with a single-level FLLH at any lumbar level except the L5-S1 disc (who were operated for that indication) were included. The most important surgical inclusion criterion was complete concordance between the patient's clinical findings and radiological imaging. Therefore, only cases in which lumbar magnetic resonance imaging (MRI) clearly demonstrated a far lateral fragment and that underwent surgical treatment were included.

Exclusion Criteria

Age under 18 years; FLLH at L5-S1; pathology with a predominant intraspinal/paramedian component; and previous surgery at the same level were exclusion criteria.

Surgical Technique

All patients were operated on under general anesthesia in the prone, neutral position. The pelvis and chest were supported as a precaution in case a contralateral oblique trajectory might be needed. A skin incision ~3-4 cm lateral to the midline, parallel to the midline, was made. The paraspinal (Wiltse) approach was used through the thoracolumbar fascia by splitting the muscle. Blunt dissection was carried out with two index fingers through the intermuscular plane to palpate the upper and lower transverse processes. At this depth, two Gelpi retractors were placed in cranio-caudal and medio-lateral orientation.

Using a long electrocautery tip, muscle remnants over the transverse processes and facet joint were cauterized and removed with a pituitary rongeur. A thin layer of muscle remains over the intertransverse membrane; this was stripped away with a dissector to expose the membrane, and the muscle was removed piecemeal with a rongeur. The intertransverse membrane is a parchment-thin, semi-transparent, lax connective structure. Next, the facet joint was fully exposed, and the pars was palpated with a dissector; its surface was cleaned with cautery to achieve anatomic orientation (at this point, the surgeon recalls the classic "Scotty dog" image seen in an oblique lumbar radiograph).

By gently applying medial and lateral pressure with a dissector on the lax, semi-transparent intertransverse membrane, it is possible to delineate the longitudinal boundaries of the thick, edematous nerve root. If the FLLH is very large and has displaced the root upward, the fragment becomes visible in its cavity only after disc material is excised.

To avoid injuring the root, the intertransverse membrane should be incised near the facet joint and the lower transverse process (the region corresponding to the axilla of the nerve root) and removed in small pieces using a Kerrison rongeur. The appearance of fatty tissue is the most important sign that one is close to the nerve root. If the nerve root is directly in view, the situation is simpler: the root is retracted laterally and upward, allowing the FLLH to be identified in the root's axilla.

Two nuances are important. First, if the structure's thickness is not substantial, then it is probably not the root; it may be another tissue or a thinner sensory nerve, because in this area the nerve root appears thick due to the ganglion and compression-induced edema. Second, if the herniation is not very large, it is often better to look for it more medially than expected. If the nerve root cannot be distinguished and a tissue believed to be annulus (pearly-white) is in front of the surgeon, it is wise to proceed cautiously-the structure in front may not be disc but the root itself. In such a situation, it is appropriate to attempt to shift this tissue from medial to lateral and upward with a dissector. If it absolutely does not slide or dissect, it is more likely to be disc (the nerve root is not visible because it has been pushed far upward).

At this stage, a tiny incision is made in the disc in the direction of the nerve root's course to check for disc material; once confirmed, the disc herniation is evacuated in all directions from under the annulus. After sufficient decompression, the nerve root comes into view under the microscope. Since this region is lateral to the Obersteiner-Redlich zone, a cerebrospinal fluid leak will not occur in the event of an injury here. After confirming that the nerve root is decompressed, a facet joint block can be performed at the surgeon's discretion. Hemostasis must be meticulous, and a drain should be placed if necessary; otherwise, the risk of seroma is higher in this area.

Statistical Analysis

Leg pain (femoralgia or sciatalgia) and mechanical low back pain were evaluated by the visual analog scale (VAS) preoperatively and on postoperative day 10. The presence of any preoperative motor deficit and motor improvement at day 10, postoperative neuropathic complaints (numbness, burning or tingling in the respective dermatome), and major/minor complications were recorded.

Continuous data were summarized as mean ± standard deviation, and categorical data as number and percentage (%). For comparison of pre- versus postoperative VAS values, a paired t-test or Wilcoxon signed-rank test was used according to data distribution. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 14 patients were included in the series (mean age 60.6±10.7 years; 50% female, 50% male). The herniation levels were L4-L5 in 8 patients (57.1%), L3-L4 in 5 patients (35.7%),

and L2-L3 in 1 patient (7.1%). In all cases, the disc fragment was located completely far lateral on imaging; in none of the cases was there a foraminal or paramedian component dominant or sufficient to explain the clinical picture.

Preoperatively, the most significant complaint was severe leg pain in the affected dermatome. By postoperative day 10, this pain was entirely controlled. The mean VAS score dropped from 9.00±0.66 preoperatively to 0.65±0.59 on day 10-an absolute decrease of 92.8%, which was statistically significant ($p<0.001$, paired t-test). Similarly, the mechanical low back pain VAS score decreased from 3.02±1.00 to 1.45±1.04, a 52.0% improvement that was statistically significant ($p=0.002$).

Neurologically, 6 of the 14 patients (42.9%) had motor weakness preoperatively. In this subgroup, 3 patients (50%) showed full recovery and 3 (50%) nearly full recovery by day 10; no patient experienced worsening of motor function.

In the early postoperative period, 4 patients (28.6%) exhibited neuropathic complaints such as numbness or burning/tingling in a dermatomal distribution. All of these symptoms regressed over a short period with conservative treatment.

All surgeries were performed via a paramedian (paraspinal/Wiltse) approach, and no bony resection of the lateral facet or pars interarticularis was performed in any case. In all operations, single-level fragmentectomy was performed under the microscope; after hemostasis, patients were mobilized within 24-48 hours and discharged. No case developed any major complication such as dural tear, nerve injury, infection, hematoma, or deep vein thrombosis. In early postoperative follow-up, there were no clinical findings indicative of segmental instability.

The level of herniation, patient age/sex, preoperative and postoperative day 10 leg pain VAS and mechanical low back pain VAS scores, presence of motor deficit and degree of early neurological improvement, and presence of postoperative neuropathic pain for each case are presented in Table 1. The mean changes in leg pain and mechanical low back pain VAS on postoperative day 10 compared with preoperative values are shown graphically in Figure 1.

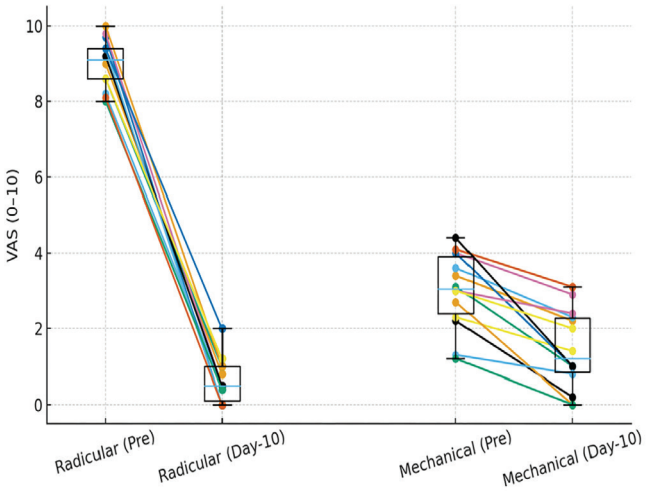

Figure 1. Comparison of preoperative and postoperative day 10 leg pain (femoralgia or sciatalgia) and mechanical low back pain VAS scores in patients with far lateral lumbar disc herniation. VAS: Visual analog scale

Table 1. Demographic data, level distribution, preoperative and postoperative day 10 VAS scores, motor deficit status, and early neurological improvement status of patients with far lateral lumbar disc herniation

				Pain scores VAS				Neurological status		
Case	Age (y)	Sex	Level	Radicular (pre)	Radicular (day-10)	Axial (pre)	Axial (day-10)	Motor deficit (pre)	Motor recovery (day-10)	Neuropathic pain (day-10)
1	44	M	L3-4	9.0	0.8	4.0	2.9	-	+	
2	63	F	L4-5	8.2	0.5	2.2	0.2	+	Complete	-
3	49	F	L3-4	8.6	1.0	3.4	2.2	-	-	
4	57	F	L3-4	9.4	0.0	3.6	2.3	-	-	
5	68	M	L4-5	9.7	0.0	3.1	1.0	+	Complete	-
6	48	M	L4-5	8.6	1.2	2.3	1.4	+	Near-complete	+
7	79	F	L4-5	9.8	0.5	4.0	1.0	-	-	
8	56	M	L3-4	9.2	0.5	4.1	3.1	-	+	
9	65	M	L4-5	10.0	1.0	3.0	2.4	+	Near-complete	-
10	71	F	L4-5	9.4	0.0	4.4	1.0	-	-	
11	75	F	L4-5	8.0	0.4	2.7	0.0	-	+	
12	50	M	L3-4	8.6	1.2	1.3	0.8	+	Near-complete	-
13	58	F	L2-3	9.4	2.0	1.2	0.0	-	-	
14	65	M	L4-5	8.1	0.0	3.0	2.0	+	Complete	-

VAS: Visual analog scale

DISCUSSION

The main message of this study is that for FLLH, even when using a paramedian corridor, it is not routinely necessary to perform "a little shaving" of the lateral facet or pars as is commonly taught; a safe and effective decompression is possible with no bone resection at all.

Historically, because a midline approach to far lateral fragments often required a total facetectomy, it has been associated with increased risk of segmental instability[3-5]. Our findings demonstrate that the ideal of "preserving the posterior elements" need not be limited to seeking alternatives to midline approaches; it can also be implemented with a paramedian approach by strictly adhering to a zero bone resection principle. The early results obtained here are consistent with efficacy and safety data reported for endoscopic and tubular technique variants[9-12].

Facet "overhang" refers to the bony protrusion formed by the lumbar superior articular process lateral to the foramen. Severe overhang has been associated with atrophy of the deep portion of the multifidus muscle[13]. In the far lateral surgical approach applied in this study, the key factor is the presence of an anatomical space that allows the surgeon to work in the nerve root's axilla without any bone resection.

Studies on endoscopic interventions are informative in this context. In a three-dimensional MRI-based analysis, the maximum cannula diameter that could pass through the neural Kambin's triangle increased from ~5.7±1.4 mm at L1-L2 to ~9.7±3.8 mm at L5-S1. In contrast, in the bony Kambin's triangle at L5-S1 the maximum diameter was limited to ~6.1±1.0 mm, and an 8 mm cannula could fit into that triangle in only 2% of 427 measurements[14]. Cadaveric morphometry shows that the distance from the tip of the superior articular process to the main nerve root is ~19 mm at L2-L3 and ~22 mm at L4-L5, suggesting that a safe working space can be obtained via a paramedian intertransverse window without bone resection[15]. A threshold of ~112.1 mm^2 for the superior articular process area has been reported to correlate strongly with foraminal narrowing; however, this parameter defines foraminal stenosis and does not directly support routine facet/pars resection in FLLH[16].

Computer modeling and *in vitro* experiments have shown that partial facetectomy significantly increases segmental mobility and intradiscal pressure; removal of even a small portion of the facet joint markedly increases segmental loading, especially in lateral flexion and axial rotation[17,18]. In this context, the "minor facet/pars shaving" commonly practiced for far lateral disc herniations appears to be a traditional but often unnecessary habit. In our series, no patient had facet or pars resection, and the early clinical outcomes are consistent with the effectiveness of this strategy. In particular, the notable decrease in mechanical low back pain VAS supports the notion that preserving facet/pars integrity has a positive impact on back pain.

Clinically, far lateral cases often present with more severe preoperative pain, yet the improvement after surgery can be similar to that observed in paracentral disc herniations[19]. Potential risk indicators for poor outcome (advanced age, long symptom duration, etc.) have been reported[20], but in our series the dramatic drop in leg pain VAS (from 9.0 to 0.65) and full or near-full early neurological recovery in patients with motor deficit underline the importance of relieving direct DRG compression. The statistically significant, marked pain reduction in the early period further emphasizes the adequacy of the decompression achieved. In this context, even partial resection of the facet overhang or pars appears unnecessary in most cases.

Longer-term results of the paramedian approach have shown good to excellent outcomes in ~80-90% of patients[21-23]. Recent series indicate that this method has a low reoperation rate and does not significantly increase instability[24,25]. Systematic reviews suggest that the overall complication profile of far lateral disc surgery is acceptable[26], and large patient series confirm that reoperation rates after single-level discectomy remain relatively low[27]. Given that no bone resection was performed in our cohort, it is reasonable to expect the rate of good outcomes to approach the upper end of this range.

For challenging anatomies, combined or modified surgical corridors have been described for far lateral discs[28]. However, even at the lumbosacral junction, far lateral nerve root compressions can be resolved safely with targeted, limited decompression[29]. Five-year outcomes of full-endoscopic transforaminal techniques support their equivalence to classic microdiscectomy in terms of efficacy[30]. Nevertheless, the focus of this article is not the choice of corridor itself, but the way it is applied-specifically, whether bone resection is truly necessary.

Classical intertransverse series have emphasized that extraforaminal disc herniation is a distinct entity that can be identified preoperatively with a high index of suspicion and the aid of MRI, and that this recognition enables a planned operative strategy in which destruction of the apophysial (facet) joint can be avoided[31]. In the same report, surgical decompression via the intertransverse approach achieved complete resolution of presenting leg pain in 85% of patients, supporting the concept that a targeted extraforaminal route can yield robust symptom relief while preserving key posterior stabilizing structures[31].

In line with this rationale, Wang et al.[32] emphasized that the key pathoanatomical feature of the condition is compression of the nerve root outside the foramen, and stated that intertransverse discectomy is a rational approach because the spinal canal is not opened and spinal stability is preserved. In their case-based experience, postoperative outcomes were reported to be satisfactory, with rapid resolution of weakness as well as low back and leg pain, reinforcing that direct extraforaminal decompression can be effective without the need for routine bony enlargement of the facet/pars complex[32].

Study Limitations

The main limitations of this study are its retrospective, single-arm design, relatively small sample size, and short follow-up duration. On the other hand, the fact that all surgeries were performed by a single surgeon-ensuring standardization and consistent implementation of the technique with close attention to surgical anatomy-is a strength. To evaluate recurrence, instability, and medium- to long-term functional outcomes, larger-sample prospective comparative studies are needed.

CONCLUSION

The modified paramedian (paraspinal/Wiltse) approach to FLLH allows effective decompression without any facet or pars resection. In this single-surgeon series, early outcomes demonstrated dramatic radicular pain relief, improvement in mechanical low back pain, and favorable early neurological recovery, with no major complications or early signs of instability. These findings support a stability-preserving, "zero bone resection" philosophy for FLLH at L2-L5 levels, and further comparative studies are warranted.

Ethics

Ethics Committee Approval: The study was approved by the Non-interventional Clinical Research Ethics Committee of İzmir Bakırçay University (approval no: 2549, date: 03.12.2025).
Informed Consent: Written informed consent was obtained from all patients included in this study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: Ü.K., Concept: Ü.K., Design: Ü.K., Data Collection or Processing: D.O.K., E.Ç., Analysis or Interpretation: D.O.K., E.Ç., Literature Search: E.Ç., Writing: Ü.K.
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