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Redefining Surgical Boundaries for Obese Patients? Full Endoscopic Lumbar Discectomy Proves Equally Effective With Shorter Hospital Stay in Obese Patients

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ABSTRACT

Objective: This cohort study aims to evaluate the impact of obesity on the outcomes of full endoscopic lumbar discectomy (FELD) in patients with lumbar disc herniation.

Methods: We conducted a retrospective analysis of 156 adult patients who underwent FELD for lumbar disc herniation from January 2015 to February 2023. Patients were divided into 3 groups: obese endoscopic (n = 71), obese open surgery (n = 31), and nonobese endoscopic (n = 54). Clinical outcomes were assessed using the visual analog scale for leg and back pain, the Oswestry Disability Index, and patient satisfaction rates. Operative time, hospital stay duration, and complication rates were also analyzed.

Results: No significant differences were observed in patient-reported outcome measures, operative time, or complication rates between obese and nonobese patients undergoing FELD. The mean operative time was longer in the endoscopic group compared with the open surgery group (70.2 vs 59.8 minutes), but the hospital stay was significantly shorter for endoscopic patients (1.7 vs 2.4 nights, P = 0.0006). Both obese and nonobese groups showed significant improvements in visual analog scale and Oswestry Disability Index scores at the final follow-up, with satisfaction rates of 85.7% in the endoscopic group reporting good to excellent outcomes.

Conclusions: FELD is a viable and effective alternative to traditional open surgery for obese patients, offering comparable clinical outcomes and the added benefit of a shorter hospital stay. These findings suggest that obesity does not inherently affect surgical outcomes, underscoring the need for further research with larger sample sizes and longer follow-up periods.

Clinical Relevance: FELD offers a viable and effective surgical option for obese patients, with outcomes comparable to traditional surgery but with the added benefit of shorter hospital stays.

Level of Evidence: 3.

Endoscopic Minimally Invasive Surgery

Keywords: full endoscopy, spine surgery, obesity, lumbar discectomy

INTRODUCTION

Obesity, defined as a body mass index (BMI) greater than 30 kg/m², represents a significant global public health issue. Its prevalence has been dramatically increasing since 1990, along with its associated consequences.[1] Overweight conditions are linked to an increased burden on the musculoskeletal system and a higher incidence of lumbar spine disorders.[2,3] Surgical interventions in obese patients pose considerable challenges and carry higher risks compared with procedures in nonobese individuals. Notably, obese patients are more prone to developing complications following spine surgeries.[4–6]

Lumbar disc herniation (LDH) accompanied by radiculopathy ranks among the most frequently diagnosed conditions within the realm of spine surgery clinical practice. The standard therapeutic approach encompasses a 6-week regimen of conservative treatment. Should the pain persist, and to alleviate nerve compression, the consideration of surgical intervention, specifically through excision of the herniated disc, may be warranted.[7] Carefully selecting patients is crucial for achieving positive clinical outcomes.

Over the past few decades, the popularity of minimally invasive spinal surgery (MISS) techniques has surged. The concept of utilizing an operative microscope and microsurgical technique was pioneered by Yaşargil et al in the 1960s.[8,9] Subsequently, the technique of tubular retractor with microdiscectomy was introduced in 1999. Concurrently, significant contributions to the proliferation of percutaneous endoscopic surgery techniques were made by Kambin et al, marking a pivotal advancement in the field of MISS.[10] These developments have significantly contributed to the evolution of MISS. Studies have suggested an increase in operative time for obese patients undergoing microdiscectomy.[11,12] However, contrasting findings have been reported for tubular surgery, indicating no statistically significant clinical difference between obese and nonobese patient populations.[13,14]

In recent years, full endoscopic lumbar discectomy (FELD) has shown both clinical and economic advantages over traditional open surgery and microdiscectomy in treating LDH.[15–19] Despite its growing popularity, there is a scarcity of studies directly comparing the outcomes of endoscopic disc herniation surgery between obese and nonobese adult populations.[20–25] To the best of our knowledge, this study represents the largest comparative cohort study to date focusing on this technique within this specific population. The primary objective of this study is to compare the clinical outcomes in obese and nonobese patients following endoscopic surgery for LDH. As a secondary objective, we conducted a comparative analysis of endoscopic surgery vs open surgery in obese patients to further evaluate the outcomes and benefits of these surgical techniques in this specific population.

MATERIALS AND METHODS

Study Population

This retrospective single-center study was carried out at the Center Orthopédique Santy in Lyon, France, using prospectively collected data. The procedures were executed by 2 experienced spine surgeons at Jean Mermoz Private Hospital in Lyon, France, from January 2015 to February 2023. Patients provided informed consent in writing after being fully briefed on the study and the potential use of their data. Ethical approval was obtained from our institutional review board (IRB00010835).

Inclusion Criteria

We included consecutive adult patients undergoing surgery for unilateral radiculopathy persisting for more than 6 weeks who had not responded to prior conservative medical treatments. Eligibility also required the presence of positive nerve root tension signs on physical examination and magnetic resonance imaging findings consistent with the clinical assessment. Emergency operations were considered for inclusion if the patient presented with a motor deficit of less than 3/5 on the Medical Research Council scale. The decision to use endoscopic vs open surgery was made by the surgeon based on the availability of endoscopic equipment on the surgical platform on the day of the procedure.

Analysis and Outcome Measure

The study initially included 157 patients, of whom 156 were ultimately analyzed after excluding 1 minor-aged patient. They were divided into 3 groups: 71 patients in the obese endoscopic group, 31 patients in the obese open surgery group, and 54 patients in the nonobese endoscopic group. Obesity is defined here, in accordance with the World Health Organization definition, as having a BMI greater than 30 kg/m². All patients in the endoscopic groups received FELD, choosing between a transforaminal or interlaminar approach based on the surgeon's decision, while a portion of the obese population underwent open surgery. Preoperative assessment included standing low-dose stereo radiographs using the EOS Edge system (EOS imaging, Paris, France) to rule out spondylolisthesis or lumbosacral transitional vertebrae. Additionally, recent preoperative magnetic resonance imaging was utilized to accurately identify the location of the lumbar herniation.

Pre- and postoperative evaluations were conducted at 6 weeks, 3 to 6 months, and 12 months, including clinical examination and patient-reported outcome measures (PROMs). Clinical and demographic data were collected prospectively (age, BMI, pain delays prior to surgery, hernia localization, length of stay, surgery duration, and motor deficit prior to the surgery). The PROMs utilized were the Oswestry Disability Index (ODI) for assessing disability, personal satisfaction levels, and the visual analog scale (VAS) for measuring leg and back pain (VAS-L and VAS-BP, respectively).

Surgical Techniques

Full endoscopic surgery was executed using a uniportal and unilateral approach under general anesthesia. Depending on individual patient anatomy and herniation location, either a transforaminal or interlaminar approach was selected. To maintain the potential for nerve response monitoring via electrode and thus minimize neurological risk, neuromuscular blockade was not employed. Patients were positioned prone with hips flexed on a radiolucent operating table. Fluoroscopy was utilized to accurately identify the target intervertebral space for the procedure.

For the interlaminar approach, a 1-cm incision was made through the skin directly anterior to the disc space to facilitate the insertion of progressively larger dilators. Subsequently, a 15° full endoscope was introduced to establish bony contact. In cases where the interlaminar window was narrow, drilling at the junction of the articular and laminar regions was performed as necessary. The flavum ligament was then incised to allow the endoscope's entry into the spinal canal, enabling the identification of neurological structures. Following the liberation of the nerve root from inflammatory adhesions and its gentle medial retraction, we verified the absence of neurological elements in the vicinity of the disc herniation using electrode stimulation. This precaution was taken before incising the annulus and excising and ultimately removing the disc herniation.

In the transforaminal approach, a guide needle was percutaneously inserted at a 45° angle posteriorly, advancing toward the axis of the trunk under biplane fluoroscopic control. The needle's trajectory was aimed at the superomedial quadrant of the pedicle of the inferior vertebra to avoid penetration into the spinal canal. This meticulous percutaneous entry targets the base of the pedicle of the lower vertebra, strategically positioned away from the exiting nerve root within Kambin's triangle, to minimize the risk of nerve root injury. The correct anteroposterior placement of the guide was verified by a profile radiograph, showing its position at the upper posterior corner of the vertebra. Following accurate positioning, the herniated disc fragment was removed through a "joystick motion" of the cannula, navigating carefully from the lower to the upper pedicle.

Open surgery was performed using a traditional midline approach under general anesthesia in the knee-chest position. This procedure involved myolaminar muscle dissection, the most conservative laminotomy possible, opening of the ligamentum flavum, identifying the disc-radicular conflict to medially retract the nerve root, and removing the herniated disc.

Statistical Analysis

Qualitative variables were analyzed using counts, as well as absolute and relative frequencies, excluding patients with missing data from percentage calculations. Comparisons were made with χ^2 or Fisher's exact test based on independence assumptions. Quantitative variables were summarized by counts, mean, SD, median, and range (min and max), without imputing missing data. These variables were compared using Student's *t* test or the Mann-Whitney *U* test and Wicoxon signed rank test, according to their distribution. Final follow-up scores (VAS and ODI) between obese and nonobese patients were compared using analysis of covariance, adjusting for sex, age, endoscopic technique, and baseline scores. Significance was set at $P < 0.05$, with analyses performed on SAS for Windows (version 9.4).

RESULTS

Obese Endoscopic Group vs Nonobese Endoscopic Group

All patients were followed for 12 months, with their demographic characteristics detailed in Table 1. Preoperative evaluations indicated that both populations were comparable in terms of ODI, VAS-L, and VAS-BP, as shown in Table 2.

Within our cohort, the Transforaminal Endoscopic Spinal Surgery System technique was more commonly applied among obese patients (34 patients, 47.9%) compared with nonobese patients (15 patients, 27.8%), a difference that was statistically significant ($P = 0.0225$). It has already been shown that the Transforaminal Endoscopic Spinal Surgery System approach results in

Table 1. Demographic characteristics endoscopic group.

Characteristic	Obese Endoscopic Patient (*N* = 71)	Nonobese Endoscopic Patient (*N* = 54)	Total Endoscopic Population (*N* = 125)	*P*
Age, y, mean (min; max)	49.1 (20; 78)	47.2 (24; 74)	48.3 (20; 78)	0.4474
Sex, *N* (%)				0.0521
Men	36 (50.7)	27 (50.0)	63 (50.4)	
Women	35 (49.3)	27 (50.0)	62 (49.6)	
BMI, mean (min; max)	33.6 (30.0; 45.1)	24.5 (17.0; 29.7)	29.7 (17.0; 45.1)	0.0032
Duration of pain before surgery,[a] mo, mean (min; max)	8.8 (0.50; 120.00)	5.8 (0.15; 24.00)	7.5 (0.15; 120.00)	0.1134
Operative herniation localization, *N* (%)				0.0579
Posterolateral	54 (76.1)	34 (63.0)	88 (70.4)	
Far lateral	14 (19.7)	11 (20.4)	25 (20.0)	
Migrated	3 (4.2)	9 (16.7)	12 (9.6)	
Operative level, *N* (%)				0.2224
L1-L2, L2-L3, or L3-L4	14 (19.7)	5 (9.3)	19 (15.2)	
L4-L5	36 (50.7)	28 (51.9)	64 (51.2)	
L5-S1	21 (29.6)	21 (38.9)	42 (33.6)	

Abbreviations: BMI, body mass index; max, maximum; min, minimum.
[a]Data were missing for 1 patient in the obese endoscopic group.

Table 2. Preoperative assessment endoscopic group.

Outcome Measure	Obese Endoscopic Patient (*N* = 71)	Nonobese Endoscopic Patient (*N* = 54)	Total Endoscopic Population (*N* = 125)	*P*
VAS-BP,[a] mean (min; max)	4.6 (0.0; 10.0)	3.6 (0.0; 9.2)	4.1 (0.0; 10.0)	0.0078
VAS-L, mean (min; max)	6.9 (2.1; 10.0)	6.6 (2.0; 10.0)	6.7 (2.0; 10.0)	0.3746
ODI,[b] mean (median) (min; max)	50.7 (53.5) (10; 96)	47.1 (46.0) (10; 78)	49.1 (50.0) (10; 96)	0.2900
Mean	50.7	47.1	49.1	
Median	53.5	46.0	50.0	
Min; Max	(10; 96)	(10; 78)	(10; 96)	

Abbreviations: ODI, Oswestry Disability Index; VAS-BP, visual analog scale for back pain; VAS-L, visual analog scale for leg pain.
[a]Data were missing for 1 patient in the nonobese endoscopic group.
[b]Data were missing for 1 patient in the obese endoscopic group.

a longer operative time compared with the ILESSYS approach.[26,27] When comparing mean operative times, obese patients had an average of 70.2 (±24.0) minutes vs 63.1 (±22.6) minutes for nonobese patients, which was not statistically significant (*P* = 0.0971), implying that surgery duration was not notably affected by patient obesity.

However, the length of hospital stay showed a distinct pattern, with 10 (14.1%) obese patients spending 3 nights or more, compared with only 1 (1.9%) nonobese patient (Table 3).

The overall incidence of surgical complications was low for both groups, with 1 obese patient experiencing an intraoperative dural tear and 1 nonobese patient encountering an inadvertent intradural Naropine injection, neither of which resulted in a significant difference (*P* > 0.999). The sole medical complication observed was atrial fibrillation in 1 nonobese patient (1.9%), with no reports from obese patients, further underscoring the similarity in complication rates (*P* = 0.4320). Reoperation was necessary for 5 (7.0%) obese patients due to disc herniation recurrence, akin to 1 (1.9%) nonobese patient. Additionally, 1 nonobese patient underwent reoperation for lumbar instability, culminating in circumferential fusion, yet these instances did not constitute a significant difference in reoperation rates or recurrence of disc herniation (*P* = 0.6978 and *P* = 0.2338), as shown in Table 4.

Preoperative mean VAS-L scores from obese and nonobese patients showed improvement at the last follow-up to 2.1 and 2.4, respectively, with similar positive trends observed in mean VAS-BP scores Figure 1. This significant reduction was mirrored in mean ODI scores, which improved dramatically for both groups by the last follow-up, affirming the effectiveness of the interventions without significant differences in the degree of improvement between obese and nonobese patients. High satisfaction levels at final follow-up were reported by 85.7% of obese patients and 87.5% of nonobese patients, demonstrating successful outcomes across the board (Table 5).

Obese Endoscopic vs Obese Open Surgery

Patients in the obese endoscopic group (*n* = 71) were, on average, older (49.1 years) than those in the obese open surgery group (*n* = 31, 41.1 years). Both groups had a similar BMI of around 33 kg/m². The operative time was significantly shorter in the open surgery group (59.8 minutes) than in the endoscopic group (70.2 minutes). There was no significant difference in surgical complications or reoperations between the 2 groups. However, patients who underwent open surgery had a statistically significantly longer hospital stay, averaging 2.4 nights, compared with 1.7 nights for the endoscopic group (*P* = 0.0006). Both groups showed similar improvements in lumbar and radicular pain scores as well as disability scores (ODI) at the final follow-up. Satisfaction rates were also comparable, with 85.7% of patients in the endoscopic group and 87.1% in the open surgery group reporting good to excellent outcomes (Table 6).

Table 3. Operative and hospital data endoscopic group.

Outcome Measure	Obese Endoscopic Patient (*N* = 71)	Nonobese Endoscopic Patient (*N* = 54)	Total Endoscopic Population (*N* = 125)	*P*
Operative duration, min, mean (min; max)	70.2 (27; 135)	63.1 (29; 139)	67.1 (27; 139)	0.0971
Approach, *n* (%)				0.0225
Transforaminal	34 (47.9)	15 (27.8)	49 (39.2)	
Interlaminar	37 (52.1)	39 (72.2)	76 (60.8)	
Length of hospital stay (night), mean (min; max)	1.7 (1; 7)	1.4 (1; 12)	1.6 (1; 12)	0.0244
3 nights or more, *n*	10	1	11	

Table 4. Complications and reoperation endoscopic group.

Outcome Measure	Obese Endoscopic Patient (N = 71)	Nonobese Endoscopic Patient (N = 54)	Total Endoscopic Population (N = 125)	P
Surgical complications, n (%)				>0.99
Yes	1 (1.4)	1 (1.9)	2 (1.6)	
No	70 (98.6)	53 (98.1)	123 (98.4)	
Nonsurgical complications, n (%)				0.4320
Yes	0 (0.0)	1 (1.9)	1 (0.8)	
No	71 (100.0)	53 (98.1)	124 (99.2)	
Re-operation, n (%)				0.6978
Yes	5 (7.0)	2 (3.7)	7 (5.6)	
No	66 (93.0)	52 (96.3)	118 (94.4)	
Disc herniation recurrence, n (%)				0.2338
Yes	5 (7.0)	1 (1.9)	6 (4.8)	
No	66 (93.0)	53 (98.1)	119 (95.2)	

DISCUSSION

LDH is the most common cause of sciatica.[28] In cases without motor weakness, conservative treatment is considered the gold standard during the initial phase. If pain persists for 6 weeks despite appropriate pharmacological management, surgery may then be offered to the patient. In our cohort, the average duration of symptoms before surgery was 7.5 months, suggesting that all noninvasive treatments had been pursued to avoid surgery.

Spine surgeons should consistently consider obesity in their patient evaluations. A higher BMI has been linked to a considerable risk of venous thromboembolism, major complications, surgical site infections, prolonged operative times, and notable socioeconomic consequences.[29] Nevertheless, obese patients can also benefit from percutaneous endoscopic lumbar discectomy (PELD). Endoscopic surgery offers advantages such as smaller incisions, reduced muscle trauma, and shorter recovery times, which are particularly beneficial for obese patients. These benefits can lead to a decrease in postoperative pain and complications, as well as a shorter hospital stay. Additionally, the minimally invasive nature of endoscopic surgery can reduce the risk of wound infections and improve overall patient satisfaction, making it a viable alternative to traditional open surgery for obese individuals.

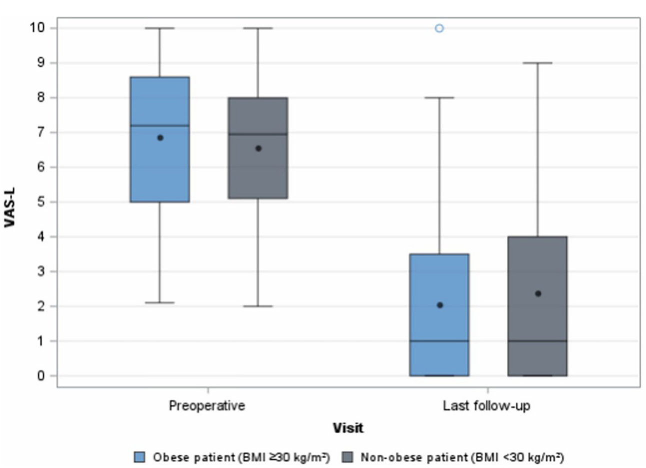

Figure. Pre- and postoperative radicular pain box plot.

Over the past decade, there has been a noticeable increase in the publication of studies on PELD for LDH, highlighting its emerging importance in spinal surgery.[30] Despite this trend, data on the efficacy and outcomes of PELD in obese patients remain scarce, with few studies directly addressing this population.[20–22,31,32] A number of studies have emphasized the noninferiority of endoscopic techniques compared with traditional open microdiscectomy, particularly noting advantages such as reduced muscle denervation, shorter hospital stays, and smaller incisions, which are especially beneficial for obese patients.[18,26]

In contrast to the outcomes associated with microdiscectomy techniques, where obese patients often face higher complication rates and longer hospital stays,[27] our findings did not show any significant differences in complication rates between obese and nonobese patients after endoscopic surgery. Incidental durotomy is commonly reported as a major complication in the literature, with a noted incidence of 9.4% in the series by Cole et al[14] on minimally invasive lumbar discectomy in obese patients. Our series reported only 1 case of durotomy, possibly due to the consistent distance between the operating field and the scope, regardless of the patient's obesity status. This consistency likely facilitates similar visualization and maneuverability during endoscopy, unlike what is seen with open microdiscectomy or minimally invasive tubular surgery.

Significant differences were noted in our study regarding the surgical approach, with a higher number of obese patients undergoing the transforaminal approach. This statistically significant preference may be attributed to the more direct route for nerve root

Table 5. Clinical results last follow-up in the endoscopic group.

Outcome Measure	Obese Endoscopic Patient (*N* = 71)	Nonobese Endoscopic Patient (*N* = 54)	Total Endoscopic Population (*N* = 125)	*P*
Delta VAS-BP, *N*	70	49	119	0.5978
Mean	−1.5	−1.2	−1.4	
Median	−1.2	−1.0	−1.2	
Min; Max	(−10.0; 3.0)	(−8.2; 5.0)	(−10.0; 5.0)	
Delta VAS-L, *N*	70	49	119	0.2958
Mean	−4.8	−4.2	−4.5	
Median	−4.9	−4.8	−4.8	
Min; Max	(−10.0; 6.0)	(−10.0; 4.1)	(−10.0; 6.0)	
Delta ODI, *N*	69	45	114	0.8573
Mean	−32.3	−31.0	−31.8	
Median	−32.0	−32.0	−32.0	
Min; Max	(−80; 10)	(−66; 16)	(−80; 16)	
Satisfaction, *N* (%)	70	48	118	0.5009
Poor	2 (2.9)	1 (2.1)	3 (2.5)	
Fair	8 (11.4)	5 (10.4)	13 (11.0)	
Good	24 (34.3)	23 (47.9)	47 (39.8)	
Excellent	36 (51.4)	19 (39.6)	55 (46.6)	

Abbreviations: ODI, Oswestry Disability Index; VAS-BP, visual analog scale for measuring back pain; VAS-L, visual analog scale for measuring leg pain.

decompression in obese patients, where fat tissue poses less of an obstruction to the endoscope. Additionally, we found no significant difference in operative times between obese and nonobese patients, aligning with other studies and marking a significant improvement over traditional open or microscopic discectomy techniques.[21,32] The endoscopic approach facilitates surgery without the need for extensive soft tissue dissection for both obese and nonobese patients.

Although hospital stays were slightly longer for obese patients, this could be attributed to anesthetic considerations, as surgeries in our department are performed under general anesthesia. Anesthesiologists may opt for a longer hospitalization for patients with respiratory

Table 6. Obese endoscopic vs obese open surgery.

Outcome Measure	Obese Endoscopic Patient (*N* = 71)	Obese Open Patients (*N* = 31)	Total Obese Population (*N* = 102)	*P*
Age, y, *N*	71	31	102	0.0063
Mean	49.1	41.1	46.6	
Min; Max	(20; 78)	(23; 68)	(20; 78)	
Sex, *N*	71	31	102	
Men, *n* (%)	36 (50.7)	23 (74.2)	59 (57.8)	
Women, *n* (%)	35 (49.3)	8 (25.8)	43 (42.2)	
BMI (kg/m²), *N*	71	31	102	0.0341
Mean	33.6	32,5	33,2	
Min; Max	(30.0; 45.1)	(30.1; 40.8]	(30.0; 45.1)	
Duration of pain before surgery, no, *N*	70	31	101	0.6796
Mean	8.8	7,6	8,5	
Min; Max	(0.50; 120.00)	(0.50; 60.0)	(0.50; 120.00)	
Operative time, min, *N*	71	31	102	0.0087
Mean	70.2	59,8	67,0	
Min; Max	(27; 135)	(40; 90)	(27; 135)	
Hospital stay (nights), *N*	71	31	102	0.0006
Mean	1.7 (1.2)	2.4 (1.1)	1.9 (1.2)	
Min; Max	(1; 7)	(1; 4)	(1; 7)	
Satisfaction, *N*	70	31	101	0.6659
Poor, *n* (%)	2 (2.9)	0 (0.0)	2 (2.0)	
Fair, *n* (%)	8 (11.4)	4 (12.9)	12 (11.9)	
Good, *n* (%)	24 (34.3)	14 (45.2)	38 (37.6)	
Excellent, *n* (%)	36 (51.4)	13 (41.9)	49 (48.5)	
Complications, *N*	71	31	102	0.51176
Yes, *n* (%)	1 (1.4)	1 (1.3)	2 (2.0)	
No, *n* (%)	70 (98.6)	30 (96.8)	100 (98.0)	
Reoperation, *N*	71	31	102	0.4489
Yes, *n* (%)	5 (7.0)	4 (12.9)	9 (8.8)	
No, *n* (%)	66 (93.0)	27 (87.1)	93 (91.2)	

Abbreviation: BMI, body mass index.

issues, which are more common in obese individuals. This difference is probably not observed in patients operated under local anesthetic. Despite these considerations, our study showed no significant differences in complication or reoperation rates between obese and nonobese groups. The only intraoperative complication observed in the obese group was a dural tear, while the nonobese group had 1 case of accidental intradural lidocaine injection, which resulted in a monoparesis of the lower limb. Fortunately, this condition resolved spontaneously a few hours after surgery. Reoperation due to disc herniation recurrence was required for 5 patients (7%) in the obese group, with varying procedures undertaken, whereas only 2 nonobese patients needed reoperation, with 1 for disc herniation recurrence. This recurrence rate is comparable to findings by Bae and Lee.[21] However, the lack of significant differences in recurrence rates between groups may be influenced by the study's limited statistical power due to the relatively small sample size. This limitation highlights the need for larger, more comprehensive studies to further explore and validate these observations. Other recognized risk factors for recurrence include older age, modic changes, a Pfirrmann grade of 4 or higher, and a greater sacral slope angle.[33] We observed no wound infections. This outcome may be attributed to the minimal postoperative scar formation and lesser tissue injuries typically associated with the procedure, unlike microdiscectomy, in the obese patient.[21,34,35]

Our study extends its focus to include not only the VAS-L and VAS-BP but also integrates the ODI and patient satisfaction as essential PROMs for assessing the efficacy of the surgical technique. There was no significant difference in terms of VAS-L, VAS-BP, ODI, and satisfaction outcomes between the 2 groups. Notably, satisfaction was rated as good or excellent by 60 (85.7%) obese patients and 42 (87.5%) nonobese patients at the 12-month follow-up. These results suggest that both obese and nonobese patients derive similar clinical benefits from the FELD treatment. This finding contrasts with the outcomes for open posterior approaches reported in the SPORT study,[27] indicating that FELD may offer a consistently effective alternative regardless of patient obesity status.[36]

In our study, obese patients undergoing endoscopic surgery have demographic and clinical characteristics comparable to those undergoing open surgery. However, the operative time was significantly shorter in the open surgery group (59.8 minutes) compared with the endoscopic group (70.2 minutes). Although the operative time was longer for endoscopic surgery, patients in this group had a shorter hospital stay, averaging 1.7 nights compared with 2.4 nights for the open surgery group, a statistically significant difference ($P = 0.0006$). We believe the longer operative time for endoscopic surgery may be due to our initial experience with this technique, reflecting the learning curve, whereas open surgery is more established. In terms of surgical complications and reoperations, there was no significant difference between the 2 groups. Both groups showed similar improvements in lumbar and radicular pain scores as well as disability scores (ODI) at the final follow-up. Satisfaction rates were also comparable, with 85.7% of patients in the endoscopic group and 87.1% in the open surgery group reporting good to excellent outcomes. These findings suggest that endoscopic surgery is a viable alternative to open surgery for obese patients, offering the added benefit of a shorter hospital stay.

It is important to acknowledge the limitations of our study, including the potential for nonsignificance due to small sample sizes, despite being the largest comparative cohorts about this topic to date. Additionally, the relatively short follow-up period of 12 months could potentially overlook long-term outcomes and complications.

Despite the limitations of our study, we provide valuable data in terms of PROMs, addressing a gap in the literature where such information is scarce.

CONCLUSION

This cohort study suggests that there are no significant differences in PROMs, operative time, or complication rates between obese and nonobese patients undergoing endoscopic LDH surgery. Additionally, when comparing obese patients undergoing endoscopic surgery to those undergoing open surgery, we found that the latter group had a statistically significantly longer hospital stay. These findings suggest that obesity may not inherently affect surgical outcomes as previously assumed with open surgery, highlighting the potential for similar postoperative recovery trajectories regardless of a patient's BMI. However, the implications of these results are preliminary and underscore the need for further research in this area. Future studies with larger sample sizes and longer follow-up periods are essential to validate our findings and to explore the nuanced ways in which obesity might influence surgical management. It is crucial that subsequent research continues to examine not only the direct impact of obesity on surgical interventions but also its broader implications for patient recovery, health care costs, and overall quality of life.

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