



Comparison of the effects of microdiscectomy and interlaminar endoscopic lumbar discectomy on sexual activity

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Abstract

Purpose The aim of this study was to compare the clinical outcomes and sexual function of male and female patients who underwent IELD and MD due to LDH.

Methods The retrospective study included 72 sexually active patients aged 24–50 years. Patients were divided into four groups based on genders and surgical techniques. Visual Analogue Scale (VAS) (leg pain/LBP) and Oswestry Disability Index (ODI) tests were performed. International Index of Erectile Function-5 (IIEF-5) to evaluate the sexual functions of male patients; Female sexual function tests (FSFI) were used to evaluate the sexual functions of female patients, and the Hospital Anxiety Depression Score (HADS) test was used to evaluate the hospital anxiety and depression levels of all patients.

Results Mean age of the patients 39.8 ± 5.6 . In all patients, a statistically significant improvement in three parameters (VAS-Leg, VAS-LBP, ODI) was observed in the post-operative period. However of note, the MD group had a statistically higher post-operative VAS-LBP pain score when compared with the IELD group ($p=0.001$; $p<0.01$). Both surgical interventions proved effective in increasing IIEF-5 scores, with the IELD group having statistically higher scores in the postoperative period. However, there was no such difference in FSFI scores in female patients with either procedure.

Conclusion The results showed that both IELD and MD improved sexual function in patients with LDH, but IELD had a greater positive effect in male patients compared to MD. It was also found that IELD caused less LBP and more improvement in anxiety levels compared to MD.

Keywords Interlaminar endoscopic discectomy · Lumbar disc herniation · Microdiscectomy · Sexual function

Introduction

Lumbar disc herniation (LDH), characterized by severe low back pain (LBP) radiating to the leg, can significantly impact an individual's daily activities [1]. The World Health Organization (WHO) recognizes sexual activity and its maintenance as significant components of quality of life [2]. Sexual dysfunction in individuals with LDH can result from actual pain, fear of exacerbating pain, physical restrictions, or depression associated with chronic pain. The mental, physical, and emotional states of individuals are strongly linked to their sexual health; thus, sexual dysfunction can lead to lowered self-esteem and hinder personal and social well-being [3].

Moreover, a strong relationship between LBP and depressive symptoms has been established. Cognitive, emotional, environmental, and social factors can greatly influence patients' perceptions of their pain, potentially leading

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to disability [4]. Improved sexual function is believed to be associated with the duration and intensity of LBP, shorter sick leave, and lower levels of anxiety and depression [3].

Some studies have reported that the high level of LBP caused by surgical techniques applied in the treatment of various spinal pathologies adversely affects sexual functions at different rate in the postoperative period [3, 5, 6]. There are many studies on sexual dysfunction in chronic low back pain, spinal fracture and spinal cord injury [5, 7, 8].

The primary goal of LDH surgery is to improve the patient's quality of life and facilitate an early return to daily activities. With severe pain being the primary complaint at first, both patients and surgeons may not initially consider sexual function, but sexual dysfunction becomes highly important in the postoperative period when sexual functionality begins to return [9]. Therefore, the choice of technique in LDH surgery should be considered as an important factor for sexual function.

Current surgical techniques for LDH are increasingly moving towards minimally invasive procedures. Among these, interlaminar endoscopic lumbar discectomy (IELD) has become the most popular method compared to microdiscectomy (MD) [10]. The impact of surgical technique choice on sexual function and quality of life in various spinal and orthopedic operations has been investigated [11]. However, there is no comprehensive study comparing the sexual function outcomes of the most commonly used IELD and MD techniques in LDH surgery and the depression-anxiety levels that affect these sexual functions.

This study aims to compare the clinical outcomes and sexual functions of male and female patients who underwent IELD and MD for LDH, as well as the levels of depression and anxiety that affect these sexual functions.

Materials and methods

Patient population

In this prospective study, 77 married patients aged 24–50 years who underwent IELD or MD due to LDH at Manisa City Hospital and Memorial Bahcelievler Hospital between January 2019 and December 2022 were included after approval from the Institutional Review Board (IRB approval no., MBHIRB/2023/01/05).

Seventy-two patients were included in follow-up after 3 months [IELD was performed in 39 (20 men and 19 women) and MD was performed in 33 (20 men and 13 women)]. 5 patients were excluded. Patients were divided into four groups based on genders and surgical techniques: (i) Male-IELD ($n=20$, 51%), (ii) Female-IELD ($n=19$, 49%), (iii) Male-MD ($n=20$, 60%), and (iv) Female-MD ($n=13$, 40%).

The remaining 5 cases were excluded for the following reasons: lumbar disc herniation recurred in two patients who underwent MD in the 1st and 3rd months postoperatively, and posterior fusion was performed in 1 patient at the postoperative 3rd month due to lumbar instability. In two patients who underwent PELD, disc herniation recurred in the 3rd month postoperatively, and these two patients were reoperated with the endoscopic method.

Informed written consent was obtained from all participants. Before collecting data, we distinctly explained to the participants the confidentiality of their identity and data, as well as how to ensure appropriate confidentiality when answering the questionnaire. The authors answered all of the participants' questions, taking care to avoid leading questions.

Inclusion criteria

- (i) To be sexually-active (aged 24–50 years), (ii) to have single-level, soft, mono-radicular signs and symptoms consistent with lumbar MRI findings that show no improvement with conservative treatment, (iii) to be suitable for either IELD or MD surgery,
- For IELD group only; to have central or paramedian LDH which is suitable for the interlaminar approach.

Exclusion criteria

- Urological (male patients) and gynecological diseases,
- A history of lumbar disc surgery at the same level or the presence of a multilevel lumbar disc herniation,
- Psychiatric disorders and the use of drugs that could affect sexual function such as psychotropic drugs,
- Other painful musculoskeletal disorders,
- Patients with spinal stenosis and spondylolisthesis, or those presenting with Cauda equina syndrome,
- For the IELD group, patients who were not suitable for the interlaminar endoscopic discectomy technique due to foraminal or extraforaminal lumbar disc herniation were not included in the study,
- Recurrent disc herniation.

Data collection

Age, gender, body mass index (BMI), and operation level were recorded for each patient. Disability and quality of life 1–10 days before surgery; Visual Analogue Scale (VAS) (leg pain/LBP) and Oswestry Disability Index (ODI) tests were performed by the surgeons and a psychiatrist. International Index of Erectile Function-5 (IIEF-5) to evaluate

the sexual functions of male patients; female sexual function index (FSFI) to evaluate the sexual functions of female patients, and the Hospital Anxiety Depression Score (HADS) to evaluate the hospital anxiety and depression levels of all patients were used. On the post-operative 3rd month the same tests were used. Patients were contacted and they were interviewed either at the control of the outpatient clinic or by phone. The data obtained were recorded for each patient. Telephone interviews were performed confidentially between the patients and the physician only, without the inclusion of third parties.

Data Collection Tools (IIEF-5, FSFI, HADS)

The IIEF is widely used for the evaluation of men's sexual functioning and has been translated into more than 32 languages, which makes it most frequently used instrument to evaluate male patients' sexual functioning. The index uses five domains to evaluate erectile function (6 items), orgasmic function (2 items), sexual desire (2 items), intercourse satisfaction (3 items), and overall satisfaction (2 items). A short version composed of five items the IIEF-5, was developed to allow for the evaluation of erectile dysfunction (ED) specifically, according to the criteria established by the National Institutes of Health [12].

The FSFI is a brief questionnaire of sexual functioning in females. It was developed for the specific purpose of assessing sexual functioning. This is a 19-item self-reported instrument assessing six domains of sexual function that measure sexual desire (score range 2–10), arousal (score range 0–20), lubrication (score range 0–20), orgasm (score range 0–15), satisfaction (score range 2–15), and pain (score range 0–15) [13].

The hospital anxiety and depression scale (HADS) is one of the most commonly used measures for assessing emotional state because it is able to differentiate symptoms of anxiety and depression from somatic symptoms of physical illness. The HADS is a self-administered scale consisting of 14 questions. Seven questions evaluate anxiety and

7 evaluate depression through 4-point Likert-type measurements (level of agreement). The validity and reliability of the HADS test has been proven in the Turkish population before. In the Turkish version of the HADS test we used in this study, the cut-off point for anxiety was 10, and the cut-off point for depression was 7 [14].

Surgical technique

All the surgeries were conducted by two different surgical teams with more than 14 years of experience in spinal surgery and more than 10 years of experience in endoscopic spinal surgery. The techniques used in IELD and MD were according to previous descriptions without stray from standard approaches [15, 16].

Statistical analysis

Statistical analysis was performed using SPSS 26 (Statistical Package for the Social Sciences). While evaluating the study data, quantitative variables were shown with mean, standard deviation, median, minimum and maximum values, and qualitative variables were shown with descriptive statistical methods such as frequency and percentage. Shapiro Wilks test and Box Plot graphics were used to evaluate the conformity of the data to normal distribution.

Student t-test was used in quantitative two-group evaluations showing normal distribution, Paired Sample t-test was used in intra-group evaluations. Mann Whitney-U test was used in intra-group evaluations of variables not showing normal distribution.

Pearson or Spearman's correlation analysis was performed according to the distribution in evaluating the relationships between variables. The results were evaluated at a confidence interval of 95%, and a p-value of <0.05 was considered as statistically significant.

Results

A total of 72 patients with a mean age of 39.8 ± 5.6 years were enrolled in the study. The descriptive analysis of the patients are given in (Table 1).

There were no statistically significant differences in the pre-operative VAS-Leg and-LBP pain and ODI scores. All patients benefited in these 3 parameters through surgery and was statistically significant. However of note, the MD group had a statistically higher post-operative VAS-LBP pain score when compared with the IELD group and this was statistically significant ($p=0.001$; $p<0.01$) (Table 2).

Upon evaluating the IIEF-5 scores in male patients, there were no statistically significant differences in the

Table 1 Descriptive analysis of patients

		<i>n</i>	%
Gender	Male	40	55.6
	Female	32	44.4
Age (years)	Mean $\pm$ SD	39.8 $\pm$ 5.6	
	Median (Min-Max)	40 (24–50)	
BMI (kg/m ²)	Mean $\pm$ SD	24.9 $\pm$ 2.5	
	Median (Min-Max)	25.1 (19–31)	
Operation Level	L3-4	7	9.7
	L4-5	49	68.1
	L5-S1	16	22.2
Intervention	IELD	39	54.2
	MD	33	45.8

Table 2 Pre- and post-operative VAS and ODI scores

		Total	IELD (n=39)	MD (n=33)	
VAS-Leg					
Pre-operative	Mean±SD	8.46±0.79	8.62±0.75	8.27±0.80	^a 0.065
	Median (Min-Max)	9 (7–10)	9 (7–10)	8 (7–9)	
Post-operative	Mean±SD	2.13±0.85	1.97±0.99	2.30±0.64	^a 0.104
	Median (Min-Max)	2 (0–4)	2 (0–4)	2 (1–4)	
Change			^b 0.001**	^b 0.001**	
Preop-Postop (Δ)	Mean±SD	-6.33±1.23	-6.64±1.29	-5.97±1.07	^a 0.020*
	Median (Min-Max)	-6 (-10–3)	-7 (-10–4)	-6 (-8–3)	
VAS-LBP					
Pre-operative	Mean±SD	6.64±0.84	6.67±0.90	6.61±0.79	^a 0.764
	Median (Min-Max)	7 (5–9)	7 (5–9)	7 (5–8)	
Post-operative	Mean±SD	3.69±1.23	2.97±0.87	4.55±1.03	^a 0.001**
	Median (Min-Max)	4 (1–7)	3 (1–5)	4 (3–7)	
Change			^b 0.001**	^b 0.001**	
Preop-Postop (Δ)	Mean±SD	-2.94±1.58	-3.69±1.34	-2.06±1.39	^a 0.001**
	Median (Min-Max)	-3 (-6–1)	-4 (-6–1)	-2 (-4–1)	
ODI					
Pre-operative	Mean±SD	63.78±9.49	65.54±11.22	61.70±6.48	^a 0.075
	Median (Min-Max)	64 (40–82)	68 (40–82)	62 (48–82)	
Post-operative	Mean±SD	18.33±4.93	17.9±4.88	18.85±5.03	^a 0.419
	Median (Min-Max)	18 (10–32)	16 (10–32)	18 (10–32)	
Change			^b 0.001**	^b 0.001**	
Preop-Postop (Δ)	Mean±SD	-45.44±10.9	-47.64±11.71	-42.85±9.39	^a 0.043*
	Median (Min-Max)	63.78±9.49	65.54±11.22	61.70±6.48	^a 0.075

^aStudent T Test^bPaired Sample Test**p* < 0.05***p* < 0.01**Table 3** Comparison of pre- and post-operative IIEF-5 scores of male patients

		Total	IELD (n=20)	MD (n=20)	<i>p</i>
IIEF-5					
Pre-operative	Mean±SD	11.90±5.14	11.50±4.80	12.30±5.55	^a 0.755
	Median (Min-Max)	10 (6–24)	10 (6–24)	10 (6–24)	
Post-operative	Mean±SD	17.13±4.84	19.35±3.76	14.90±4.84	^a 0.003*
	Median (Min-Max)	18 (7–25)	19 (11–25)	14 (7–25)	
Change		^b 0.001*	^b 0.001*	^b 0.004*	
Preop-Postop (Δ)	Mean±SD	5.23±4.75	7.85±4.46	2.60±3.45	^a 0.001*
	Median (Min-Max)	4 (-4–17)	8 (1–17)	2 (-4–11)	

^aMann Whitney U Test^bWilcoxon Signed Rank Test**p* < 0.01

pre-operative values. Both surgical interventions proved to be effective in increasing the IIEF-5 scores while the IELD group had statistically higher scores in the post-operative period (*p*=0.003; *p*<0.01) compared to the MD group (Table 3).

While evaluating the FSFI scores of female patients, there were no statistically significant differences of pre- and post-operative values with regards to the surgical intervention type. However, both interventions were successful in decreasing the FSFI scores and this was statistically significant (Table 4).

When analyzing the HADS-Anxiety and HADS-Depression scores with regards to gender, there were no statistically significant differences in between genders. However, gender difference did not seem to play a role in this improvement (*p*>0.05).

Both surgical interventions improved HADS anxiety and depression scores with a statistical significance (*p*=0.001; *p*<0.01). Of significant note, the IELD group had a higher reduction in HADS anxiety scores compared to the MD group with a statistical significance (-3.64 vs. -1.76, *p*=0.007, Mann Whitney U Test).

The study also aimed at elucidating whether pre-operative anxiety and depression levels affected sexual function, pain levels and daily functioning through Pearson and Spearman Correlation Tests. Pre-operative HADS Anxiety and Depression scores did not seem to affect IIEF-5, FSFI, VAS and ODI scores (*p*>0.05). But exclusively, HADS-Depression had a negative correlation with ODI, the reduction of HADS-Depression scores resulted in an increased ODI score and had a weak but statistically significant relationship (*r*=-0.358; *p*=0.002; *p*<0.01). The lack of relationship was also present when post-operative HADS scores

Table 4 Comparison of pre- and post-operative FSFI scores of female patients

		Total	IELD (n=19)	MD (n=13)	p
FSFI					
Pre-operative	Mean±SD	54.59±13.23	55.84±11.02	52.77±16.24	^a0.939
	Median (Min-Max)	58.5 (24–74)	58 (32–74)	59 (24–72)	
Post-operative	Mean±SD	41.78±10.23	44.16±8.61	38.31±11.71	^a0.111
	Median (Min-Max)	43 (21–61)	46 (29–54)	41 (21–61)	
Change		^b0.001*	^b0.001*	^b0.001*	
Preop-Postop (Δ)	Mean±SD	-12.81±8.29	-11.68±6.60	-14.46±10.37	^a0.577
	Median (Min-Max)	-11.5 (-32–2)	-10 (-23–2)	-13 (-32–2)	

^aMann Whitney U Test^bWilcoxon Signed Rank Test* $p < 0.01$ **Table 5** Comparison of VAS-LBP and sexual function

	VAS-LBP vs. IIEF-5		VAS-LBP vs. FSFI	
	r	p		
Pre-operative	-0.600	0.000**	0.172	0.347
Post-operative	-0.363	0.021*	-0.331	0.064
Preop-Postop (Δ)	-0.346	0.029*	-0.076	0.680

^rSpearman Correlation Coefficient * $p < 0.05$ ** $p < 0.01$

were compared with IIEF-5, FSFI, VAS and ODI scores ($p > 0.05$).

Since IELD statistically resulted in a significant decrease in VAS-LBP and a higher IIEF-5 score in male patients, we wondered whether VAS-LBP alone is a factor in determining sexual function (Table 5).

During the pre-operative period, it can be seen that VAS-LBP had a negative correlation with IIEF-5, an increase in VAS-LBP caused a decrease in IIEF-5 and this was statistically significant ($r = -0.600$; $p < 0.01$). This was also valid for the post-operative period ($r = -0.363$; $p < 0.05$). There was a significant relationship as well when pre- and post-operative scores are compared ($r = -0.346$; $p < 0.05$). However, VAS-LBP did not seem to affect FSFI scores of female patients ($p > 0.05$). In short, higher lower back pain scores resulted in lower IIEF-5 scores of male patients both pre- and post-operatively.

The lack of correlation between lower VAS-LBP and FSFI scores of female patients led us to ask whether LBP did not change significantly in female patients. When VAS-LBP scores were compared pre- and post-operatively according to gender, there was no statistically significant difference ($p = 0.246$). Although there was no statistically significant difference, female patients had a greater decrease of VAS scores compared to males (-3.19 vs. -2.75).

Discussion

Minimally invasive spinal surgery has become increasingly popular among both spinal surgeons and patients requiring LDH surgery [10, 17–19]. Although both IELD and MD provide favorable outcomes, it is still controversial as to which procedure is more effective, IELD is known to cause less tissue damage, provide better preservation of bone structure, and to have a lower risk of developing scar tissue and spinal instability after surgery compared to MD [10, 16–18, 20]. Additionally, IELD provides numerous other advantages such as shorter hospitalization, less bleeding, less pain, lower complication rates, and the ability to be performed under local anesthesia, all of which indicate that it is a safe and effective method [10, 17–20]. On the contrary, its major disadvantages include a long learning curve and insufficient decompression [17–19]. While IELD has a lower risk of postoperative LBP due to a smaller incision, less muscle injury and retraction, and less bleeding, MD has a higher risk of postoperative LBP due to the requirement of a larger incision, more muscle retraction, and partial lamina and facet joint resection [9, 16–20]. Accordingly, the greater pain intensity caused by MD results in delayed return to daily life.

In a randomized study, Meyer et al. compared IELD and MD and reported that although the clinical outcomes were similar in both techniques, IELD provided more favorable outcomes for LBP compared to MD [10]. Similarly, in a retrospective study, Jarebi et al. found that IELD and MD provided similar clinical outcomes, while IELD led to rapid postoperative recovery and rapid improvement in LBP compared to MD [20]. In a prospective study, Ruetten et al. also reported that although IELD and MD provided similar clinical outcomes, IELD resulted in a lower prevalence of LBP and less traumatization [18].

Sexual dysfunction is frequently seen in patients with LDH and affects the quality of life of the patients [9, 21]. Studies have shown that lumbar flexion increases intradiscal pressure and that the lumbar region can come to a

flexion position during sexual intercourse. It also showed that leg pain and/or LBP inhibited free movement during sexual activity and decreased sexual desire due to anxiety caused by this pain, resulting in sexual dysfunction. Therefore, axial and radicular pain caused by LDH may adversely affect sexual function and may be exacerbated during sexual intercourse [21]. The presence of severe pain may reduce sexual performance. In the study of Panneerselvam et al. in which they compared the pre- and post-operative sexual functions of male patients who underwent lumbar microdiscectomy; they found that most of the patients with LDH (77%) had sexual reluctance [22]. In addition, they indicated patients with coexistent LBP had greater affliction than did those with isolated radiculopathy and surgery significantly improved the pain with corresponding improvements in sexual function. In a retrospective study, Kanayama et al. found that LDH caused a significant decrease in sexual desire and sexual activities in both men and women and that surgical treatment provided significant improvement in sexual dysfunction [21]. Akbas et al. found that the sexual intercourse frequency increased significantly and the complaints about sexual problems decreased in the postoperative period [9]. Similarly, our study found that more LBP had a greater negative impact on sexual function, especially in male patients.

We believe that IELD resulted in a lower LBP score in the postoperative period compared to MD which is the main factor for the greater improvement in sexual function in male patients. The statistically significant negative correlation between VAS-LBP and IIEF-5 in the pre- and post-operative periods, supports the stated result. However, there was a lack of correlation between VAS-LBP and FSFI in female patients and the lack of significant difference between the post-operative results of surgical techniques and sexual function in female patients. Previous studies have reported that women demonstrated a lower frequency of sexual activity compared to males after lumbar surgery even though they had similar numbers before LBP. Pain associated with LDH had a more pronounced impact on sexual desire and satisfaction among females resulting in a decreased sexual proactivity. A significantly higher proportion of female patients required modifications in sexual positioning compared to their male counterparts. These gender-based differences in sexual behavior may influence the postoperative recovery of sexual activity [21]. Furthermore, these inherent disparities could account for the absence of significant variations in postoperative sexual function outcomes across different surgical techniques in female patients.

Women may experience longer recovery periods and higher pain sensitivity post-surgery, leading to delayed resumption of sexual activity. For instance, after total hip arthroplasty (THA), female patients typically resumed

sexual activity around six weeks postoperatively, whereas male patients did so within the first three weeks [23].

Psychological factors can play a vital role in sexual performance [7, 8]. Anxiety can be caused by pain, fear about the surgical intervention and its consequences, or misperceptions about the disease itself. Therefore, it is important to examine the psychological effects of LBP and sciatic pain associated with LDH. Individuals with anxiety disorder are more prone to performance anxiety related to sex, which can lead to decreased desire and satisfaction. In a study where only male patients operated for LDH were evaluated for pre- and post-operative sexual function, psychological factors were found to have serious effects on sexual function and advised for obtaining the patient's sexual history and habits as a part of routine medical treatment [24]. Akbas et al. had similar findings in their study on 43 patients with LDH in which 59% had HADS scores indicating anxiety, and a significant statistical correlation was noted between anxiety and sexual dysfunction [9].

Similarly, a study involving 22 patients undergoing MD identified a significant correlation between preoperative anxiety and sexual dysfunction [22]. While comparisons of pre- and postoperative anxiety levels by gender and surgery type revealed no significant differences, the reduction in anxiety from pre- to postoperative periods was notably greater in the IELD group compared to the MD group. Women might face greater psychological barriers, such as body image concerns and anxiety about postoperative complications, which can delay the return to sexual activity. These concerns are often more pronounced in women, affecting their readiness to engage in sexual relations post-surgery [25].

The higher level of anxiety in the IELD group in the preoperative period may be due to the relatively unfamiliar endoscopic approach that has gained popularity in recent years. This uncertainty may have exacerbated fear as it may have been harder to understand the surgical procedure, the risks and benefits. The endoscopic approach may have been perceived as a riskier procedure just because it is fairly new and less familiar. Additionally, patients were informed about the advantages of endoscopic approach and may have had more cautious thoughts about the claims.

A clear relationship between depression and sexual dysfunction has been established previously [24]. While a negative correlation was observed between sexual tests (IIEF-5 and FSFI) and depression in our study, this correlation level was weaker than the correlation between anxiety and sexual tests (IIEF-5 and FSFI). Depression secondary to pain may initially affect sex drive, but it takes time to negatively affect sexual functions. The reason why depression has less effect on sexual functions compared to anxiety is that the average age of the patients in both groups was relatively young, and as such, depression may be superseded by anxiety [26]. In

both IELD and MD groups, depression scores improved statistically significantly in the post-operative period compared to the pre-operative period, and no significant difference was found between the surgery groups. The fact that there was no difference in the level of postoperative improvement in depression according to anxiety was thought to be due to the longer time it takes for depression to affect sexual function.

Limitations

The present study has several limitations. First, sexual function is often considered a sensitive and taboo topic for many patients, making it challenging to collect reliable data, as assessments of sexual function may evoke discomfort. Second, notable gender-based differences in sexual behavior suggest that females may need to be treated as a distinct group from males due to hormonal, emotional, and psychological factors affecting their postoperative sexual function. Furthermore, women often assume a more passive role in sexual activity, necessitating separate evaluation from men in terms of sexual function. Third, the relatively small sample sizes in the MD and IELD groups, coupled with the three-month postoperative assessment period—which may be considered a relatively short follow-up—pose additional limitations. Future studies with larger patient cohorts and extended follow-up durations would likely provide more robust findings.

Conclusion

The findings indicate that both IELD and MD effectively improved sexual function in patients with LDH; however, IELD demonstrated a greater positive impact on sexual function in male patients compared to MD. In female patients, the surgical technique did not appear to significantly influence postoperative sexual function. Additionally, IELD was associated with less LBP and greater reductions in anxiety levels compared to MD. While the overall clinical outcomes of IELD and MD were comparable, IELD appears to offer greater benefits for male patients regarding anxiety and sexual function, suggesting it may be a safe and effective alternative to MD.

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Data availability The datasets supporting the conclusion are available upon reasonable request.

Declarations

Ethic approval and consent to participate Approval by the Manisa Provincial Directorate of Health. Patient's Informed consent form.

Conflict of interest All authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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