Turk Neurosurg, 2025
DOI: 10.5137/1019-5149.JTN.48513-25.3

Original Investigation

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Received: 28.01.2025
Accepted: 09.05.2025
Published Online: 04.09.2025

Endoscopic or Microscopic Discectomy: Which One Do Neurosurgeons Prefer for Their Own Lumbar Disc Surgery?

Hakan KINA[1], Aydın Sinan APAYDIN[2]

[1]Istinye University Medical Park Gaziosmanpasa Hospital, Department of Neurosurgery, Istanbul, Türkiye
[2]Karabuk University, Faculty of Medicine, Department of Neurosurgery, Karabuk, Türkiye

Corresponding author: Aydin Sinan APAYDIN ✉ dr.sinanapaydin@yahoo.com

ABSTRACT

AIM: To examine the factors influencing neurosurgeons' preferences between microscopic discectomy (MD) and endoscopic discectomy (ED) for the treatment of lumbar disc herniation (LDH) in Türkiye.

MATERIAL and METHODS: A cross-sectional survey was administered to 229 active neurosurgeons in Türkiye. The 23-item questionnaire assessed various factors influencing the preference for ED or MD, including training, surgical experience, demographic characteristics, and institutional factors. Data analysis was performed via ANOVA, multivariate logistic regression, chi-square tests, t tests, and descriptive statistics. A thematic analysis was conducted on the open-ended responses.

RESULTS: The results revealed that while traditional MD remained the preferred technique among older and more experienced neurosurgeons, 62.9% of surgeons with endoscopic training favored ED. Surgical preferences are significantly influenced by hands-on experience and institutional support for endoscopic procedures. Although younger surgeons preferred ED, MD was favored in complex and emergency situations ($p < 0.05$).

CONCLUSION: Younger surgeons increasingly opt for ED because of their familiarity with minimally invasive techniques, although MD remains the predominant approach among more experienced surgeons. Surgical decisions are heavily influenced by institutional support and practical experience. Continuous education and support for endoscopic methods will be essential for enhancing patient outcomes and integrating new technologies into clinical practice as surgical practices evolve.

KEYWORDS: Endoscopic discectomy, Microscopic discectomy, Lumbar disc herniation, Neurosurgeons, Surgical preferences

ABBREVIATIONS: ED: Endoscopic discectomy, **MD:** Microscopic discectomy, **LDH:** Lumbar disc herniation

INTRODUCTION

Lumbar disc herniation (LDH) is a common spinal condition that often requires surgical intervention when conservative treatments fail (11). Surgical techniques have evolved from traditional open procedures to less invasive options, with microscopic discectomy (MD) and endoscopic discectomy (ED) emerging as popular options (9). MD was first used in the 1970s and is still considered the gold standard for treating LDH, largely because of its proven safety record and consistent surgical outcomes (8). A magnifying view is possible with MD due to the smaller incision sizes required versus those used for open surgery (13). Precise handling of the dura and nerve roots can be accomplished with less muscle damage, a quicker recovery, reduced opioid use, and lower total treatment costs due to magnification surgery performed under the muscles (11). More recently, the development of ED has provided an even less invasive alternative. Unlike MD, ED uses highly specialized instruments and extremely small incisions—sometimes only approximately 10 mm^2—to access the herniated disc material (11). This technique aims to preserve paraspinal muscle integrity by avoiding large muscle dissections, potentially reducing postoperative discomfort and ac-

Hakan KINA : 0000-0002-9741-7720 Aydin Sinan APAYDIN : 0000-0002-2916-9550

celerating recovery (9). Despite sharing similarities, MD and ED differ notably in their technical demands, required equipment, and learning curve (4). Many surgeons continue to favor MD, given its long track record and the reliability of its outcomes. However, interest in ED has been increasing, particularly among surgeons seeking to minimize tissue trauma and shorten patient rehabilitation times (12). Thus, understanding what drives neurosurgeons' choice between MD and ED is becoming increasingly relevant.

This study examined how factors such as professional experience, the availability of institutional resources, and patient-specific considerations influence decision-making in lumbar spine surgery (3,11). By highlighting these dynamics, this research contributes to more personalized surgical planning and helps shape future training and clinical practice directions.

MATERIAL and METHODS

This study was approved by the ethics committee of the Istinye University (23.11.2024 -24/226).

This study employed a cross-sectional survey design to investigate neurosurgeons' preferences between ED and MD for LDH. The study included 229 actively practicing neurosurgeons across Türkiye. Participants were recruited from all types of healthcare institutions to ensure a diverse and representative sample. A tailored 23-question survey was developed to evaluate factors influencing surgeons' preferences for ED or MD, including demographics (age, years of experience, and practice setting), surgical training, and familiarity with ED and MD techniques. Additional factors assessed were the perceived advantages and disadvantages of each approach, patient selection criteria, expected outcomes, institutional factors (such as equipment availability and cost considerations), personal preferences, and comfort levels with each technique. The survey also included a hypothetical scenario based on an LDH diagnosis. The survey incorporated a blend of multiple-choice, Likert scale, and open-ended questions to collect quantitative and qualitative data. The survey was pilot-tested with a small group of neurosurgeons before distribution to ensure clarity and validity. The survey was administered electronically via a secure online platform (Survey Monkey), and potential participants received an email invitation containing study information and a link to the survey. Reminder emails were sent one and two weeks after the initial invitation to increase response rates. The survey was open for two weeks. Quantitative data were analyzed via descriptive statistics, including frequencies, percentages, means, and standard deviations. Chi-square tests were employed to examine relationships between categorical variables, whereas *t* tests or ANOVA were used for continuous data analysis. Multivariate logistic regression analysis was conducted to identify independent ED or MD preference predictors. The open-ended responses were subjected to thematic analysis. Two researchers independently coded the data, resolving discrepancies through discussion to ensure reliability. The study received ethical approval from Istinye University's Institutional Review Board. Informed consent was obtained from all participants prior to survey initiation. All the data were collected anonymously and stored securely to maintain confidentiality. This methodology facilitated a comprehensive examination of neurosurgeons' preferences and decision-making processes regarding ED and MD, offering valuable insights into current practices in LDH surgery management.

RESULTS

We investigated the factors influencing the surgical preferences of 229 neurosurgeons in treating LDH (Table I). The effects of demographics, clinical experience, institutional environments, and training on surgical decisions were evaluated via chi-square tests.

Surgery Preferences and Demographics

Age and sex were not significantly associated with the selection of techniques for LDH surgery ($p>0.05$). The male sex predominated in the cohort (92.6%; n=212). Younger neurosurgeons exhibited a greater inclination toward minimally invasive procedures; however, this difference was not significant. In contrast, more experienced neurosurgeons, particularly those with more than 20 years of practice (29.3%; n=67), tended to prefer traditional methods (Table II).

Previous Experience and Method Selection

Years of experience alone did not significantly influence surgical preference when the participants were grouped into categories of less than 10 years versus more than 10 years ($p>0.05$). However, experience with endoscopic surgeries significantly impacted decision-making. Surgeons with specialized endoscopic training were significantly more likely to choose minimally invasive techniques (62.9%, n=144; $p<0.05$), highlighting the importance of hands-on experience in building confidence with these methods. Moreover, surgeons working in institutions with established endoscopic practices (71.2%, n=163) more frequently favored endoscopic procedures than those who did not have such institutional support ($p<0.01$), suggesting that organizational infrastructure and familiarity with the methods contribute to the preference for endoscopic techniques.

Preferences Based on Scenarios

Emergency Situations

In urgent cases, traditional methods were significantly preferred over endoscopic treatments ($p<0.001$), indicating a tendency to favor techniques that offer greater control and visualization in life-threatening situations. Additionally, patients with recurrent LDH were significantly more likely to be treated with traditional surgery ($p<0.05$). This preference likely reflects the perceived reliability and effectiveness of traditional methods in addressing complex and recurrent issues. In situations requiring additional treatments, such as complex decompression or fusion, open surgery was the preferred approach ($p<0.001$). This trend suggests that traditional techniques are favored when broader access and direct visualization are necessary for multistep procedures (Table II). The chi-square analysis revealed that the observed difference between ED and MD was

Table I: Characteristics of the Responders to the Survey

Variable	Category	n	Percentage (%)
Age	< 30 years	5	2.2
	31–40 years	81	35.4
	41–50 years	71	31.0
	51-60 years	43	18.3
	>60 years	29	12.7
Gender	Female	17	7.4
	Male	212	92.6
Years of experience	< 5 years	62	27.1
	6–10 years	35	15.3
	11–15 years	38	16.6
	16-20 years	27	11.8
	>20 years	67	29.3
Type of institution	University Hospital, Training and research Hospital	45	19.7
	Goverment Hospital	59	25.8
	Private Hospital	30	13.1
	Private Practice	79	34.5
Previous history of lumbar spinal surgery	No	210	91.7
	Yes	19	8.3
Endoscopic training	Yes	144	62.9
	No	85	37.1
Institutional endoscopic practice	Yes	163	71.2
	No	66	28.8

Table II: Comparison of Groups in Various Clinical Scenarios

Factor	Category	Preferred Surgical Method	Significance (p-value)
Age	< 40 vs. ≥ 40 years	No significant difference	> 0.05
Gender	Male vs. Female	No significant difference	> 0.05
Years of experience	< 10 vs. ≥ 10 years	Minimal trend toward open	> 0.05
Endoscopic training	Yes vs. No	Endoscopic favored with training	**< 0.05**
Institutional Endoscopic Practice	Yes vs. No	Endoscopic favored in endo-supported clinics	**< 0.01**
Emergency Surgery Need	Urgent vs. Routine	Traditional favored in emergencies	**< 0.001**
Recurrent Disc Herniation	Yes vs. No	Traditional favored in recurrence	**< 0.05**
Combined Interventions Required	Yes vs. No	Traditional preferred for complex cases	**< 0.001**

Table III: Multivariate Logistic Regression Analysis of Factors Affecting Surgical Preferences in Lumbar Disc Herniation Surgery

Independent variables	p-value	OR	95% CI	
			Lower	Upper
Age	0.476	1.498	0.493	4.548
Gender	0.279	0.277	0.027	2.831
Years as a specialist	0.988	1.006	0.467	2.164
Institution type	0.613	0.877	0.527	1.458
History of LDH surgery	0.341	6.187	0.145	263.658
Close relative with LDH surgery in the last 5 years	0.574	0.717	0.225	2.284
Institution performing endoscopic lumbar disc surgery	0.105	0.280	0.060	1.303
Preferred method for LDH surgery	0.212	3.470	0.492	24.490
Training in endoscopic spinal surgery	0.731	1.304	0.287	5.920
Number of microscopic LDH surgery performed	0.100	1.800	0.893	3.631
Preference method for recurrent LDH surgery	**0.001**	112.837	7.075	1799.683
Preference for discectomy with spinal stenosis	**0.048**	6.658	1.016	43.640
Preference for urgent LDH surgery	**0.004**	28.042	2.969	264.817
Preference for upper lumbar region disc surgery	**0.011**	0.179	0.047	0.674

OR: *Odds ratio,* ***CI:*** *Confidence intervals,* ***LDH:*** *Lumbar disc herniation.*

primarily linked to insufficient training and experience in ED. In contrast, logistic regression analysis revealed no significant associations between the choice of ED or MD and the absence of adequate endoscopic surgical training (Table III). Our chi-square and logistic regression analyses also highlighted that traditional surgical techniques are significantly preferred in cases involving discectomy for spinal stenosis, emergency LDH surgery, and upper LDH procedures.

DISCUSSION

Either MD or ED are typically performed in LDH surgeries. Our nationwide survey of 229 neurosurgeons in Türkiye revealed that access to surgical equipment and years of professional experience significantly influenced technique selection. Notably, surgeons with longer career durations demonstrated a marked preference for MD, consistent with the findings of previous studies identifying MD as the most effective treatment for LDH (8,11). Longstanding existence with MD combined with the comprehensive training provided for this technique in residency programs explains this preference. ED is gaining popularity among patients and surgeons because of its minimally invasive nature. However, many neurosurgeons consider ED to be a less familiar and more difficult method to perform than MD (2,6). The prominence of minimally invasive techniques in surgical training programs has increased the tendency toward ED among young surgeons, leading to generational changes. Studies have shown that young surgeons demonstrate a greater ability to adapt to new technologies and benefit more from modern training methods (1,5). Considering that young surgeons will play a greater role in their clinics in the future, ED is expected to be applied more widely. Practical experience plays an important role in determining surgical preferences. Similarly, in our study, surgeons who received training in endoscopic techniques tended to prefer ED. Surgeons working in institutions where endoscopic equipment is easily accessible demonstrate a greater preference for ED (15,17). The microscopic method provides direct visualization, a wider working area, and the ability to perform extensive decompression (10). ED has the advantages of a shorter hospital stay and less postoperative pain. In addition, our study evaluated preferences in different scenarios, such as urgent discectomy, recurrent discectomy, multiple-level disc herniations, and lumbar stenosis. Neurosurgery specialists still prefer MD as the first choice, which aligns with the literature (9). The results support the belief that ED has a narrow indication among surgeons. Obtaining optimal treatment results requires incorporating patient preferences into the decision-making process. The increasing emphasis on shared decision-making has made it important to inform patients about treatment options and ensure their active participation in the process. In this context, neurosurgeons must balance their technical preferences with patients' expectations and comfort levels and include patients in decision-making by properly informing them (7). Studies comparing the long-term results of MD and ED methods in different patient groups will provide important information about the long-term effectiveness of these methods. In addition, determining the factors that prevent the wider use of ED will provide valuable insights for surgical education and infrastructure improvements (16). Importantly,

neurosurgeons receive continuous education to enable them to perform minimally invasive spine surgery safely and effectively. Creating uniform standards for identifying patients most appropriate for ED or MD would promote more reliable, evidence-based choices (14). A lack of technical support, restricted access to endoscopic systems, and insufficient opportunities for practical training in EDs are some of the main reasons why MD is still preferred. In conclusion, endoscopic procedures are anticipated to become more widely accepted for spinal pathologies in the future, particularly as more long-term research data become available, even though traditional surgical methods are still the recommended choice for more complicated and recurring cases.

Limitations

Since our study relied on a survey, the limited number of neurosurgeons performing ED and the underrepresentation of female neurosurgeons led to nonhomogeneous groups. The inability to reach a larger number of neurosurgeons is another limitation.

CONCLUSION

This study underscores the multifaceted nature of surgical decision-making in managing LDH, particularly when selecting between the ED and MD approaches. While MD continues to be the preferred method among more experienced surgeons owing to its proven reliability and familiarity, younger surgeons trained in minimally invasive techniques are increasingly favoring ED. As surgical practices evolve, it is essential to cultivate an environment of ongoing learning and adaptation to ensure the best patient outcomes across various clinical situations.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to Prof. Dr. Mehmet Zileli for the invaluable guidance and support he provided in the preparation and editing of this article.

Declarations

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Availability of data and materials: The datasets generated and/or analyzed during the current study are available from the corresponding author by reasonable request.

Disclosure: The authors declare no competing interests.

AUTHORSHIP CONTRIBUTION

Study conception and design: HK, ASA
Data collection: HK, ASA
Analysis and interpretation of results: HK, ASA
Draft manuscript preparation: HK, ASA
Critical revision of the article: HK, ASA
Other (study supervision, fundings, materials, etc...): HK, ASA
All authors (HK, ASA) reviewed the results and approved the final version of the manuscript.

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