

Transforaminal Endoscopic Discectomy versus Microdiscectomy for Treatment of Lumbar Disc Herniation and Associated Unilateral Sciatica: A Comparative Study

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ABSTRACT

Background Data: Recently, transforaminal endoscopic discectomy (TED) has become accepted as a safe alternative procedure for microdiscectomy (MID) in lumbar disc surgery. Numerous studies compared microdiscectomy with interlaminar endoscopic discectomy; however, the number of studies comparing MID with TED is relatively limited.

Purpose: To compare TED and MID in treating lower lumbar disc prolapse (LDP) and associated unilateral sciatica in terms of overall outcome, complications, and rate of recurrence.

Study Design: Retrospective clinical case series.

Patients and Methods: This retrospective study included one hundred patients with low back pain and unilateral sciatica due to lower lumbar herniated discs. They were divided into 2 groups, each one consisted of 50 patients: Group A underwent MID and Group B TED. Clinical assessments of all patients were conducted using Visual Analogue Score (VAS) and Oswestry Disability Index (ODI) preoperatively and at one-year postoperative follow-up.

Results: In this study, one hundred patients were surgically treated (50 for MID and 50 for TED) from June 2017 to December 2018. The mean age was 40.44 ± 11.31 and 41.14 ± 11.60 years for MID and TED, respectively. Males were most affected in both TED and MID groups (76% in MID and 66% in TED). The most affected disc level in both groups was the L4-L5 level, representing 60% and 68% for MID and TED, respectively. The mean operative time was 63.82 ± 17.37 and 72.60 ± 16.90 minutes for MID and TED, respectively, with significant difference ($p < 0.05$). The mean hospital stay was 29.80 ± 31.73 and 14.76 ± 11.20 hours for MID and TED, respectively, with significant difference ($p = 0.02$). Upon comparing the postoperative values, all patients in both groups showed a significant improvement in their

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preoperative back pain, leg pain, and ODI scores. According to Macnab's Outcome Criteria, in our study, the results were as follows: for the MED group, overall good to excellent outcomes in 92% (N = 46), fair in 4% (N = 2), and poor in 4% (N = 2); for the TED group, overall good to excellent outcomes in 86% (N = 43), fair in 6% (N = 3), and poor in 8% (N = 4).

Conclusion: Percutaneous posterolateral transforaminal discectomy has become a relatively safe and effective procedure over the last years; however, MID is the gold standard surgical approach till now for treating LDP and associated sciatica. (2020ESJ211)

Keywords: Transforaminal; Microdiscectomy; Endoscopic; Sciatica; Lumbar disc.

INTRODUCTION

The first trial for surgical treatment of prolapsed lumbar disc by laminectomy and discectomy has been described more than 100 years ago³⁰ but was published in detail for the first time in 1934 by Mixer and Barr.²⁸ The lumbar discectomy approach remained unchanged till the late 1970s when the operating microscope was introduced to the operative field for proper magnification and clear visualization.^{5,42,43} Since then, microdiscectomy (MID) has been considered the gold standard procedure until now.

In the same era of MID, many minimally invasive approaches have been developed, started by blind percutaneous techniques and automated nucleotomy.^{17,39} Kambin¹⁸ has created posterolateral transforaminal access to the lumbar disc through the safe Kambin's triangle. The approach has been refined during the last decades, and different methods to resect the disc from either outside-in^{8,10} or inside-out³¹ have been described. Lee et al.²³ have created the foraminoplasty approach for L5-S1 especially because it is a challenging level due to high iliac crest in many patients.

Transforaminal endoscopic procedures for LDP have become advanced, accepted, and widely applied worldwide many decades ago and it has become gradually common with improvements in optics and endoscopic instruments.³⁷ Transforaminal endoscopic discectomy (TED) under local anesthesia is considered the least invasive discectomy procedure and the treatment

of choice in selected patients of LDP.^{37,46} Recently, about one-third of all spinal surgeries are conducted by the endoscope in Korea and China.⁹ This study aims to compare TED and MID in the treatment of lower lumbar disc prolapse (LDP) and associated unilateral sciatica in terms of overall outcome, complications, and rate of recurrence.

PATIENTS AND METHODS

This retrospective study included patients with low back pain and unilateral sciatica due to lower lumbar herniated discs at Zagazig University Hospitals, from June 2017 to December 2018. All required data were retrieved from our hospital medical records. One hundred patients that met our inclusion criteria with complete clinical, radiological, and contact data were recruited for this study. Patients were divided into 2 groups, each consisted of 50 patients: Group A underwent MID and Group B TED. In the TED group, 35 patients underwent the operation under local anesthesia and 15 under general anesthesia, whereas in the MID group, all 50 patients received general anesthesia. Preoperative clinical assessments of all patients have been conducted using the Visual Analogue Scale³³ (VAS), and follow-up was at 1, 6, and 12 months postoperatively. Oswestry Disability Index⁸ (ODI) has been assessed preoperatively and at 6 and 12 months postoperatively. Informed written consent was obtained from the patients; the risks and benefits of the two surgical procedures were discussed in detail with the patients. The study was approved by our Institutional Research Board (IRB).

Inclusion criteria were as follows: age, 25–70 years; patients with unilateral sciatica due to lower LDP; failed conservative treatment for 6 weeks; and patients who completed at least a one-year follow-up. Exclusion criteria were as follows: patients of lumbar canal stenosis; bilateral sciatica; sciatica due to malignancy, infection, and trauma; cases of spinal instability, highly migrated disc; large sequestered discs and severe neurological deficits; recurrent and upper lumbar discs; patients with incomplete follow-up or data. We conducted preoperative routine laboratory investigations, administered prophylactic antibiotics, and reviewed all radiological films carefully.

Microdiscectomy Procedure

Microdiscectomy was conducted under general anesthesia (GA) using the standard technique and magnification. After induction of the anesthesia, the patient was placed in a prone position; the lumbar area was painted and draped as usual. Proper level identification was conducted using the C-arm; a 2.5 cm skin incision was made, subcutaneous fascia was incised, and then subperiosteal detachment of the paraspinal muscles was carefully done. Unilateral interlaminar retractor was applied, the ligamentum flavum was divided and removed, the dural sac and the nerve root compressed by the disc were clearly identified, the root was gently mobilized medially, and then the herniated disc has been removed. Being sure the root is freely mobile after disc removal and good hemostasis is achieved, Depo-Medrol (80 mg) has been injected around the root if more manipulation has been done and then the wound was closed (Figures 2, 3, and 4).

TED Procedure

All patients underwent operation using the 25° scope YESS (Yeung Endoscopic Spinal System) (Karl Storz, Germany) with an inner working channel of 3.5 mm. All patients were placed in a prone position on a radiolucent table. Local anesthesia has been used in 35 patients and GA in 15 patients. Good sterilization and draping of the lower lumbar region were conducted. Initial needle placement and landing at the safe triangle

guided by fluoroscopy is a very important step; the average distance from the entry point to the midline was 10–12 cm, sometimes less or more according to the exact site of the protruded disc. A proper needle position will guide all instruments. Successful needle position should be at the medial pedicular line in the anteroposterior X-ray view and at the posterior vertebral line in the lateral view. The superior articular process is a good bony landmark for needling, and we used it as a fulcrum. After passing the guidewire through the needle, the needle was removed and an 8 mm incision at the entry point was made. Additional local anesthesia has been infiltrated when the obturator hits the disc. A bevel-ended operative working sheath was inserted along the obturator, then the obturator removed, and the endoscope introduced into the operative sheath. Yeung's inside-out technique with half-half modification was used in all cases. The discectomy is considered successful when a large disc fragment or nearly equal-sized multiple fragments were excised and the recommended endpoint of the procedure is a free mobilization of neural tissue with visualization of dural pulsation, not full exposure of the nerve root. Bleeding control during the procedure was done by saline washing and RF bipolar cautery; transforaminal injection of 80 mg Depo-Medrol was administered routinely after the first couple of cases to minimize or prevent neural irritation and dysesthesia. Finally, the scope and operative sheath were removed, and the wound was closed with a single stitch. Under local anesthesia, the surgeon was able to communicate with the patients during all steps of the procedure (Figures 1, 2, and 4).

Postoperative Measures

Immediate postoperative care was the same for both approaches. Patients were discharged home within 24 hours unless there were complications. Rehabilitation and physiotherapy programs were initiated 3 months postoperatively.

Outcome Assessments

Clinical evaluation has conducted using VAS (0–10 points) for pain preoperatively and at 1, 6, and 12 months postoperatively and ODI for the

functional status preoperatively and at 6 and 12 months postoperatively. Overall outcome has been evaluated using modified Macnab's criteria.

Statistical Analysis

All data were collected and analyzed using SPSS Version 19.0 (SPSS Inc., Chicago, IL, USA). All data are expressed as mean \pm SD. $p \leq 0.05$ was considered significant. *t*-test and ANOVA test were used to compare different means.

RESULTS

General Data (Table 1)

In the current study, one hundred patients were surgically treated (50 in the MID group and 50 TED) from June 2017 to December 2018. The mean age was 40.44 ± 11.31 and 41.14 ± 11.60 years for MID and TED, respectively, and males were most affected in both TED and MID groups (76% in MID and 66% in TED). The most affected disc level in both groups was the L4-L5 level (60% and 68% for MID and TED, resp.). Mean operative time was 63.82 ± 17.37 and 72.60 ± 16.90 minutes for MID and TED, respectively, with a significant difference ($p < 0.05$). The mean hospital stay was 29.80 ± 31.73 and 14.76 ± 11.20 hours for MID and TED, respectively, with a significant relation ($p = 0.02$). The mean duration of return to work was 39.68 ± 8.11 and 26.36 ± 6.33 days for MID and TED, respectively, with a significant relation ($p < 0.05$).

Outcome Measures

Compared to the preoperative values, all patients in both groups showed a significant improvement in their postoperative VAS back pain, VAS leg pain, and ODI functional scores.

Back Pain VAS (Table 2). In the MID group, the mean VAS for back pain was 7.09 ± 1.12 preoperatively and 2.78 ± 0.887 , 1.76 ± 0.686 , 1.91 ± 0.636 at 1, 6, and 12 months postoperatively, respectively. In the TED group, the mean VAS for back pain was 6.80 ± 1.12 preoperatively and 2.70 ± 0.899 , 1.68 ± 0.819 , 1.52 ± 0.68 at 1, 6, and 12 months postoperatively, respectively, with high statistical

significance. Compared with VAS of back pain preoperatively, VAS at different follow-up durations (1, 6, and 12 months postoperatively) was significantly decreased and improved in both groups ($p < 0.001$ for each); however, the difference was not statistically significant between the two groups during all follow-up periods, except for the final follow-up (at 12 months postop, there was a significant difference in favor of TED group with $p = 0.002$). Moreover, no significant difference was observed between 6 m VAS postop and 12 m VAS postop in the MID group ($p = 0.168$).

Sciatic Pain VAS (Table 2). In the MID group, the mean VAS for sciatica was 7.55 ± 0.71 preoperatively and 2.12 ± 0.798 , 1.74 ± 0.803 , 48 ± 0.646 at 1, 6, and 12 months postoperatively, respectively, with statistical significance ($p < 0.05$). In the TED group, the mean VAS for sciatica was 7.64 ± 0.76 preoperatively and 2.32 ± 0.74 , 1.80 ± 0.782 , and 1.54 ± 0.696 at 1, 6, and 12 months postoperatively, respectively, with a significant relation. However, no significant difference was observed when comparing the two groups at 12 months postoperatively ($p = 0.261$). Compared with VAS of leg pain preoperatively, VAS at different follow-up dates (1, 6, and 12 months postoperatively) was significantly decreased and improved in both groups (each $p < 0.001$), without significant difference between the two groups during the follow-up period and at the final follow-up (12 months postop with $p = 0.261$).

Functional Status ODI. In the MID group, the mean ODI was 41.14 ± 4.84 preoperatively and 24.04 ± 2.82 and 15.16 ± 3.13 at 6 and 12 months postoperatively, respectively, with a statistical significance ($p < 0.001$). In the TED group, the mean ODI was 41.68 ± 0.47 preoperatively and 23.76 ± 2.42 and 14.60 ± 2.68 at 3 and 12 months postoperatively, respectively, with a significant relation ($p < 0.001$). No significant difference was detected between the two groups at 12 months postoperatively ($p = 0.137$). Compared with ODI preoperatively, ODI at different follow-up dates (6 and 12 months postoperatively) was significantly improved in both groups (each $p < 0.001$), without

a significant difference between the two groups at the final follow-up (12 months postop) with $p = 0.137$ (Table 2).

Macnab's Outcome. According to Macnab's Outcome Criteria, in our study, the results were as follows: for the MED group, overall good to excellent results in 92% of the patients ($N = 46$), fair in 4% ($N = 2$), and poor in 4% ($N = 2$); for the TED group, overall good to the excellent outcomes in 86% of the patients ($N = 43$), fair in 6% ($N = 3$), and poor in 8% ($N = 4$). (Table 3)

Complications

The reported rate of complications (Table 3) was 10% (5 patients) and 16% (8 patients) in the MID and TED group, respectively. In the MID group, the complications (5 cases) were as follows: 2 patients had wound infections, 1 patient suffered

from discitis, one patient suffered from dysesthesia, and only one patient had a dural tear. In the TED group, the complications (8 cases) were as follows: 1 patient had a superficial wound infection, 2 patients suffered from discitis, 2 patients suffered from a dural tear, and three patients suffered from dysesthesia. In the TED group, three patients (6%) have suffered from dysesthesia in the first 10 cases which did not occur later on and was relieved within 6 weeks with medical treatment without more intervention, whereas, in the MID group, there was only one reported case of dysesthesia. Regarding the recurrence rate, 2 (4%) and 5 patients (10%) in the MED and TED groups, respectively, suffered from recurrent LDP and sciatica ($p = 0.960$, not significant) (Table 4).

Table 1. Demographic and perioperative data.

Parameters	MID	%	TED	%
Male	38	76%	33	66%
Female	12	24%	17	34%
Mean age	40.44 ± 11.31	NA	41.14 ± 11.60	NA
Sciatica				
RT	31	62%	34	68%
LT	19	38%	16	32%
Operated disc level				
L3-L4	3	6%	4	8%
L4-L5	30	60%	34	68%
L5-S1	12	24%	9	18%
Two-disc levels	5	10%	3	6%
Operative time/minute	63.82 ± 17.37	NA	72.60 ± 16.90	NA
Hospital stay/hour	29.80 ± 31.73	NA	14.76 ± 11.20	NA
Return to work/days	39.68 ± 8.11	NA	26.36 ± 6.33	NA
Local anesthesia	NA	NA	35	70%
General anesthesia	50	100%	15	30%

Table 2. Visual Analogue Scale and Oswestry Disability Index.

Parameters	MID	TED	p value
VAS back			
Preop	7.09 ± 1.12	6.80 ± 1.12	p = 0.69
1 month postop	2.78 ± 0.887	2.70 ± 0.899	p = 0.569
6 months postop	1.76 ± 0.686	1.68 ± 0.819	p = 0.399
12 months postop	1.91 ± 0.636	1.52 ± 0.68	p < 0.002
VAS sciatica			
Preop	7.55 ± 0.71	7.64 ± 0.76	p = 0.72
1 month postop	2.12 ± 0.798	2.32 ± 0.74	p = 0.06
6 months postop	1.74 ± 0.803	1.80 ± 0.782	p = 0.322
12 months postop	1.48 ± 0.646	1.54 ± 0.696	p = 0.261
ODI			
Preop	41.14 ± 4.84	41.68 ± 0.476	p = 0.157
6 months postop	24.04 ± 2.82	23.76 ± 2.42	p = 0.322
12 months postop	15.16 ± 3.13	14.60 ± 2.68	p = 0.137

Table 3. Outcome measures.

Macnab criteria	MIC	%		TED	%	
Excellent	34	68%	92%	29	58%	86%
Good	12	24%		14	28%	
Fair	2	4%		3	6%	
Poor	2	4%		4	8%	

Table 4. Complications.

Item	MIC (N = 50)	TED (N = 50)
Total	5 (10%)	8 (16%)
Wound infection	2	1
Dural tear	1	2
Discitis	1	2
Dysesthesia	1	3
Recurrence	2	5

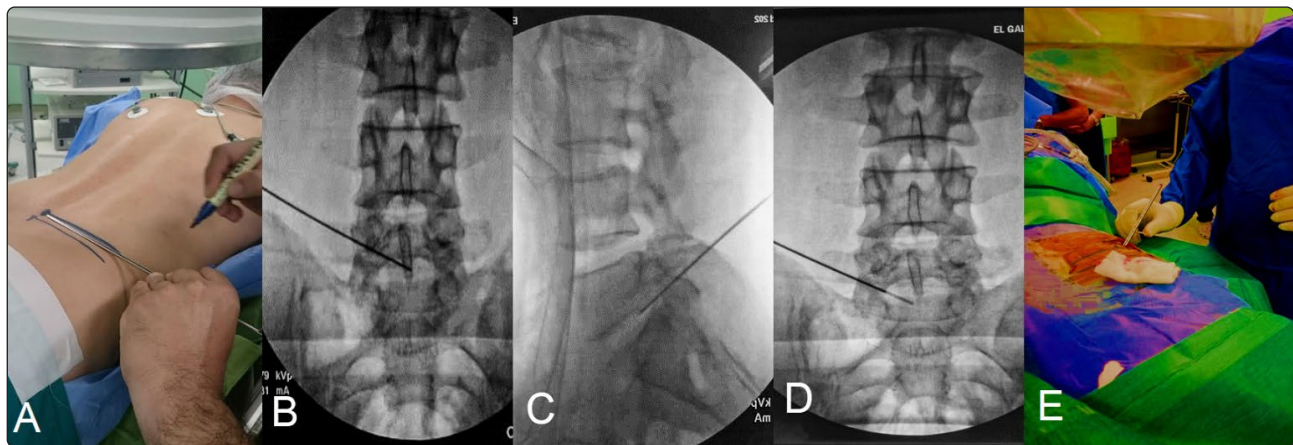


Figure 1. Endoscopic discectomy: (A) intraoperative photo showing drawing lines; (B) needling; (C) lateral X-ray showing the needle inside the disc; (D) guidewire passed through the needle disc; (E) obturator inside the disc.

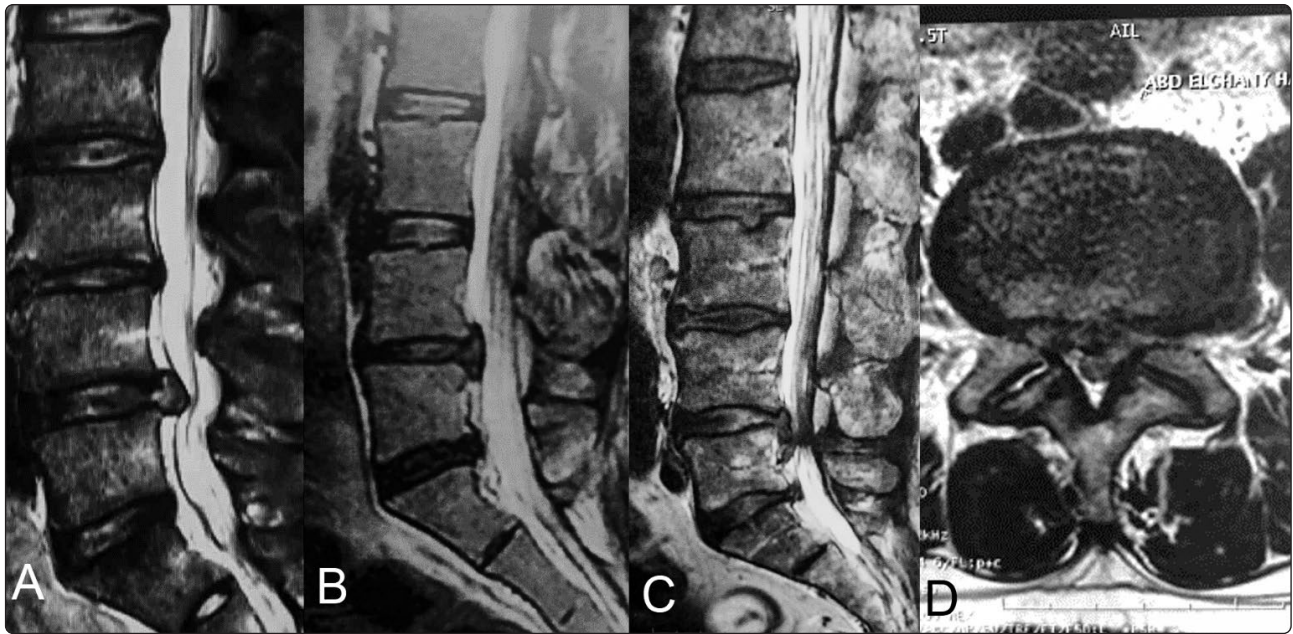


Figure 2. A 49-year-old female patient presented with severe low back pain and agonizing sciatica. (A) T2 sagittal MRI lumbar spine revealed a large extruded L4-L5 disc prolapse treated by TED; good pain relief was not achieved in this patient. (B) T2 sagittal MRI lumbar spine done after 2 months, revealing residual disc; the patient refused further surgery. MRI was conducted urgently after the patient fell and suffered from severe low back pain and sciatica. (C & D) Sagittal and axial MRI showing a big caudal migrating disc at the operative level L4-L5, which was operated microscopically, and she was doing fine during the follow-up for one year.



Figure 3. Image of a 52-year-old male patient who presented with severe sciatica. (A,B) T2 sagittal and axial MRI lumbosacral spine revealing a huge L3-L4 disc prolapse operated urgently by microdiscectomy. (C,D) T2 sagittal and axial MRI lumbosacral spine after 6 months revealed a good discectomy. After a one-year follow-up, the patient was doing fine.

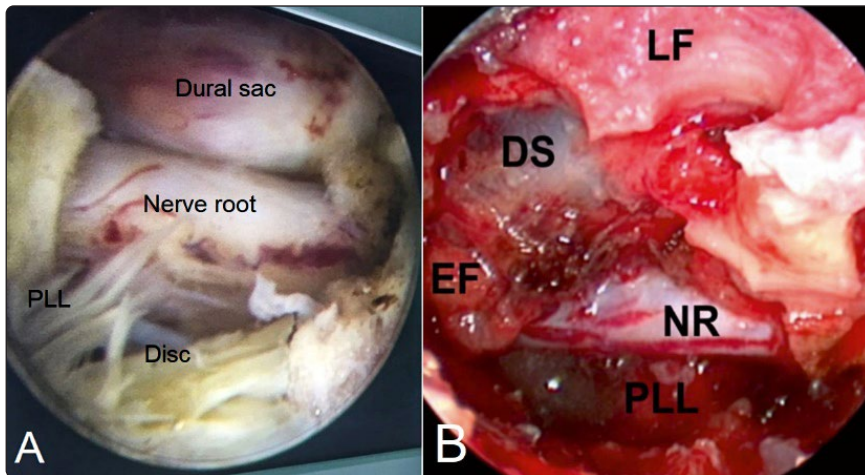


Figure 4. (A) Intraoperative TED photos revealing the disc, nerve root, dural sac, posterior longitudinal ligament (PLL), and disc. (B) Operative microscopic discectomy photo revealing the following: NR, nerve root; DS, dural sac; EF, epidural fat; PLL, posterior longitudinal ligament; LF, ligamentum flavum.

DISCUSSION

Although minimally invasive MID has many advantages over the conventional open one, both of them need GA, paraspinal muscle denervation, some degree of bone resection, and dural and nerve root retraction and result in postoperative scarring, all of which increase the operative morbidity.¹ Since the main aim of surgical treatment of LDP is enough decompression with minimal intraoperative trauma and postoperative complications¹⁵, the percutaneous transforaminal endoscopic procedure for LDP has been accepted and widely applied worldwide many decades ago. TED was initially created by Kambin and Brager¹⁸ and refined by Yeung who introduced the multichannel wide-angled endoscope to the field of spine surgery in 1991 (YESS) and now the procedure has become advanced and more popular and the treatment of choice in selected patients of LDP.⁴⁴

In this study, there were no demographic differences between the groups in our study; males were mostly affected in both groups; the mean age was 40.44 ± 11.31 and 41.14 ± 11.60 years for the MID group and the TED group, respectively, without a significant difference ($p = 0.134$).

L4-L5 disc level was the most commonly involved level in both groups (60% and 68% in the MID and TED groups, resp.). In this study, the operative

time in the TED group was significantly longer than that in the MID group (72.60 ± 16.90 and 63.82 ± 17.37 minutes, resp.; $p < 0.05$), which was in contrast to many studies^{1,19,41,46} that have reported a longer operative time in the MID group as a result of the time consumed in the induction of GA and tissue dissection, but the difference was not significant. In our study, although local anesthesia has been used in 70% of that cases, we noticed a significantly longer operative time in the TED group with statistically a significant difference between the two groups ($p < 0.05$), mainly due to the learning curve and the time used for endoscopic setup.

In our study, the duration of hospital stay in the TED group was significantly shorter than that in the MID group (14.76 ± 11.20 and 29.80 ± 31.73 hours in TED and MID, resp.; $p < 0.02$); return to work was also significantly earlier in the TED group than that in the MID group (39.68 ± 8.11 and 26.36 ± 6.33 days for MID and TED, resp.; $p < 0.05$), which was in line with many studies.^{1,41,46}

In the current study, the long operative time in the TED group was compensated by a short hospital stay, easy recovery, and early return to work.

Compared to MID, TED can be performed under local anesthesia, which is one of the most important advantages of TED allowing good patient–surgeon communication throughout the procedure, in turn avoiding any nerve harm and minimizing anesthesia-associated complications.^{6,34}

Local Anesthesia

Compared to MID, TED can be performed under local anesthesia. The main advantages of TED under local anesthesia are less anesthesia-related complications and quick recovery with a shorter hospital stay. The patient is awake and aware during surgery, with good intraoperative communication with the surgeon; thus, nerve root injury can be avoided. Moreover, the procedure is possible for patients with poor general condition, when the GA is contraindicated.^{11, 24, 37}

In this study, using the ANOVA test and comparing the preoperative measures of the two groups, all postoperative values improved significantly in terms of back pain, leg pain, and ODI. No significant differences were noticed between the two surgical procedures (TED and MID) in terms of VAS of sciatica, ODI, rate of complications as reported by many randomized studies^{12, 26, 36, 45, 46}; however, we noticed a better VAS of back pain 12 months postoperatively in the TED group (with a significant difference, $p < 0.002$) and shorter operative time and a lower rate of recurrence in the MID group.

In contrast to MID which requires some degree of paraspinal muscle denervation, and bone resection, TED is a stitchless surgery that does not need muscle dissection, bone removal, or root or dural retraction, it is expected to report a lower postoperative back pain VAS and during the following up. In this study, we have reported a lower VAS of back pain at one-year follow-up in the TED group than that in the MID group, which is consistent with Ahn et al.¹ in his retrospective matched cohort study. TED improves back pain not only by dural sac decompression and decreasing the intradiscal pressure but also through ablation of the new vessel nerve formation and the granulation tissue around the annular fissure, which is one of the most technical advantages of TED over MID.⁷

In the present study, although a difference was noted between the complication rates of the two groups, it was not statistically significant (10% and 16% in MID and TED, resp.; $p = 0.658$, not

significant). Our results are comparable to the results of Shriver et al. and Zhang et al. in their meta-analysis, which reported that there was no statistically significant difference between the two approaches (MID and TED) in terms of complication rates.^{38, 46} Some studies^{1, 15} suggested that the TED approach would be associated with higher complication rates because the surgical exposure is limited, which makes the surgery relatively difficult with the possibility of nerve damage and other complications.² However, others suggested the opposite, as due to the use of local anesthesia, small incision, and minimal tissue manipulation, the recovery will be rapid, the scar tissue minimal, and the complication rates less.^{21, 22, 35}

Dysesthesia

Many theories explained the occurrence of postoperative dysesthesia in the TED approach: one of them was due to heat transmission from the radiofrequency coagulator to the surrounding neural tissues or mechanical compression of the dorsal root ganglion by the working cannula.⁶ Other explanations were the thermal modulation and mechanical trauma of furcal nerves (abnormal foraminal nerves).⁴⁴ In our study, we did not notice any cases of dysesthesia after routinely administering a steroid transforaminal injection at the end of surgery in the TED group as recommended by Gore and Yeung¹¹; however, there was only one case of resistant dysesthesia reported in the MID group, which may be due to the manipulation of the nerve root and dorsal root ganglia. Dysesthesia in the TED group of our study was comparable to that reported in other studies.^{3, 45, 46}

Broken surgical instruments are not an uncommon complication of the TED approach; the instrumental fatigue due to overuse and rough manipulation were the main risk factors. Different instruments, such as biopsy forceps and graspers, were broken during this study; checking every surgical instrument carefully before and after surgery could help avoid such complications. In the TED group, the long operative time and the

higher rate of complications were maybe due to the early experience with the endoscope, which has a very steep learning curve; gradually, the complication rate was lower and the operative time became short.^{3,44,46}

In the current study, although there was a difference between the recurrence rates in the two groups, it was statistically nonsignificant (4% and 10% in MID and TED, resp., $p = 0.960$), and this was comparable to the results of Yeung and Tsou⁴⁵ (4.0%–9.7% and 4.2%–11% for MID and TED, resp.) and Kim et al.²⁰ (6.3% and 9.5% for MID and TED, resp.).

Recurrence

Persistence of the same symptoms postoperatively without an initial period of improvement was considered a failed discectomy. Inadequate or improper discectomy was the main reason for recurrent back pain and sciatica before 6 months postoperatively; however, if it occurred after 6 months postoperatively, it was considered as recurrent cases. In the MID group, two cases (4%) suffered from recurrence after 6 months postoperatively without cases being reported before 6 months, whereas in the TED group, 5 patients (10%) needed revision surgery and 3 suffered from recurrent symptoms before 6 months and 2 after 6 months with a significant difference.

Revision

All revision surgeries in this study were MID, except for one done endoscopically and all patients were doing fine, which was consistent with Liu et al.²⁵ who recommended the microscopic approach for recurrent cases after endoscopy, although Hoogland et al.¹⁴, 2008, and Jasper et al.¹⁶, 2013, favored TED to be repeated in cases of recurrence. In our study, compared to the MID group, the TED group had a longer operative time, higher rate of complications, and higher rate of recurrence that may be due to the steep learning curve; with time and more experience, the surgeons will become more familiar with the approach and such rate of recurrence and the operative time will decrease and even the overall outcome will improve as reported in the literature.^{3,44,46}

We can report that the main advantages of TED over MID in our study are as follows: the local anesthesia, short hospital stay, early return to work, and better postoperative back. However, several drawbacks existed, such as higher rates of recurrence and complications that need more attention and investigation to minimize them and to clarify whether they are procedure-related or surgeon-related complications. The success rate of TED in our study was 86% which is consistent with the findings of Nellesteijn¹⁶ (84%), Jasper et al.²⁹ (83.9%), and Türk et al.⁴⁰ (90.4%). In general, our results correlated with those of many studies that discussed the two procedures (TED and MID) with nearly the same outcomes.^{1,4,10,26, 27,29,31,36}

Fair and poor results in the MED group were due to postoperative adhesion and scarring in one case (2%), discitis in 2 cases (4%), and resistant dysesthesia in one case (2%) which improved partially after 6 months. Fair and poor results in the TED group were due to inadequate discectomy in 4 cases (8%), discitis in 2 cases (4%), and a dural tear in one case (2%). Because the disc is targeted in TED under local anesthesia, directly through the safe Kambin's triangle with facet preservation that minimizes spinal instability^{18,32}, and due to other advantages of PETD, it is considered a potential minimally invasive good surgical option for treating LDP in selected cases.^{23,32}

The main limitations of this study are as follows: its retrospective nature, using different anesthetic techniques, no control group, the absence of randomization, lack of long-term follow-up, and the small number of patients. Therefore, we recommend conducting a prospective multicenter study with long-term follow-up.

The main drawback of the study design is its retrospective nature.

CONCLUSION

Although MID till now is the gold standard surgical approach for treating LDP and sciatica, TED is a relatively safe and effective alternative

procedure with comparable results. Because TED can be done under local anesthesia with anatomy preservation, short hospital stay, and early recovery, it is only a matter of time until becoming the gold standard worldwide.

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الملخص العربي

استئصال القرص بالمنظار عبر الثقوب مقابل استئصال القرص المجهري لعلاج فتق القرص القطني وعرق النسا أحادي الجانب المصاحب: دراسة مقارنة

البيانات الخلفية: تم قبول استئصال القرص بالتنظير الداخلي مؤخرًا كإجراء بديل آمن لاستئصال القرص المجهري في جراحة القرص القطني. هناك الكثير من الدراسات التي تقارن استئصال القرص المجهري باستئصال القرص بالمنظار الداخلي ، ولكن عدد الدراسات التي تقارن استئصال القرص المجهري مع التنظير الداخلي عبر الثقوب محدود نسبيًا

الغرض: نهدف في هذه الدراسة إلى المقارنة بين استئصال القرص بالمنظار عبر الثقوب واستئصال القرص المجهري في علاج هبوط القرص القطني السفلي وعرق النسا أحادي الجانب من حيث النتيجة الإجمالية والمضاعفات ومعدل التكرار.

تصميم الدراسة: سلسلة الحالات السريرية بأثر رجعي.

المرضى والطرق: تضمنت دراسة بأثر رجعي مائة (100) مريض يعانون من آلام أسفل الظهر وعرق النسا من جانب واحد بسبب الأقراص القطنية السفلية المنفتحة مقسمة إلى مجموعتين تتكون كل مجموعة من 50 مريضًا، المجموعة (أ) عولجت باستئصال الجزئي (MID) ، المجموعة (ب) التي أجريت عن طريق استئصال القرص بالتنظير الداخلي (TED). تم إجراء التقييم السريري قبل الجراحة لجميع المرضى باستخدام الدرجة التناظرية البصرية (VAS) ومؤشر الإعاقة (ODI) Oswestry وتمت المتابعة بعد شهر واحد و 6 أشهر و 12 شهرًا بعد الجراحة.

النتائج: في الدراسة الحالية ، تم علاج مائة (100) مريض جراحياً (50 لمرضى منتصف العمر و 50 مريضاً في TED) من يونيو 2017 إلى ديسمبر 2018 ، متوسط العمر (11.31 ± 40.44) و (11.60 ± 41.14) عامًا بالنسبة للوسط و TED على التوالي ، الذكور كانت الأكثر تضرراً في كل من مجموعتي TED و (76% MID في MID و 66% في TED) وكان مستوى القرص الأكثر تأثراً في كلا المجموعتين هو 5-L4 (60% و 68% في MID و TED على التوالي). (17.37 ± 63.82 و 16.90 ± 72.60 دقيقة للوسط و TED على التوالي مع اختلاف معنوي $P < 0.05$) متوسط الإقامة في المستشفى كان (31.73 ± 29.80 و 11.20 ± 14.76 ساعة في MID و TED على التوالي مع علاقة معنوية $P = 0.02$. مقارنة بقيم ما بعد الجراحة ، أظهر جميع المرضى في كلا المجموعتين تحسناً ملحوظاً في آلام الظهر قبل الجراحة وآلام الساق ودرجات ODI. وفقاً لمعايير نتائج ماك ناب ، في دراستنا ، النتائج الجيدة بشكل عام إلى الممتازة لمجموعة (46 MED نقطة ، 92% ، عادلة (2 نقطة 4%) ونتائج سيئة في (2 نقاط 4%). كانت المجموعة (43 نقطة ، 86% ، عادلة (3 نقاط ، 6% ، نتيجة ضعيفة (4 نقاط ، 8%).

الخلاصة: أصبح استئصال القرص عبر الجلد الخلفي الوحشي عن طريق الجلد إجراءً آمناً وفعالاً نسبياً على مدار السنوات الماضية ، ولكن استئصال القرص المجهري هو النهج الجراحي القياسي حتى الآن لعلاج تدلي القرص القطني وعرق النسا المرتبط به.