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Post-Operative Outcome of Microscopic Discectomy in Patients with Lumber Disc Herniation

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ABSTRACT

Background: The symptoms of lumbar disc herniation (LDH) include back discomfort and malfunction of the nerve roots. Instead of being a novel treatment, microdiscectomy (MD) is viewed as a technological variation of normal discectomy.

Objective: To evaluate the post-operative outcome of microscopic discectomy in patients with lumber disc herniation**.**

Patients and Methods: This study included 20 patients with herniated lumbar disc who have been treated by microdiscectomy [12 cases operated through microscopic fenestration (9 cases by aid of microscope and 3 cases by loup magnification) while 8 cases through transmuscular approach (all by loup magnification)].

Results: The mean age of the studied patient was 46.07 ± 8.4 years, most of them were males (70%). Both (foraminal and extraforaminal) disc zone herniation among patients were the predominant (55%). The common level involved in microscopic approaches was L4-5 level (45%). The mean operation duration was 62 ± 13 min. and the mean blood loss was 67.5 ± 38 cc. A stable postoperative dynamic x-ray was done in all cases of standard microscopic fenestration (n=12) and all cases of trans-muscular approaches (n=8). There was no recurrence among all studied patients.

Conclusion: Microsurgical discectomy could be considered as the main surgical method in patients with lumbar disk herniation.

Keywords: Lumber disc herniation, Microscopic discectomy; Post-operative outcome.

INTRODUCTION

The second most common reason for people to seek medical attention is low back pain, which is regarded as one of the most common causes of incapacitating spine illnesses ever recorded in medical history, along with sciatica [(1)]**.** Pain in the back and nerve root dysfunction, including pain in the nerve root's distribution, weakened muscles innervated by that root, and dermatomal sensory disruption, are the most common symptoms of lumbar disc herniation [(2)]. When evaluating a ruptured lumbar disc, MRI is a crucial research. A CT scan is not thought to be state-of-the-art, and CT myelography is recommended when more skeletal information is needed [(3)]**.**

Surgery is recommended for those with severe intractable pain who have not improved after receiving all available conservative treatments for their radicular pain, whether or not a neurological impairment has developed [(4)]. Microdiscectomy (MD) is a surgical procedure that uses a head light loupe or a microscope to magnify the disc through a smaller incision and with significantly less dissection [(5)]**.** The purpose of surgery is to remove any objects, such as soft disc material, bony osteophytes, and spondylotic ridges that are crushing the nearby neural components [(6)].

Decompression of the spinal cord and nerve roots, stabilising instability by fusion surgery or mobility-preserving stabilisation procedures, and deformity treatment are the main methods for improving neurological function [(7)]**.**

Microscopic approach should be used because studies have shown that it increases accuracy while lowering hospital stays, pain, and blood loss due to tissue stress. However, there is no difference in long-term patient satisfaction between normal open discectomy and microdiscectomy [(8)]**.** The aim of the present study was to evaluate the post-operative outcome of microscopic discectomy in patients with lumber disc herniation.

PATIENTS AND METHODS

This retrospective study included 20 patients with herniated lumbar disc that were performed in Neurosurgery Department, Zagazig University Hospitals, Sharkia, Egypt. All participants were screened to determine the eligibility for participation in the study according to specific inclusion and exclusion criteria.

Inclusion criteria: Age of the patients (middle aged patients 20-60 years old). No sex variation. Patients with disc herniation evident by clinical picture and neuro-radiological imaging foraminal, extra-foraminal or central herniated disc.

Exclusion criteria: Patients with spondylolisthesis; patients older than 60 years old, and spinal infection.\

Methods:

All patients were subjected to careful history taking and complete neurological examination. The diagnosis of lumbar disc herniation and its cause were established by the clinical picture, neuroradiological imaging including lumbosacral CT and MRI for all cases. 20 patients with lumbar disc herniation were treated surgically using microscopic discectomy either standard microscopic fenestration or trans-muscular approaches. The patients were informed about the safety, presumed benefits and cost of both

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techniques and were allowed to choose.

Operative Techniques

Following the onset of general anaesthesia and intravenous antibiotic treatment. The patient was intubated. On a Jackson table, the patient was positioned prone. The elbows should be flexed and the arms should be supported by arm boards with an abduction of less than 90°. To increase lumbar lordosis, the hips are extended. To avoid skin disintegration and peripheral nerve palsies, all pressure points were cushioned [(9)].

I. Microscopic fenestration:

The skin was cut sharply to create a midline vertical incision above the disc space to reach these herniations. The paraspinous muscle was separated from the spinous processes in a subperiosteal manner after the fascia was cauterised on the ipsilateral side of the spinous processes. The lamina was included in the dissection. A deeper self-retaining retractor should now be employed for improved visualisation. Now, to ensure precise exposure, it is advised to take a second localising image with a field equipment. The working microscope or loupe magnification was used until decompression was finished. The interlaminar space was assessed to determine whether bone excision is required.

The first step was using a kerrison punch to remove the inferior lip of the superior lamina. With respect to the position of the disc space and disc herniation, the laminectomy was performed superiorly, starting medially at the base of the spinous process. After that, the facet joint should receive lateral decompression. If the disc fragment is extruded in a caudal direction, the superior lip of the more inferior lamina might need to be removed. With a scalpel or an up-angled curette and a pituitary rongeur and the ligament can be severed from its laminar attachments and peeled off all at once. After the ligament has been cut, the approach should be reevaluated focusing on the lateral thecal sac, axilla, and epidural veil. A micropituitary rongeur can be used to gently pry the problematic disc out of the epidural space if it is entirely extruded and free. The next step is to enter the annulus and carry out a more involved discectomy.

When compression results from a retained disc inside the disc space, the annulus should be opened abruptly and linearly with a scalpel. Once the disc is exposed, the annulus can be gently pressed downward in an effort to push disc material out into the epidural space for removal.

After the discectomy, the disc space needs to be extensively irrigated to remove any last loose fragments. The wound was then stitched shut in layers using 0 Vicryl sutures in the dermal layer and 3-0 Vicryl sutures in the dorsal lumbar fascia. For the skin, a running, subcuticular suture was employed [(10)].

II. Far Lat (Trans muscular) approach:

A muscle-splitting approach is used to make a paramedian incision 3 cm lateral to the midline. A table tilted away from the surgeon can help with visualisation. The facet joint and transverse process can be felt by palpating the dorsal lumbar fascia, which was incised with monopolar cautery. A retractor in the shape of a speculum is docked to the lateral edge of the facet joint after the muscles were divided. The intertransverse ligament was cut at this point as the muscular attachments to the transverse processes were being released under loupe magnification, floodlight, and an operational microscope.

A Kerrison rongeur was used to do a partial, lateral facetectomy. The underlying disc fragment was removed by locating and mobilising the exiting nerve root. The rostral and caudal pedicles, as well as the dorsally displaced nerve root, were all palpable from this window [(11)].

Ethical approval: The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans. Written informed consents were obtained from all participants and the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University.

Statistical analysis

Data entered and analyzed using Microsoft Excel software then imported into Statistical Package for the Social Sciences (SPSS version 22.0) software. Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. Differences between quantitative independent multiple were tested by ANOVA. P value was set at ≤ 0.05 for significant results & ≤ 0.001 for high significant result.

RESULTS

The present study showed that the mean age of the studied patient was 44.07 ± 8.4 , and the majority of cases were males **(Table 1)**.

Table (1): Demographic data among the studied patients

Items	Microscopic discectomy (n=20)
• **Age per year**	
Mean ± SD	**44.07 ± 8.4**
(minimum-maximum)	**32-55**
• **Sex**	**No (%)**
Female	**6 (30)**
Male	**14 (70)**
• **Occupation**	
Worker	**12**
House wives	**4**
Professional	**4**
• **Marital status**	
Married	**19**
Single	**1**
Smoking	
non-smoker	**11**
smoker	**9**

More than half of the patients had foraminal and extraforaminal disc zone of lumber herniation and one case had foramina and paracentral **(Table 2)**.

Table (2): Frequency distribution regarding disc zone of lumber herniation

Disc zone of lumber Herniation	Microscopic discectomy (n=20) No. (%)
Central & Paracentral	**8 (40 %)**
Foramina & Paracentral	**1 (5 %)**
Foraminal & Extraforaminal	**11 (55 %)**

Regarding the level of lumbar herniation, most patients had disc zone of lumber herniation at L4-5 **(Table 3)**.

Table (3): Frequency distribution regarding the level of lumbar herniation

Disc zone of lumber Herniation	Microscopic discectomy (n=20)No. (%)
L1-2 &L5-S1	**2 (10 %)**
L3-4	**2 (10 %)**
L3-4, L4-5	**4 (20 %)**
L4 -5 & L5-S1	**0**
L4-5	**9 (45 %)**
l5-S1	**3 (15 %)**

The mean operation duration was 62 ± 13 min and the mean blood loss was 67.5 ± 38 cc **(Table 4)**.

Table (4): Operative evaluation among the studied patients

Items	Microscopic discectomy (n=20)
• **Operative Duration per minute Mean ±SD (minimum-maximum)**	**62 ±13 40-130**
• **Operative Blood Loss per cc Mean ±SD (minimum-maximum)**	**67.5±38 30-170**

Standard microscopic fenestration or trans-muscular approaches regarding different clinical parameters of post-operative outcomes were illustrated in table (5).

A stable postoperative dynamic x-ray was done to all cases of standard microscopic fenestration (n=12) and all cases of trans-muscular approaches (n=8). There was no recurrence among all studied patients.

Table (5): Standard microscopic fenestration or trans-muscular approaches regarding different clinical parameters of post-operative outcome

	Micro discectomy	
	Fenestration n=12 No (%)	**Trans-muscular n=8 No (%)**
Hospital stay		
Over night One day Two days	**0** **9(75)** **3(25)**	**0** **8 (100 %)** **0**
Post -Operative Dynamic x ray		
Stable	**12(100)**	**8 (100 %)**
CT		
Intact facet partial removed lat facet	**12** **0**	**4 (50 %)** **4 (50 %)**
MRI		
Removed Partial removed	**9(75)** **3(25)**	**8 (100 %)** **0**
Mobilization		
Early Late	**9(75)** **3(25)**	**8 (100 %)** **0**
Recurrence		
Yes No	**0** **12(100)**	**0** **8 (100 %)**

A case of male patient, 45 years old driver with L4-5 disc prolapse and canal stenosis operated with Lt Microscopic fenestration technique. Post-operative CPK was elevated. There was an improvement in post-operative MRI **(Figure 1)**.

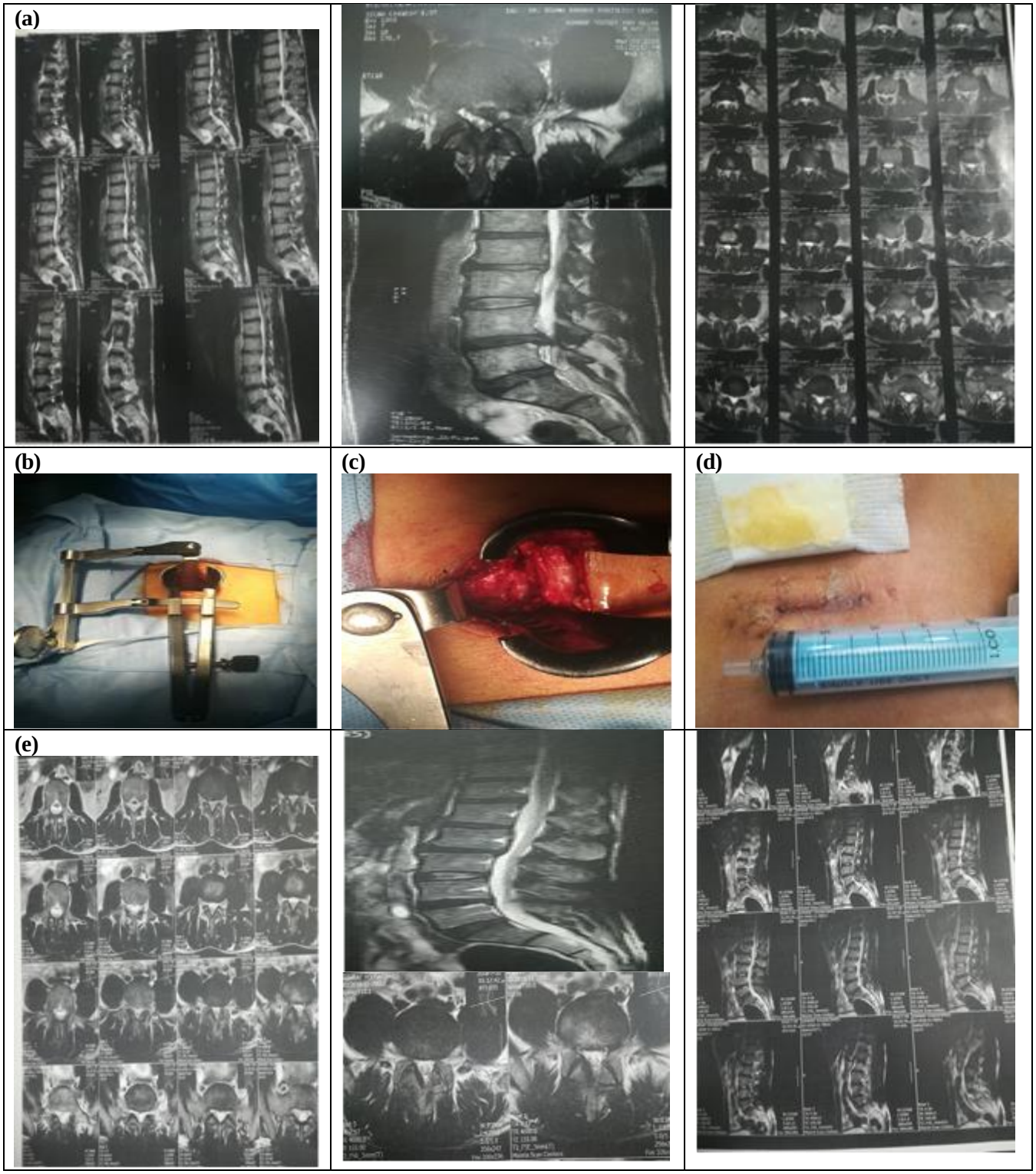

Figure (1): A male patient, 45 years old, L4-5 disc prolapse and canal stenosis, showing: **(a)** Preoperative MRI, **(b)** Illustrated surgical steps, **(c)** Identification of neural tissue and discectomy, **(d)** Post-operative wound closer and **(e)** Post-operative MRI.

DISCUSSION

Low pain in the back extending to the lower limb, with a distribution region reflecting the dermatomes of the affected nerve roots, is the primary symptom of lumbar disc herniation (LDH) [12].

The most frequent spinal surgery is a discectomy for herniated lumbar discs. The fundamental goal of all available methods is to alleviate the nerve root compression brought on by the herniation [5, 13]. Although discectomy with fusion, microsurgical or endoscopic discectomy, and open conventional discectomy are recognised treatment options for LDH following failure of medicinal therapy or substantial neurological impairments, the most effective management approach is still debatable [14, 15]. In addition to precision surgical technique, accurate indication evaluation is necessary for satisfactory clinical outcomes: a strong correlation between clinical and radiological results indicating that the pain was caused by the herniation pressing on the nerve root [16]. In patients with LDH who don't have obvious clinical or radiological signs of instability, microsurgical discectomy is a viable treatment option [8, 15].

Regarding the basic characteristics of the studied group, Male was the predominant sex (70%). Mean age was 46.07 ± 8.4 years. Workers were the predominant occupation. Smokers constituted 45% among the studied patients. Both (foraminal and extraforaminal) disc zone herniation among patients were the predominant (55%). The common level involved in microscopic approaches was L4-5 level (45%). This finding agree with **Mayer and Brock** [17] who found that in 56 patient (36 male and 20 female), the average age was 40.89 ± 9.14 years. The most common level involved was L4-5 level.

In the current study, the mean operation duration and the mean blood loss were 62 ± 13 min. and 67.5 ± 38 cc respectively. This could be explained on basis of extensive muscle and periosteal dissection, retraction, more time for haemostasis and excess time expenditure to identify anatomical landmarks for disc zone herniation. **Gibson *et al.*** [18] reported that the operative time was 28 ±11 min in the MD.

In our experience, the postoperative discomfort was reduced more by microscopic discectomy than by vigorous curettage of the disc space. On the other hand, by causing hypermobility at the implicated level, radical discectomy can increase the severity of postoperative back discomfort [16, 18].

Our successful results for post-operative outcomes are consistent with several studies. **Gue *et al.*** [19], **Baba *et al.*** [20] and **Ozgen *et al.*** [21] represented a good to excellent outcomes after LDH. Also, the current outcomes are confirmed with **Mashhadinezhad *et al.*** [16] who showed that microsurgical discectomy produced favorable outcomes in most patients with first-time LDH.

One of the limitations of the present study was the retrospective design, without taking into account any other scoring systems for outcomes (such the SF-36 or the Japanese Orthopaedic Association score system).

CONCLUSION

Microsurgical discectomy could be considered as the main surgical method in patients with lumbar disk herniation.

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