

LUMBAR DISCECTOMY; COMPARATIVE STUDY OF ENDOSCOPIC VS FENESTRATION OPERATION

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ABSTRACT.. Background: Discectomy is the standard treatment for lumbar disc disease. Fenestration operations involved lot of tissue dissection and so the complications. Instead the endoscopic discectomy involved less tissue dissection but limited exposure. **Objectives:** The objectives of this study were to compare the outcome of endoscopic discectomy and fenestration discectomy in terms of relief from symptoms and complications. **Study Design:** Analytic study. **Place and duration of study:** Neurosurgical unit Bahawal Victoria hospital Bahawalpur, from Feb 2010 to Aug 2010. **Patients and Methods:** Forty cases fulfilling the inclusion criteria were selected. Efficacy of procedure was determined by improvement in Denis pain scale, Macnab's criteria and straight leg raising (SLR) improvement. **Results:** Forty patients divided in two equal groups. Patients of group A underwent fenestration and Group B endoscopic discectomy. 60% of patients had left sciatica while 40% of patients had right sciatica. According to Denis pain scale 10% patients had moderate pain, 30% had severe pain and 60% had constant pain. Straight leg raising test showed, 50% patients had less than 30° SLR, 30% patients showed SLR of 31° to 40° and 20% patients had SLR more than 40°. MRI findings were disc bulging, protrusion and rupture. Considering SLR, Denis pain scale and Macnab's criteria of pain control there was no clinical difference found between the two operative procedures except in two patients in group B when open discectomy had to be performed. **Conclusions:** MED is a safe and effective mode of treatment for low back pain in patients with lumbar disc herniation.

Key words: Discectomy, Low back pain, Microendoscopic discectomy, Fenestration.

INTRODUCTION

Backache associated with sciatica is very common problem. The human race is paying price for attaining the upright posture¹. From adolescence to adulthood 80-85% of people suffered from this ailment². Degenerative changes lead to spinal canal narrowing^{3,4}. One common reason for Low Back Pain (LBP) is the herniation of intervertebral discs into the canal⁵. Compression of nerve roots by protruded disc is strongly associated with distal extremity pain^{5,6}. The symptoms and signs of sciatica and MRI findings of nerve root compression or displacement by a disc herniation are correlated before invasive therapy is undertaken⁷. Literature shows that standard discectomy is preferred technique for lumbar disc herniation then minimal invasive operations⁸.

Only 10 years ago, if one had spine surgery, one could expect it to take as much as one year before one would be able to return to normal activities. Minimally invasive techniques, however, are changing the face of spine surgery. What used to result in a week-long hospital stay, a year's recovery period and a large scar has been

diminished to a few days, a few months and a few small scars^{3,4,7}.

Available evidence suggests that Prof. Muhammad Gazi Yasargil Turkish Neurosurgeon was the first person to introduce minimal invasive technique¹¹. According to another evidence microsurgical discectomy, was introduced by Yasargil and Casper^{11,13}. MED involves less tissue dissection, so the infection rate and post op pain is less as shown by the results of Smith et al¹⁵.

Dissecting the muscles during fenestration operation produces the majority of the perioperative pain and delays return to full activity. The degree of the perioperative pain necessitates the use of significant pain medication with their inherent side effects. Also, the degree of the perioperative pain delays return to normal daily activities and nonphysical work^{9,10}. The dissection of the paraspinal muscles from their normal anatomic points of attachment results in a healing by scarring of these muscles. The various layers of the individual muscle healed by scar to one another losing their

independent function^{12,14}.

OBJECTIVES

The objectives of this study were to compare the outcome of microendoscopic discectomy (MED) and fenestration discectomy in terms of relieve from symptoms and complications.

PATIENTS AND METHODS

Setting

Department of Neurosurgery Bahawal Victoria Hospital Bahawalpur.

Study Design

Interventional quasi experimental study.

Sample Size

Forty cases fulfilling the inclusion criteria were included.

Duration of study

Six months, from March 2010 to August 2010.

Inclusion Criteria

- Age range 30-45 years
- Either sex
- MRI proven disc
- Straight leg raising (SLR) less than 60 degrees
- Unilateral disc

Exclusion Criteria

- Cauda equina syndrome
- Presence of infection
- Spinal canal stenosis
- Obese patient

Operational Definitions

Efficacy

- Improvement in straight leg raising sign in degrees.
- Improvement in Denis Pain Scale. (Table no: I)
- Mean Oswestry Disability Index
- Mcnabs criteria

Discectomy Endoscopic

Minimally invasive surgery, also known as "keyhole" surgery, uses a thin, telescope-like instrument known as an endoscope, which is inserted through small incisions. The small incision made and with the help of endoscope protruded disc removed

Fenestration

Relatively bigger incision made, muscles of one side dissected, disc removed.

Forty cases fulfilling the inclusion criteria were collected from inpatient department of neurosurgery Bahawal Victoria hospital Bahawalpur. The procedure was performed in neurosurgical operation theater. Provisional diagnosis of herniated disc was confirmed by MRI of lumbar spine and the type of disc (bulge, prolapse and extruded) were recorded.

If clinical diagnosis and MRI findings were consistent with herniated disc then case was booked for study. Procedure was explained and written informed consent was taken. Bleeding disorder was ruled out on history. A patient is brought into the operating room and is put under general anesthesia. The patient is turned onto his abdomen and padded into position. A fluoroscope is brought in for use during the remainder of the operation. The patient's back is scrubbed with sterile soap, and a sterile field is created. Drapes are placed accordingly, and the surgery begins.

RESULTS

Total forty patients were included in the study. Patients were divided in two equal groups. Group A patients undergone fenestration operation while Group B patients were treated by microendoscopic discectomy. In the distribution of gender, there were 32 (80%) male and 8 (20%) females. The mean age of the patients was 39 years. There were 4(10%) patients of age range of 30 to 35 years, 20(50%) patients of age range of 36-40 years and 16(40%) patients of age range of 41-45 years (Table no: II). Occupational distribution showed, 16(40%) laborers, 8(20%) farmers, 4(10%) drivers, 4(10%) shopkeepers, 8(20%) housewives.

Fig-1. Ventral layer of ligamentum flavum is split gently by Penfield dissector. The epidural fat tissue will emerge after penetrating the ligament. Ligamentum flavum is removed by a small Kerrison punch while protecting the neural tissues

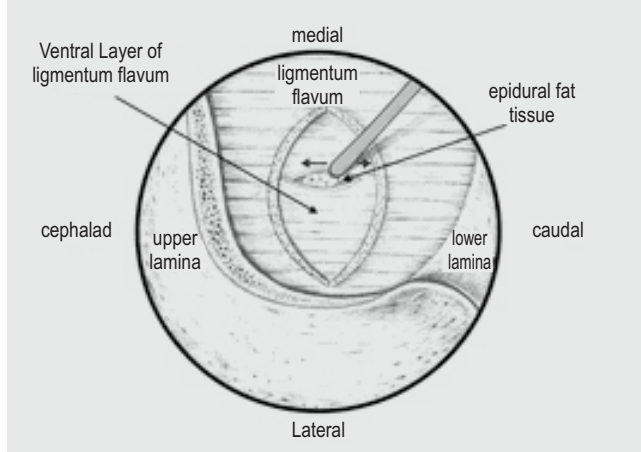
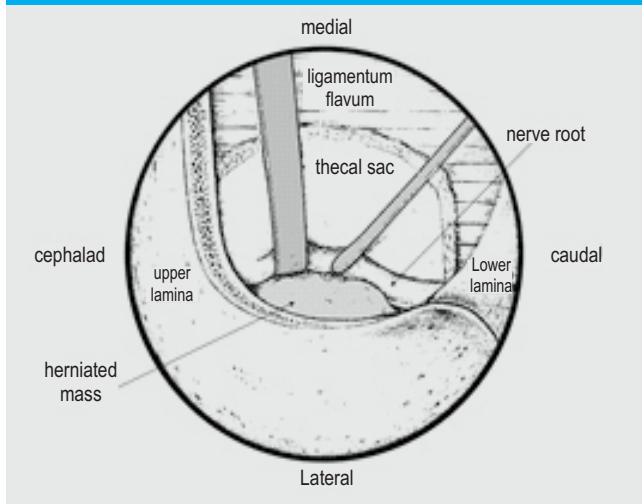
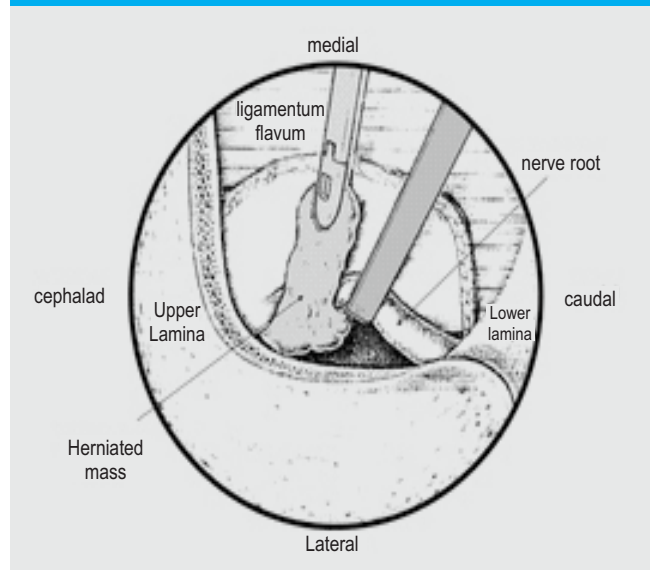


Fig-2. Nerve root retraction. The nerve root is retracted medially using a Penfield dissector or suction retractor in a standard fashion.



According to Denis pain scale, before there was no patient of no pain and mild pain, 4(10%) of moderate pain, 12(30%) patients of severe pain and 24(60%) patients of constant pain (Table III). 24(60%) patients of LBP with left radiculopathy, 16(40%) patients of LBP with right radiculopathy. There were 20(50%) patients of $<30^\circ$ SLR, 12(30%) patients of 31° - 40° SLR, 8(20%) patients of 41° - 50° SLR (Table III). In the distribution of type of disc by finding of MRI, there were 14(35%) patients of

Fig-3 Discectomy. The herniated disc is removed by pituitary rongeur. Take care not to put the pituitary rongeur too deeply into the intradiscal space



bulge, 22(55%) patients of protrusion and 4(10%) disc were ruptured. In the improvement of SLR, before there were 40(100%) patients of less than 50° SLR. But postoperatively there significant improvement in SLR. In group a 70% patients had SLR above 50° and in group b 75% patients had SLR more than 50° (Table IV).

Regarding Denis pain scale, group A should 70% patient had no pain and in group B 80% had no pain both groups showed excellent results and 52% of patients had no pain while 20% patients of group A and 10% patients of group B had minimal pain and two patients of group A and group B showed no improvement in Denis pain scale.

Pain control criteria of Mcnabs showing excellent pain control in 60% of group A and 70% patients of group B. In 20% patients of group A and 10% patients of group B had fair pain control. 20% patients of group A and group B had poor pain control (Table-IV). Oswestry disability index showed excellent results in group A patients than group B patients.

DISCUSSION

The results of our study showed that backache due to lumbar disc herniation is common presenting complaint in working age group also shown by the study of

Table-I. Dennis pain scale	
P1:	No pain
P2:	Occasional minimal pain; no need for medication
P3:	Moderate pain, occasionally need medications no interruption of work or activities of daily living
P4:	Moderate to severe pain, occasionally absent from work; significant changes in activities of daily living
P5:	Constant, severe pain; chronic pain medication

Table-II. Demographic features of study individuals	
Total number of patients	40
▶ Group A	20
▶ Group B	20
Gender	
▶ Male	32
▶ Female	08
Age	
▶ 30-35 years	04
▶ 36-40 years	20
▶ 41-50 years	16
Occupation	
▶ Laborers	16
▶ Farmers	08
▶ Drivers	04
▶ Shopkeepers	04
▶ Housewives	08

Gholamreza et al¹⁰. According to the Ahmad M et al and our study the majority of cases are in the fourth decade of life¹¹. There is male predominance i.e.8:2 male to female ratio but Akbar A male suffer more than females but the ratio is 3:1. It is because of the inclusion and exclusion criteria showing the huge difference¹². Our study also confirmed the work of other authors that most disc herniation occurs at the level of L4/L5 followed by L5/S1 level^{13,14}.

In our study on MRI findings the bulge was found in 24% patients, prolapse was found in 64% patients and extrusion was found in 12% patients. While in the study of Rosenberg et al⁵ the bulge was found in 42% patients and according to the study of Ahmed et al³ the disc prolapse was found in 92.4% patients. So our study is

Table-III. Clinical characteristics & MRI findings	
Sciatica	
▶ Left	24
▶ Right	16
Dennis pain scale	
▶ Moderate pain	04
▶ Severe pain	12
▶ Constant pain	24
Straight leg raising	
▶ ≤30°	20
▶ 31° - 40°	12
▶ 41° - 50°	08
Disc pathology	
▶ Bulge	14
▶ Protruded	22
▶ Ruptured	04

Table-IV. Clinical outcome		
Improvement in Dennis pain scale		
	Group A	Group B
No pain	14	16
Minimal pain	04	02
Moderate pain	02	02
Improvement in SLR		
	Group A	Group B
≤30	-	-
31° - 40°	02	01
41° - 50°	04	04
> 50°	14	15
McNabs criteria		
	Group A	Group B
Good control	12	14
Fair control	04	02
Poor control	04	04

comparable with the above studies Improvement in straight leg raising coincide in two groups i.e. before

surgery 100% of the patients had SLR less than 500 and postoperatively 90% of the patients of both the groups had SLR more than 60°, these results coincide with different studies¹⁵.

As for as Denis pain scale concerned only two patients of the group B showed no relief from constant pain and had to be reoperated otherwise 88% of the patients had either no pain or minimal pain^{6,8,12}.

Approximately 80% of patients had good or excellent outcomes based on modified Mcnab criteria. The remaining 3 patients had fair outcomes, and no patient had a poor outcome¹⁵. In contrast different studies showed that results of fenestration, hemilaminectomy and standard laminectomy for lumbar discectomy are satisfactory^{16,17,18,19}. The success rates for micro discectomy range from 88 to 98.5% in various series²⁰. It was established that this procedure reduces the incision size, blood loss and morbidity²¹. The advantages of MED over standard microdiscectomy include smaller incision, lesser post operative pain, early ambulation, short hospital stay, shorter time to return to work and lesser cost of treatment²².

The best methods to learn MED are skill development in cadaveric workshops and clinical supervision in a learning environment. The specific skills required in MED include visuo-spatial orientation, handling of endoscopic equipment and working through a small field of view. Surgeons who are experienced in the standard microdiscectomy may be better equipped to overcome the learning curve faster^{21,22}.

CONCLUSIONS

Micro endoscopic discectomy is a safe and effective surgical approach for the treatment of lumbar disc herniation. Endoscopic discectomy for herniation produces improvement in pain, disability, and functional health that is comparable with outcomes reported for conventional open discectomy. Minimal invasive techniques should be adopted and young neurosurgeons should be properly trained and the cost of endoscopes should be reduced so that the minimal invasive procedures performed commonly.

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