

# A retrospective comparative study of Percutaneous Transforaminal Endoscopic Discectomy (PTED) and Microendoscopic Discectomy (MED) for the treatment of lumbar disc herniation in 160 patients.

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## Abstract

**BACK GROUND CONTEXT:** Percutaneous Transforaminal endoscopic discectomy (PTED) and Microendoscopic discectomy (MED) are minimally invasive surgeries for management and treatment of pain and disability caused by lumbar disc herniation due to nerve compression. This two procedures have high success rate and good outcomes than other surgical procedures.

**PURPOSE:** The purpose of this study is to compare the surgical outcomes of these two minimally invasive procedures on the basis of patients daily life, cost, early return to work, blood loss and pain relief.

**STUDY DESIGN:** A retrospective comparative study.

**PATIENTS:** 245 patients were taken for the study purpose but only one hundred and sixty patients were selected for the study on the basis of their physical, clinical and radiological presentation of lumbar disc herniation at a single site.

**METHODS:** All the patients were divided into two groups (80 patients each) according to the inclusion and exclusion criteria; named as PTED Group and MED Group. All the patients in PTED Group went for PTED procedure and MED Group for MED procedure of surgery; all of the patients were follow-upped and interviewed by telephone for their satisfaction, physical status and disabilities caused due to pain or other factors on the basis of SF-36, VAS, MacNab Criteria and ODI after surgery.

**RESULTS:** After comparing all the variables of PTED Group and MED Group we have very minor differences in both group. We found that these two methods have similar impacts on patient's quality of life and their daily physical works. We found that PTED group have more beneficial results than MED Group on the basis of hospital stay and early return to work.

**CONCLUSION:** According to the study result we concluded that PTED method of surgery is an alternative to MED procedure with less blood loss, more beneficial outcomes, minimum muscle & bone trauma and also cosmetically.

**Keywords:** PTED; MED; Hemilaminectomy; Minimally invasive; Chemonucleolysis; Nucleoplasty; LDH.

## Introduction and historic background:

Spinal disc herniation or Lumbar intervertebral disc herniation (LDH) is the main cause of back pain which affects people in their work and daily activities with or without various sign and symptoms. If left untreated it may cause disabling pain, paresthesia and even paralysis of the lower limbs. Lumbar intervertebral disc herniation are usually the result of wear and tear in the vertebral disc which leads to bulge out the central part (nucleus pulposus) through the outer part (annulus fibrosus) compressing the nerves, and along with central nervous system, regional and local factors interactions cause pain [1-3]. Most people get relief by conservative method where as some group of

people need surgery to get free from pain and other sign & symptoms of disc herniation.

Lumbar disc herniation can be treated by many methods but it is divided into two major categories: Conventional (Traditional or open) discectomy and minimally invasive discectomy. Conventional method includes hemilaminectomy with discectomy, chemonucleolysis, nucleoplasty and microdiscectomy whereas Minimally invasive procedure includes Percutaneous laser discectomy, manual, and automated Percutaneous lumbar discectomy, Microendoscopic discectomy (MED) and Percutaneous transforaminal endoscopic discectomy (PTED or TED).

With the development of the endoscope for surgical procedure all other fields in surgery have gone farther more to develop new techniques and procedures except spinal surgery, may be it is due to the complex bony structure, less working field and need for specialized instruments which are not yet developed or are in the developing phase. In 1934 Mixter and Barr for the first time treated the lumbar disc herniation by open laminectomy and discectomy [4], also known as Love's technique was published by Ross and Love in 1971. Further Casper and Yasargil changed the open laminectomy into open microdiscectomy [5] which was done by giving a small incision with or without the aid of a headlight loupe or microscope magnification. Later on a new technique was developed in 1997 to treat the herniated lumbar disc by interlaminar space by Foley KT, Smith [6] and Destandeu [7], with the development of spinal endoscope, tubular retractors and microscope these surgeries are performed easily and safely through posterior approach (interlaminar space) which is recently known as Microendoscopic discectomy. In 1973 Kamblin and Gellmann [8] in the United States and in 1977 Hijikata in Japan [9] individually performed the posterolateral percutaneous nucleotomy for the release of compressed nerve root by resecting the nucleus pulposus without direct visualization but under direct visualization this surgery was introduced by Fost and Housman in 1983 which is today known as Percutaneous endoscopic discectomy (PED) or Percutaneous transforaminal endoscopic discectomy (PTED or TED) [10].

Microendoscopic discectomy and Percutaneous transforaminal endoscopic discectomy are widely accepted as two minimally invasive technique for the treatment of lumbar disc herniation because of their small skin incision, minimum muscle trauma, less blood loss, minimum nerve irritation [11] and quick recovery. This two methods are also economical than the conventional methods due to the reuse of the apparatus for the operation, less hospital stay, less suppository use for pain management and quicker return to daily life and work. Microendoscopic surgery is done by posterior approach with the help of different sized retractors and a microscope but some hospitals use Operative magnifying glass [12] instead of microscope for better visualization and three dimensional view. Whereas, PTED is done through posterolateral approach with a small port incision for the retractors under the direct endoscopic view on a video monitor.

The aim of this study is to evaluate the surgical outcomes of the two minimally invasive surgeries MED and PTED by a

retrospective study along with comparison on region of disc herniation, economically, days of hospitalization and recovery. Eventhough this two approaches have difference in their indication for surgery, but in some region of lumbar disc herniation these two methods can be applied and it depends on the surgeons' selection for the better outcome and safety.

## Materials and Method

### Patient Characteristics:

In this Retrospective study, we enrolled 160 patients with clinically-symptomatic disc herniation who underwent discectomies from January 2014 to December 2014. Out of these 160 patients 80 patients have PTED surgery and remaining 80 have MED surgery, whose age ranges from 18 to 80 years (mean, 39.81±13.81 years in PTED Group and 43.21±14.17 years in MED Group). The duration of pain was recorded from the day 1 to 20 years (mean, 108.36±178.51 weeks in PTED Group and 143.54±265.26 weeks in MED Group). All the patients received atleast 6 weeks of conservative treatment except the patients who went emergency surgeries with extreme pain and cauda equine syndrome (patients with cauda equine syndrome were not included in this study). Surgery was indicated to the patients according to recent day's standards based on radicular pain symptoms and existing neurologic deficits. [13, 14]

### Study Groups:

245 patients were taken for the study group but only 160 patients meet our study criterion, and from remaining 85 patients, some patients were out of contact, some have multilevel and revision surgeries, some have cauda equine syndrome and few were deceased so 160 patients were taken for the study purpose, 160 patients were arranged in two groups; eighty patients in each groups. One group was named as Percutaneous Transforaminal Endoscopic Discectomy (PTED) surgery group and another named as Microendoscopic discectomy (MED) surgery group; patients were selected according to the inclusion and exclusion criterion, and the patients were introduced briefly about the procedure of the operation which they would have according to their case. Both the operations (PTED

&MED) were done by a single surgeon in our hospital (Zongda Hospital affiliated to Southeast University), who have many years of experience in these two procedures of surgery. 37 operations were performed at L4/L5 level and 43 operations were performed at L5/S1 level in PTED Group whereas 33 operations were performed at L4/L5 level and 47 operations were performed at L5/S1 level in MED Group. All the operations were done for the first time without any revision surgery or any history of surgery at other level of spine.

### Inclusion and Exclusion Criteria:

Every forms of lumbar disc herniation was included for the study purpose from year 2014 January till 2014 December conformed by clinical evaluation and radiographs (CT and MRI). Cases with signs of motor weakness, sensory changes, radiculopathy and abnormal reflex caused by the herniated disc were included, Failed cases which were atleast treated for six weeks by conservative medication(except cases with emergencies), Patients of age 18 to 80 years old were included and then thepatients were divided into two groups according to the surgery performed by the surgeon, for the treatment of disc herniation regarding to the patients welfare and better outcomes. All the cases taken for surgery were involved for the first time at single level and no other surgeries were performed at that level or other level of the spine.

Actually till now there is no established or gold standard criterion for including patients in PTED technique so we have used following criterion to select the Patients for PTED procedure (1) herniated disc material was located cranially below the lower edge of the upper pedicle or caudally not over the middle of the lower pedicle and (2) in the lateral radiographs it shows that the foramen was not overlaid by the pelvis beyond the middle of the upper pedicle. For MED the selection criterion was as follows: case which were not suitable to perform PTED and suitable for MED were in MED group including patients with (1) calcified disc,(2) high cranially migrated disc herniation, (3) severe degenerative lumbar changes and some kind of stenotic lesion at the same level. Exclusion criteria includes the patients who were not suitable for surgery either by their general condition or other forms of diseases. Patients with severe neurologic deficit, cauda equine syndrome or spinal instability that needs fusion. Patients with other forms of disease at the same level such as tumor, fractures or infections which were not in a good condition for performing surgery. Patients were excluded who have central or lateral stenosis of spinal canal, previous operations, severe degenerative or narrowing of the disc space at the index level, drug dependency or known psychological disorders. Patients who have disc herniation other than L4/5 and L5/S1 region were not included in this study. Table 1 shows the inclusion criteria, exclusion criteria and the study done.

Indices	PTED (N=80)	MED (N=80)	P value
<b>Age (years)</b>			
Average (Mean±SD)	39.81±13.81	43.21±14.17	0.126 <sup>a</sup>
Range	18 – 73	18 - 80	
<b>Gender</b>			
Male	44(55.00)	43(53.75)	
Female	36(45.00)	37(46.25)	
Male : Female ratio	1.222	1.162	
<b>Duration of Low back pain (In weeks)</b>			
Average (Mean±SD)	108.36±178.51	143.54±265.26	0.327 <sup>b</sup>
<b>Site of Lumbar disc herniation(SOLDH)</b>			
L4/L5	37	33	0.524 <sup>c</sup>
L5/S1	43	47	
<b>Site of pain (SOP)</b>			
Lumbar	47	65	0.002 <sup>d</sup>
Both Leg	4	0	
Right Leg	7	3	

Left Leg	8	0
Lumbar+Both Leg	6	8
Lumbar+Right Leg	4	3
Lumbar+Left Leg	4	1

**Table 1** Demographic data

a = t-test

b = t-test

c = Chi-square test

d = Fisher's Exact test

**Technical Note:**

**In Percutaneous transforaminal endoscopic discectomy (PTED)**

These both surgical techniques were done according to the modern day's standard method as suggested in previous literatures [8, 15-18]. In PTED group all the procedures were performed under local anesthesia in prone position on a radiolucent surgical table after well padding the patients to decrease the abdominal pressure and stability under hospital's usual sterile fashion. Careful documentation of the admitting lumbar site was taken and the cannula insertion point was determined before surgery from the CT and MRI. The entry point of the needle was about 10 to 13 cm from the midline. After infiltration of the local anesthesia (1% lidocaine), an 18 gauge spinal needle was advanced at the target point under the guidance of a fluoroscope image. The target point was mid-pedicular line on anteroposterior image and the posterior vertebral line on the lateral image. After conforming the right position of the spinal needle into the disc, the degenerated herniated mass was stained with indigocarmine for intraoperative identification. A guide wire was introduced into the herniated mass and the needle was removed. After touching the annulus a tapered cannulated obturator was inserted into the disc by hammering, a set of dilators were inserted along the obturator by inserting and removing one after another and then a working cannula with a beveled opening was inserted (Joimax system). The stained disc material was removed using small forceps and a radiofrequency probe. Occasionally appearing bleeding sites were stopped by bipolar cauterization. After targeted fragmentectomy the complete device was removed and a single suture was given at the wound site and sterile

dressings were done. A working cannula of 2.8 mm was used without a laser and an endoscopic drill.

**In Microendoscopic discectomy (MED, METRx-MD system)**

In this group, the procedure was performed under general anesthesia or spinal anesthesia on a radiolucent table in prone position after securing the pressure points by leaving the abdomen free from pressure to reduce intraoperative venous bleeding as in PTED. After preparing and draping the site for operative procedure according to the hospital's usual sterile fashion a longitudinal skin incision of 16 to 20 mm was given just lateral to the midline approximately 1.5 to 2 cm at the level of the appropriate disc space. Then a guide wire was inserted under intermittent lateral fluoroscopy to the inferior edge of the superior lamina. After positioning the guide wire on the inferior edge of the superior lamina sequential dilators were inserted one over another under fluoroscopy control till the tubular retractor (16mm) was passed over the largest dilator and the dilators were removed, then the retractor was connected to the flexible arm. All the working instruments were inserted according to the METRx-MD system. A pituitary rongeur was used to remove the soft tissues overlying the lamina and interlaminar space, a Kerrison punch was used to perform appropriate laminotomy at the laminar edge and an electrocautery was used for haemostasis along with a high speed drill was used to remove the bone rapidly. After opening the yellow ligament with a curved curette and resecting with Kerrison punch in a standard fashion, the ligamentum flavum was removed, the dura and transversing nerve root were identified and secured properly. A bipolar cautery and micro-scissors were used to resect the veins after cauterization. The herniated disc was removed with a pituitary rongeur

and discectomy was done. After decompression, the intervertebral space was irrigated with saline solution with high pressure in order to swill out the remaining fragments and the tubular retractors were removed, the wound site was also irrigated thoroughly to clean out the bone chips, blood clots, cotton fibers and gauze swabs etc. A suction drainage was placed in situ. The fascia, subcutaneous tissues and skin were reapproximated with one or two sutures.

### Clinical evaluation

Clinical evaluation was done by the surgeons of our department for 1 year follow-ups and self-evaluation questionnaires such as the ODI, SF-36, MacNab criteria and VAS were used as the indices to point out the clinical outcomes before and after the surgeries. Along this we also included the indices like average expenses, recurrence rate, complication, duration of hospital stay, operative time and duration of pain to evaluate the outcomes in both groups. While calculating the average expenses we have included the expenses for diagnosis, surgery, medication and the treatment during the hospitalization. Patients who were unable to come to the hospital for follow-ups were reviewed by telephone calls and were interviewed according to the questionnaires.

### Statistical analysis

The statistical analysis was performed by using SPSS software version 20. A paired sample t-test and a Wilcoxon signed rank test were used to compare the differences between the pre and post-operative indices of the two groups. T-test, Chi-square test and Fisher's exact test were used to compare the indices of disc herniation, referred pain and parts involved. A P-value of less than 0.05 was considered as statistically significant.

## Results

### Baseline characteristics:

Data were collected from our hospital's digital recording system from January to December, 2014. 245 patients were selected for the study purpose (125 patients in PTED group and 120 patients in MED group), out of which 40 patients were out of contact due to some reason and some have changed their address and

phone number, 30 patients have herniation at multiple level (L1/2=3, L2/3=7, L1/2/3=5, L4/5/S1=9, L3/4/5=5, L2/3/4/5=1), 2 patients were less than of age 18 and 1 patient was 84 years old, 2 patients have cauda equine syndrome with muscle dystrophy and remaining 10 patients have past history of spinal surgery or infection at some level of spine and some patients came for revision surgery (out of 10 patients 1 patient was deceased), so 80 patients were included in each group. These patients were follow-upped at least 10-12 months post-operatively. While conducting this study 1 patient was of age 84 and two patients were of age 14 years old with good outcome but were not included in the study according to the inclusion and exclusion criteria discussed above.

In PTED Group there were 44 male and 36 female with mean age of 39.81 ranging from 18-73 years old. Their mean duration of radiculopathy was 108.36 weeks and almost every patient have experienced back pain pre-operatively, some have experienced motor deficit and sensory deficit. Preoperatively none of the patients have bowel and reflex deficit. 37 patients have disc herniation at L4/L5 level and 43 patients have at L5/S1 level, 47 patients have experienced pain at lumbar region, 4 in both leg, 7 in right leg, 8 in left leg, 6 in lumbar and both leg, 4 in lumbar and right leg, 4 in lumbar and left leg. Were as in MED Group there were 43 male and 37 female, their mean age was 43.21 ranging from 18 to 80 years old. Their mean duration of radiculopathy was 143.54 weeks and every patients have experienced back pain pre-operatively, none of the patients have pre-operative bowel and reflex deficit too but some have motor and sensory deficit. In this group 33 patients have disc herniation at L4/L5 level and 47 patients have disc herniation at L5/S1 level. 65 patients have pain in lumbar region, 3 have in right leg, 8 have in both leg and lumbar region, 4 patients have pain in lumbar and right leg and 4 have lumbar and left leg pain, 0 patients have pain in both leg and left leg (table 1.). Here in this study we have only mentioned about pain at lumbar region and legs which means referring pain and some sensory deficits in that leg or region. It was very difficult to explain each and every referring pain and sensory loss at a particular region of back and legs so we have collectively mentioned it as pain at lumbar, legs or both legs for ease.

**Clinical outcomes:**

In PTED Group, with regard to back pain, the average pain discomfort scores that was measured on a VAS pre-operatively was  $2.96 \pm 1.084$  and post-operatively follow-ups visit was  $0.33 \pm 0.591$ . The ODI scores recorded during the same intervals was  $45.75 \pm 11.387$ . The mean improvements in the VAS scores for back pain and leg pain was 2.63, and the mean decreased ODI was 40.9. All these figures were statistically significant ( $p < 0.05$ ). The SF-36 physical healthy component (PCS) scores at the same intervals after treatment was  $56.31 \pm 6.14$  and the SF-36 mental health component (MCS) scores during the same intervals was  $61.88 \pm 4.84$ . The result of Macnab Criteria was also better. All these figures were statistically significant ( $p < 0.05$ ) (Table 3, 4, 5). In MED Group, with regard to back pain, the average pain discomfort scores that was measured on a VAS pre-operatively was  $2.96 \pm 1.084$  and post-operatively follow-up visit was  $0.33 \pm 0.591$ . The ODI scores recorded during the same intervals was  $45.75 \pm 11.387$ . The mean improvements in the VAS scores for back pain and leg pain was 2.71, and the mean decreased ODI was 34.3. All these figures were statistically significant ( $p < 0.05$ ). The SF-36 physical healthy component (PCS) scores at the same intervals after treatment was  $56.3125 \pm 6.146$  and the SF-36 mental health component (MCS) scores during the same

intervals was  $61.88625 \pm 4.84$ . The result of MacNab Criteria was also better in MED Group (Table 6). All these figures were statistically significant ( $p < 0.05$ ) (Table 3, 4, 5). Both groups had negligible blood loss that had no significant clinical influence so the blood loss data are not mentioned in this study but according to the other papers which have been published from our hospital shows that on average there is about 20 ml of blood loss in MED technique and extremely less blood loss in PTED technique, and it is very difficult to estimate as there is no direct measurement. The mean operative times was 90.1250 (average  $90.12 \pm 28.78$ ) minutes in PTED and 47.1750 (average  $47.17 \pm 14.79$ ) minutes in MED Group, which is significantly shorter in MED than in PTED. The mean hospital stay is significantly shorter in PTED Group ( $7.40 \pm 2.62$  days) than in MED Group ( $9.15 \pm 2.76$  days) ( $p < 0.00$ ) (Table 2). Only one patient in PTED group have superficial skin infection which was controlled by conservative medication and there was not any recurrence lumbar disc herniation or disc infection at the same level (Table 2) till date. There was no dural tear or leakage of cerebral fluid neither irritation of other nerve root during the operation, this might be possibly due to the experience of the surgeon, who have more than 15 years of experience in MED and 4-5 years of experience in PTED technique.

**Table 2.** Main complications and average operative time and hospital stay in both group.

Indices	PTED GROUP(80)	MED GROUP(80)	P- VALUE
Average Ot time (Mean±SD)	90.12±28.78	47.17±14.79	0.000 <sup>a</sup>
Average hospital stay(Mean±SD)	7.40±2.62	9.15±2.76	0.000 <sup>b</sup>
Average Expenses	16555.58±2617.30	10498.28±3146.07	0.643 <sup>c</sup>
Complications:			
Superficial infection	1	0	
Temporary N. root injury	0	0	
Recurrent disc relapse	0	0	
Discitis	0	0	
Others (bowel )	0	0	

a, b, c = Independent sample t-test.

**Table – 3** VAS scores of patients in the TED and MED groups

Group	VAS score				Average score
	0-2	3-5	6-8	>8	
TED					

Before treatment	23	54	3	0	2.96±1.084
After treatment	80	0	0	0	0.33±0.591
MED					
Before treatment	27	52	1	0	3.02±1.006
After treatment	80	0	0	0	0.31±0.565

Rank sum test: Before treatment: Z=-0.272, p=0.78. After treatment: Z=-0.047, p=0.963  
Wilcoxon Signed Ranks Test: PTED: Z=-7.850, 0.000 (Before treatment VS After treatment)  
MED: Z=-7.928, 0.000 (Before treatment VS After treatment)

**Table – 4SF-36 score**

	PTED	MED	t	P-VALUE
PF	94.8125±6.53	92.62875±10.59	1.569	.119
RP	97.5±10.967	93.39875±17.32	1.789	.076
BP	94.1±12.11	90.7125±13.18	1.693	.092
GH	97.1625±5.88	95.04125±9.77	1.664	.098
VT	95.1875±7.61	92.625±12.90	1.530	.128
SF	97.5±6.72	92.3475±12.49	3.251	.001
RE	98.75125±6.37	90.48625±23.17	3.076	.003
MH	98±5.09	97.2±5.95	.914	.362
PCS	56.31125±6.146	54.99875±4.06	1.596	.113
MCS	61.88625±4.84	60.0075±4.17	2.631	.009

Average = Mean±SD

**Table –5 ODI scores of patients in the MED and PTED groups**

Group	ODI score					Average score
	0-20	21-40	41-60	61-80	81-100	
TED						
Before treatment	0	30	42	8	0	45.75±11.387
After treatment	75	5	0	0	0	4.85±8.112
MED						
Before treatment	0	51	28	1	0	39.40±7.907
After treatment	78	2	0	0	0	5.10±6.513

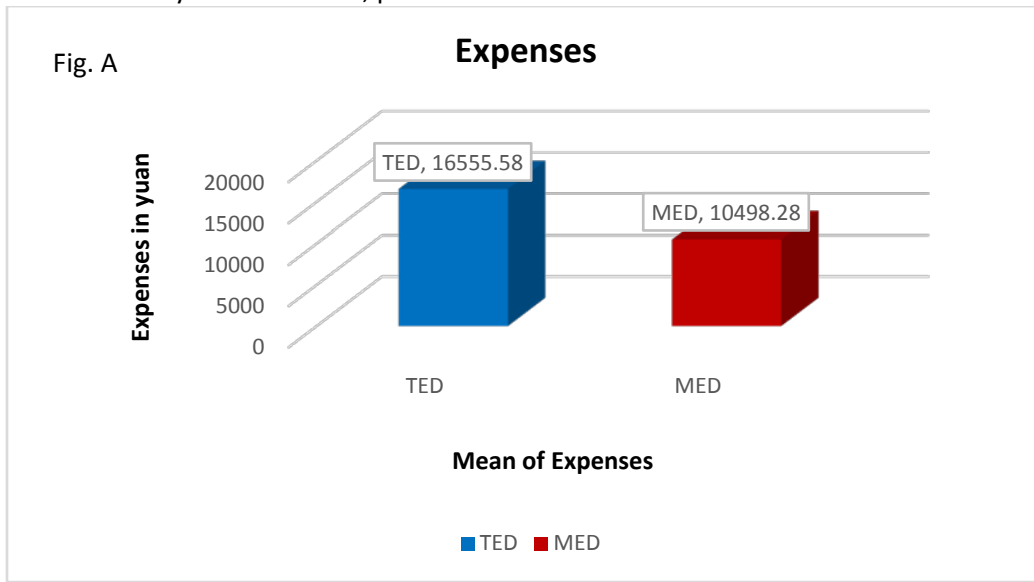
Rank sum test: Before treatment: Z=-3.593, p=0.000. After treatment: Z=-0.456, p=0.648  
Wilcoxon Signed Ranks Test: TED: Z=-7.776, 0.000 (Before treatment VS After treatment)  
MED: Z=-7.795, 0.000 (Before treatment VS After treatment)

**Table – 6Macnab Scores of patients in the TED and MED groups**

Group	Excellent	Good	Fair	Poor	Total
TED	29(36.25)	38(47.5)	8(10)	5(6.25)	80

MED	34(42.5)	26(32.5)	18(22.5)	2(2.5)	80
Total	63	64	26	7	160

Mann-Whitney Test:  $Z=-1.836$ ,  $p=0.066$



**Expenses:** Currency in Yuan (Mean is used to plot the graph)

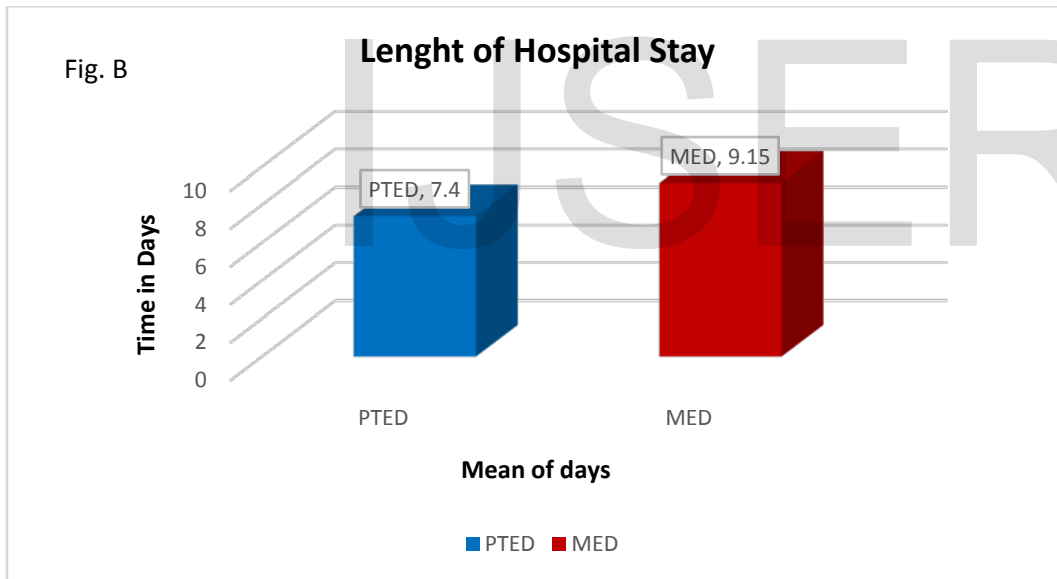




Fig. C **Operation Time**

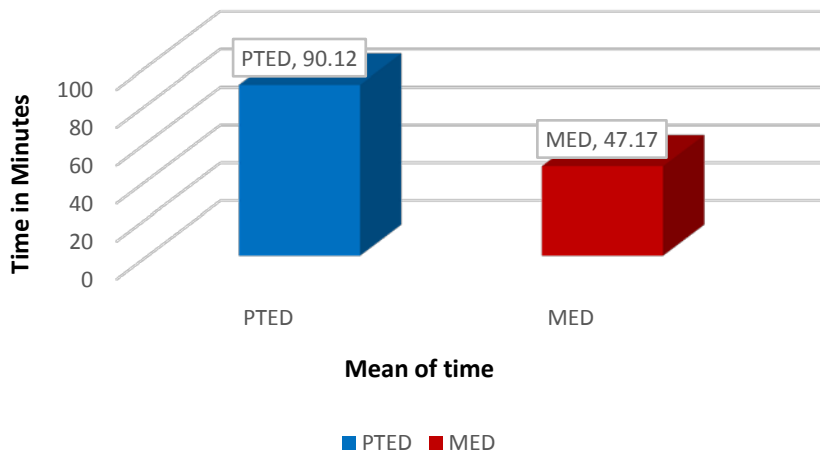
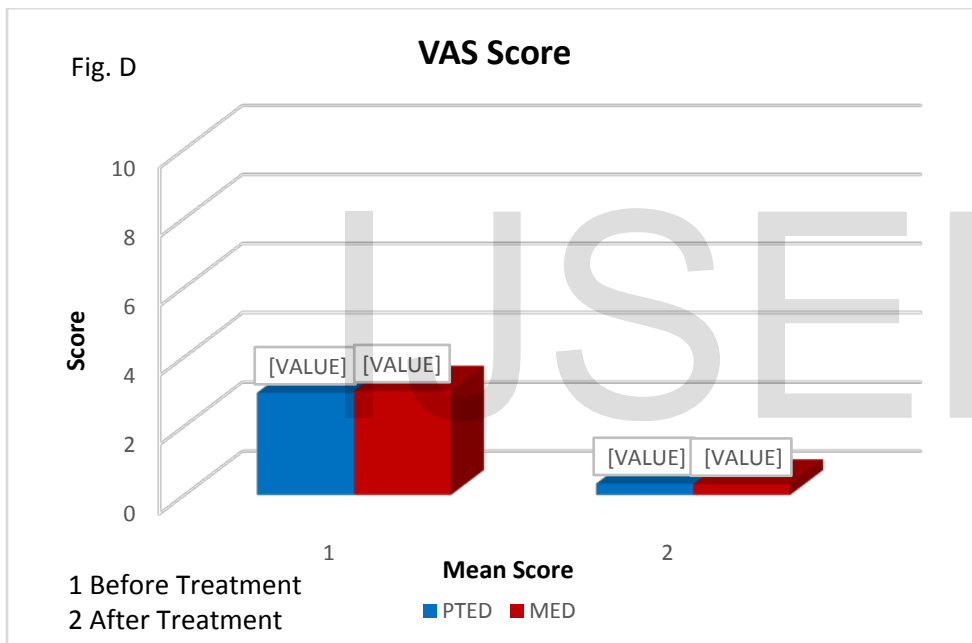
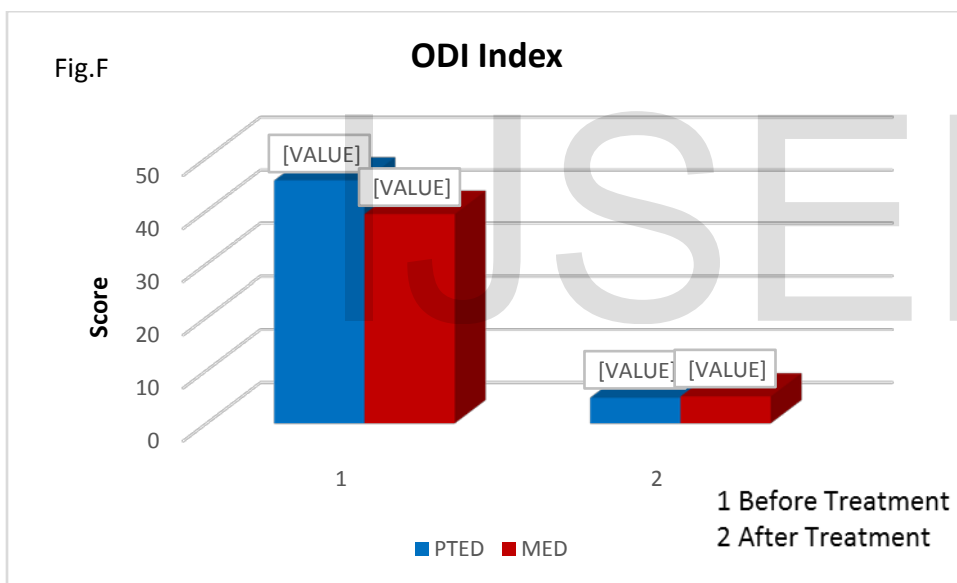
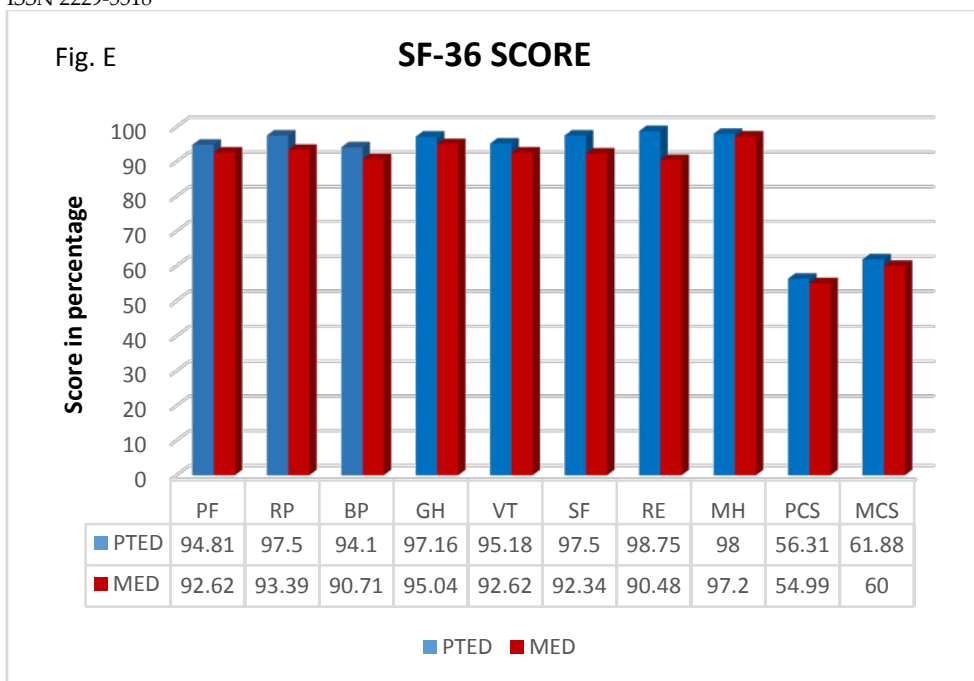


Fig. D **VAS Score**





**Discussion:**

Lumbar disc herniation is a major reason for lower back pain and hospital visit, which is due to age related degeneration of annulus fibrosus, straining, trauma, lifting injuries and other causes of back muscle injuries. Every people in this world experience atleast one episode of back pain, and spine is the major source of pain and disability [19, 20]. Before the introduction of Micro-endoscope, conventional method of microdiscectomy was the gold standard of treating herniated lumbar intervertebral disc. But the

disadvantage of open surgery include extensive retraction and dissection of paraspinal muscles, a longer operative time, larger wounds, bone resection and longer hospital stay with many complications [21, 22]. After the introduction of micro endoscope with tubular retractor system surgeons can perform discectomy easily with minimally invasive surgical approach and good clinical outcomes have been shown by many previous studies[23, 24] moreover with PTED system surgeon have performed surgeries by preserving more paraspinal structures during surgeries and reduced postoperative pain that usually makes early discharge

from hospital, and it can be performed under local anesthesia.

In Percutaneous transforaminal endoscopic discectomy (PTED) technique, damaging of the stabilizing structures of the spine were significantly reduced, moreover, the ligamentum flavum did not have to be opened which results in less trauma to the muscles and less epidural scar formation which is good for revision surgeries; where as in Microendoscopic discectomy (MED) technique it needs to be open so patients feel more pain postoperatively [25, 26]. The more the structures were preserved more the postoperative pain due to surgery was reduced and more the patients were able to mobilize earlier but the neurological deficits were not predicted on the basis of this results. In this study we found that PTED Group was better than of MED Group in post-operative, earlier mobilization, hospital stay and earlier to work.

In this study all the patients in MED Group underwent surgery after the induction of general anesthesia and in PTED Group underwent surgery after introduction of local anesthesia, whereas a local anesthesia and spinal anesthesia also can be used for MED Group [16, 27, 28]. PTED performed under general anesthesia have more advantages than performed under local anesthesia such as there is no intra-operative pain and patient discomfort during the procedure [29, 30], which makes the performance of the procedure safer but does not allow to know the patient's condition if accidentally some nerve are touched.

In several studies it had shown that Patients with shorter symptom durations (<6 months) have a better outcome than the longer durations which indicates that a recent soft disc herniation is easier to remove than the disc herniation of longer duration by using an endoscope. Many studies have proven the safety and effectiveness of both MED and PTED, but there are only few studies of long-term follow-ups for these two procedures [25, 31-34]. In this study we have used several survey questionnaire to find out the impact of these two methods on the patient's quality of life and various outcomes before and after the surgery. ODI is used as one of the specific outcome measures which is used to rule out and also for the management of spinal disorders, now it has become the gold standard outcome criterion for the back pain (lumbar back

pain). We found that these two methods have almost similar impact and outcomes in various indices of different survey questionnaires. We also found that SF-36 [24, 35] questionnaire regarding physical and mental component along with other component were almost similar (graph. E) in both PTED Group and MED Group. Furthermore we also found similar improvement in other surveys such as Visual Analog Score (VAS) (graph. D), Oswestry Disability Index (ODI) score (graph. F) and modified MacNab score [36-38] Table 6. In these survey questionnaires' both the procedures (PTED and MED) were found better for pain and symptom cure, but according to the patient's benefit; PTED is better than the MED technique of surgery. Regarding post-operative pain and hospital stay we found that PTED Group have a better outcome than the MED Group, as the average hospital stay in PTED Group was  $7.40 \pm 2.62$  and the average hospital stay in MED Group was  $9.15 \pm 2.76$ . While conducting this study we have not included the patients with cauda equina syndrome and for ease we have divided the pain syndrome in different categories shown in table no. 1 where referring pain and numbness is mentioned as back pain + leg pain (Rt or Lt). The mean expenses in PTED group was 16555.58 (average  $16555.58 \pm 2617.30$ ) and in MED Group was 10498.28 (average  $10498.28 \pm 3146.07$ ) (fig. A & B). We also found that the operation time was less in MED group  $47.17$  (average  $47.17 \pm 14.79$ ) and  $90.12$  ( $90.12 \pm 28.78$ ) in PTED group (figure C). The hospital stay time is longer in our study regarding to other studies because the patients in our hospital wish to discharge only when they feel totally free of pain and are able to do their daily work by their own. In our study we also found that the PTED technique of surgery is more expensive than the MED technique than other studies done in other part of the world because this technique of surgery costs more than MED technique according to the rule of our hospital.

Although this study showed satisfactory clinical outcomes with PTED than the MED method of surgery but it has some limitations 1) in the process of selection of the two groups. However, in selected cases the outcomes of the PTED might be better than the MED. 2) the follow-up times were limited due to change of the patient's address, telephone number, duration of study and some patients with good results refused for follow-ups and further examination. 3) Number of patients are not enough to compare these two minimally invasive

surgeries which influence the factors such as degree of disc herniation, position of herniated disc material etc.

## Conclusion

There are several procedures of treating Lumbar disc herniation but in present day the most effective treatment method for LDH are PTED and MED. Both methods are minimally invasive surgeries and have better outcomes than other procedures in terms of blood loss, pain relief, hospital stay, expenses, trauma to muscle, nerve irritation and also cosmetically. Our study have shown that PTED is more beneficial to patients than MED regarding hospital stay, post-operative symptoms, daily life and pain relief. It shows that PTED is as effective as MED and can be considered as an alternative treatment modality for lumbar disc herniation to MED surgical procedure.

## Acknowledgements

The author express his gratitude to his professor Dr. Wu Xiao Tao, Caifeng, Arjun Sinkemani, Zhou Jie and all other surgeons of his department for their assistance, and this study was supported by unrestricted funds from his professor.

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