

“A COMPARATIVE STUDY OF FUNCTIONAL OUTCOME OF CONVENTIONAL DISCECTOMY WITH PERCUTANEOUS ENDOSCOPIC DISCECTOMY”



Orthopaedic

KEYWORDS: Humerus fractures, Intramedullary nailing, Plating.

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ABSTRACT

INTRODUCTION: DISC prolapse is a common problem seen in general population and 10% patients may require surgical intervention.

OBJECTIVE: To determine functional outcome of patients operated by Conventional Discectomy with endoscopic discectomy.

METHODOLOGY

Study Area: Bharati Hospital

Sample Size: 40 (20 - Conventional discectomy, 20 - endoscopic discectomy)

Scores used: VAS and Oswestry Disability Index

RESULTS : Patients operated for Disc Herniations by conventional or percutaneous discectomy were followed up 1 month 3 months and 6 months postoperatively showing similar results in terms of pain relief

However patients operated by conventional discectomy had more post operative pain a larger incision size and more blood loss in comparison to those operated by percutaneous discectomy.

Patients operated by conventional discectomy had to go through General Anesthesia while those operated by endoscopic discectomy could be given Local Anesthesia

CONCLUSION : Endoscopic discectomy is a newer technique which is practised now a days for PIVD and it shows better results than conventional discectomy in terms of post op pain the amount of blood loss, post op ambulation and anesthesia given.

However the pain relief at followup is almost the same for both surgical techniques.

Introduction

DISC prolapse is a common problem seen in 1 in 10,000 in general population and 10% patients may require surgical intervention. Lumbar disc herniation accounts for only 5% of all low back pain problems but is the most common cause of radiating nerve root pain (sciatica). The natural history of disc herniation indicates that they may decrease in size or even disappear within a few weeks or months of onset. In migrated or extruded herniations, phagocytosis of the herniated disc by the macrophages occurs, while, in contained herniations, dehydration of the herniated nucleus pulposus plays a major role in the reduction of the herniated disc size. Various types of procedures ranging from large Laminectomy to Percutaneous Discectomy under Local Anaesthesia are being practiced. Lumbar discectomy is the most common surgical procedure for lumbar related symptoms.

AIM:

To determine functional outcome of patients operated by conventional discectomy versus percutaneous endoscopic discectomy

OBJECTIVES:

- To study the outcome of patients operated by conventional discectomy
- To study the outcome of patients operated by percutaneous endoscopic discectomy
- To correlate post operative findings and functional outcome of patients operated by conventional discectomy and percutaneous endoscopic discectomy

MATERIAL AND METHODS

Study Population:

Forty patients with low back pain with or without radiculopathy or neurodeficit were evaluated in the study. All the patients had disc prolapse on MRI and had received atleast 6 weeks of conservative treatment in the form of bed rest, analgesics and muscle relaxants.

Study Area:

Bharati Hospital and research Centre Pune.

Study Type:

Prospective, Comparative

Sample Size:

20 Patients operated by conventional discectomy and 20 patients operated by percutaneous endoscopic discectomy.

Inclusion Criteria:

- Patients having low back pain and unresponsive to conservative management for 6 weeks
- Patients having intervertebral disc bulges or disc herniations at a single or multiple levels
- Patients having radiculopathy/nerve root compression, claudication and neurological deficits due to disc bulges or herniations at a single or multiple levels
- Patients having unilateral leg pain/radiculopathy will be included as candidates for endoscopic discectomy

Exclusion Criteria:

- Patients with infective pathology
- Patients who require instrumentation / with instability
- Vertebral fractures
- Radiological evidence of Facet Joint Arthritis

EQUIPMENT AND SUPPLIES

Open Discectomy:

- C – Arm Fluoroscope
- General Surgical Instruments
- Cobb and Nibblers
- Kerrison Rongeurs
- Dura Retractors
- Disc Removing Forceps

7. Suture Material

Percutaneous Endoscopic Discectomy:

1. C – Arm Fluoroscope
2. Long Spinal Needle
3. Endoscopic spinal surgery system
4. Camera
5. Light source
6. Endoscopic Disc Removing Forceps
7. Xylocaine 2% Solution
8. Contrast Agent
9. Suture Material

PROCEDURE DESCRIPTION:

Open Discectomy:

Anesthesia given – General Anesthesia

Patient positioning – Prone on a radiolucent table with C – Arm Fluoroscope

Anteroposterior views are obtained to get a clear view of spinous processes, disc spaces at the level determined.

Midline incision is taken centered over the desired level and dissection is carried out till spinous processes are exposed.

Interspinous ligament is cut and dissection is carried out till the laminae are exposed.

Laminectomy is performed carefully using Kerrisons rongeurs at the desired level.

Ligamentum flavum is carefully removed exposing the thecal sac.

Thecal sac and nerve roots are identified and decompressed thoroughly if required.

Nerve roots are then retracted using dura retractors and disc space is approached.

Small incision is made over the annulus fibrosus of the disc and herniated disc material is removed using disc removing forceps.

Thorough wash in the disc space is given. Wash is given over the operative site, suturing is done in layers and aseptic dressing is applied.

Percutaneous endoscopic Discectomy:

Patient positioning: Prone on a radiolucent table with C – Arm Fluoroscope

Level of the disc space is marked using the C – Arm Fluoroscope in both Anteroposterior and Lateral Views.

The entry point is infiltrated with local anesthetic and an 18 gauge spinal needle is inserted in the anteromedial direction at an angle of 30 degrees with the horizontal aiming for the anatomical disc center through the triangle of safety.

The three sides of the triangle are formed by the line with the outer margin of intervertebral foramen another line tangential to the pedicle and the hypotenuse coincident with the upper margin of the spinal nerve.

A guide wire is passed through the 18 gauge needle into the annulus and radiopaque dye is inserted and needle is removed

Serial dilators are passed over the guide wire and is engaged into the annulus and guide wire removed.

Annulus is then fenestrated using a malate and obturator is further advanced

Working channel is then slid over the obturator confirmed in C – Arm and dilator is removed. Endoscope is then introduced in the working channel and disc is approached and herniated disc is removed using a disc removing forceps.

After the disc is removed endoscope is removed and suturing is done

Aseptic dressing is then applied.

OBSERVATIONS

Age and Sex Distribution:

A total of forty patients were taken in the study out of which twenty were operated by Endoscopic Discectomy and twenty were operated by Open Discectomy Technique. Amongst these 40 patients, 21 were males and 19 were females

The sex ratio in the study was almost the same for both sexes Patients according to their age groups were divided in to groups ranging from 10-20 years to 60 – 70 years.

There were a total of 3 patients in the age group of 10 to 20 years. A total of 7 patients in age group of 20 – 30 years, 10 patients were present in both 30 to 40 years and 40 to 50 years of age group and age groups 50 – 60 and 60 – 70 years had 6 and 4 patients respectively.

This shows us the predominance of disc herniations in age group of 30 to 40 and 40 to 50 years.

Type of Anesthesia:

Both local anesthesia and General anesthesia were used in the study. Patients operated by open discectomy method were given general anesthesia as a rule. However patients operated by the endoscopic discectomy technique were operated using both local and general anesthesia.

The type of anesthesia given for the patients undergoing endoscopic discectomy were dependent on the amount of pain the patient would be able to tolerate and also on the personal choice of the patient.

In a total of 40 patients, 22 patients were operated under general anesthesia and 18 patients were operated under local anesthesia.

In the Endoscopic discectomy group of patients there were 2 patients who were not willing to undergo surgery under local anesthesia and so were given general anesthesia.

ENDOSCOPIC DISCECTOMY:

The minimum blood loss was 4 ml and maximum blood loss was 20 ml. The average blood loss for patients operated by endoscopic discectomy was 8.75 ml with a standard deviation of 4.56 and median of 8.

Size of Incision:

The incision size for patients operated by Endoscopic discectomy was only about 1 cm and those for patients operated by Open Discectomy was ranging from 3 cms to 6 cms depending upon the level of disc bulge and exposure needed for the surgery.

Post operative pain:

Patients operated by endoscopic discectomy technique had almost no post operative pain while those operated by open discectomy had a considerable amount of post operative pain ranging from 3 to 7 days after surgery.

It was also observed that patients operated by endoscopic discectomy could be discharged the same day while those operated

by open discectomy technique required 10 to 12 days of admission.

Post Operative Complications and Wound Infection:

Forty patients having disc herniations were operated using open discectomy and endoscopic discectomy techniques

Out of these there were 3 patients who had post operative complications or wound infections.

One of the patient being operated by endoscopic discectomy under general anesthesia was suspected to have a nerve root damage and had to be switched over to open discectomy for nerve root exploration.

This patient ultimately developed a foot drop.

Two other patients developed complications after being operated by open discectomy one of which developed discitis and the other wound infection.

DISCUSSION

The aim of this study is to compare two broad surgical modalities of treatment of disc herniation. The study was carried out over a period of 2 and a half years in the subjects after thorough evaluation of their clinical signs and symptoms, clinical examinations and investigations (radiological, hematological and biochemical).

In the general population, incidence of disc herniations and radiculopathy appears to be equally distributed between men and women. Workers exposed to heavy work, especially twisting and lifting, have a higher incidence of disc prolapse. Females though being more vulnerable to these abnormal forces, still account for a lesser number, as major work force is still dominated by the male population.

Hard labor and heavy work is an important predictor of recurrent LDH. Manual labor, including repetitive lifting or vibration, has been previously shown to be predictors of recurrent LDH [1]

Heavy work was significantly higher in patients with recurrent herniation in one study [2] and predicted its occurrence. However, in the study of Meredith and coworkers (2010) being a manual laborer was not significantly associated with recurrent LDH.

The male to female ratio in the study was 1:1 which shows no significant predominance related to the sex of the patients.

The age group of the patients were divided into six groups ranging from 10 to 20 years of age to 60 to 70 years of age. It was seen that disc herniations were most common in age groups between 30 to 40 and 40 to 50 years of age.

Age and sex differences are demonstrated as risk factors of LDH [3][4]

Young age and male gender are defined as risk factors for LDH recurrence (Suk et al, 2001; Cinotti 1999). However, some other studies reported that sex and age were not associated with higher rates of recurrence (Suk et al, 2001; Cinotti 1998). In the studies considering open discectomy or microdiscectomy, age and gender were not significantly different between recurrence (rLDH) and non-recurrent LDH groups (Meredith, 2010; Moliterno, 2010).

It is at this age at which the disc is on its way to degeneration through a decrease in its water content. Under the age of 30 the resilience of the disc protects it from herniation, but over the age of 50 years the disc develops some degree of inherent stability through fibrous changes that occur with loss of turgor.

However there are so many exceptions to these epidemiological observations that they serve little more than general guidelines.

22 patients were operated under general anesthesia and 18 people were operated under local anesthesia. Patients operated by open discectomy technique were all operated under open discectomy where as 2 out of the 20 patients operated by endoscopic discectomy technique had to undergo general anesthesia and 18 were operated by local anesthesia.

The type of anesthesia used in endoscopic discectomy technique depended upon the choice of the patient. There are some patients who tend to get anxious when told to opt for local anesthesia and hence choose general anesthesia as an option.

Patients undergoing general anesthesia are more prone to complications of general anesthesia which is not so the case in local anesthesia which is why local anesthesia is a better option when there is a choice.

In endoscopic discectomy technique under local anesthesia another advantage is that when discectomy is done sometimes the patient gets immediate pain relief which can be confirmed if the patient is under local anesthesia. The leg movements and ankle plantarflexion and dorsi flexion can also be assessed if the patient is under local anesthesia.

Most studies report that performing this procedure under local anesthesia with constant intraoperative feedback from patients is important in reducing the risk of neural damage. (Krugluger et al, 2001; Kambin & Brager, 1987).

Patients operated by open discectomy technique had more blood loss compared to those operated by endoscopic discectomy.

A small study of 22 patients by **Huang et al, 2005** remarked on a significantly reduced operative stress in the MED group as evidenced by a significantly lower serum C-reactive protein postoperatively. In line with the other studies included in this review the MED group had a longer operative time but smaller incision size and less operative blood loss.

Garg et al, 2011: This RCT compared OD to MED for patients with sciatica unresponsive to at least 6 weeks conservative treatment. There were 112 patients and although no primary outcome measure was identified, the ODI was assessed. Despite significantly longer operative and anaesthetic times, the patients who received MED had a significantly shorter hospital stay and a smaller amount of intraoperative blood loss.

Incision size in patients operated by endoscopic discectomy was around 1 cm while those operated by open discectomy had a larger incision size. Also patients operated by endoscopic discectomy had less post operative pain as compared to open discectomy.

Minimally invasive surgery has attracted growing attention because of the reduction in postoperative pain, earlier mobilization and shorter recovery. It allows smaller incisions and less tissue trauma comparing to standard open microdiscectomy (*Sinkemani et al, 2015*)

Advocates of Minimally invasive discectomy highlight many of its potential benefits, including a smaller incision and less paraspinal muscle injury which may lead to reduced postoperative pain, a shorter hospital stay, and a faster recovery [5]

With microscopically assisted procedures, such as microscopically assisted percutaneous nucleotomy (MAPN), immediate postoperative pain relief was reported in 75% of cases [6]

Patients undergoing open or endoscopic discectomy were analysed for post operative pain relief on the basis of VAS score and Oswestry Disability index over a follow up of 1 month, 3 months and 6 months.

There are several studies which have been conducted taking into consideration these scores

As mentioned above a study by **Teli et al, 2010 and Huang et al, 2005** have taken into consideration these scores.

Righesso et al, 2007 conducted a study comparing open discectomy with minimally invasive discectomy taking into consideration VAS score.

RESULTS:

A total of forty patients operated by endoscopic discectomy and open conventional discectomy were evaluated on the basis of anesthesia given, the size of the incision, Blood loss during surgery, post operative complications and infections and for post operative pain relief over a period of 1 month, 3 months and 6 months respectively using VAS score and Oswestery Disability index

The results were as follows

- Patients operated by Endoscopic Discectomy had minimal amount of blood loss as compared to Open Discectomy
- Patients operated by Endoscopic Discectomy could be operated under local anesthesia which is not the case with Open Discectomy
- Endoscopic discectomy requires an incision as small as 1 cm while open discectomy technique requires a much bigger incision size.
- One patient operated by Endoscopic discectomy sustained a nerve root injury which led to foot drop
- Two patients operated by Open discectomy technique developed post operative infections one of which developed superficial surgical site infection and the other developed discitis.

Oswestery Disability Index

Mean and Standard deviations were calculated for the values of Oswestery Disability index taken pre operatively, at 1 month, 3 months and 6 months and the values were as under:

Table 1

	Surgery code	N	Mean	SD	P Value by sample t test
PREOP(ODI)	Open	20	27.80	3.62	0.39
	Endoscopic	20	26.85	3.28	
1 MONTH FOLLOWUP (ODI)	Open	20	19.70	5.26	0.152
	Endoscopic	20	17.30	5.12	
3 MONTHS FOLLOWUP (ODI)	Open	20	16.10	4.82	0.137
	Endoscopic	20	14.00	3.85	
6 MONTHS FOLLOWUP (ODI)	Open	20	14.45	5.05	0.424
	Endoscopic	20	13.30	3.85	

According to the above results the Mean Pre operative ODI for open Discectomy was 27.80 and that for Endoscopic discectomy was 26.85. The p- Value calculated by 2 independent sample t test was found to be 0.39 which is not significant.

The mean 1 month follow up Oswestery disability index were found to be 19.7 and 17.3 respectively for open discectomy and Endoscopic discectomy. P- value calculated by 2 independent sample t test was found to be 0.152 which is not significant.

The mean 3 month follow up Oswestery disability index were found to be 16.10 and 14.00 respectively for open discectomy and Endoscopic discectomy. P- value calculated by 2 independent sample t test was found to be 0.137 which is not significant.

Finally mean 6 month follow up ODI was found to be 14.45 for open discectomy and 13.30 for endoscopic discectomy and p – value was 0.424 which is not significant.

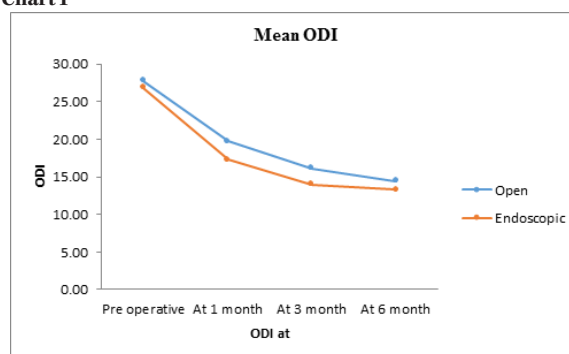
It was found that the Mean Oswestery index considerably dropped over 1 month, 3 months and 6 months when compared to the preop oswestery disability index which indicated pain relief and also that patients resumed their normal life activities after discectomy.

There was no significant difference found in the pain relief in patients operated by both these techniques and were found to be equally effective according to Oswestery Disability index.

Table 2

	Open	Endoscopic
Pre operative	27.80	26.85
At 1 month	19.70	17.30
At 3 month	16.10	14.00
At 6 month	14.45	13.30

Chart 1



Vas Score:

Minimum, Maximum and Median values for VAS score were calculated along with their p-values

Table 3

	Open			Endoscopic			p- value
	Min	Max	Median	Min	Max	Median	
Pre operative	5	8	7	5	8	7	0.779
At 1 month	3	8	5	4	8	6	0.108
At 3 month	2	7	3	1	7	4	0.862
At 6 month	1	7	2	1	6	3	0.883

Minimum pre operative VAS score was 5, the maximum was 8 and the Median was 7 for open discectomy while for endoscopic discectomy the minimum VAS score was 5, the maximum was 8 and the median was 7. P-value calculated by Mann-Whitney U test was 0.779 which was not significant.

At one month the minimum score was 3, Maximum was 8 and median was 5 for open discectomy while for endoscopic discectomy minimum score was 4 maximum was 8 and median was 6. P-value was 0.108 which was not significant.

At three months the minimum score was 2 maximum was 7 and median was 3 for open discectomy while minimum score was 1 maximum score was 7 and median was 4 for endoscopic discectomy. P-value was 0.862 which was not significant.

At six months follow up the minimum value was 1, maximum was 7 and median was 2 for endoscopic discectomy while minimum was 1, maximum was 6 and median as 3 for endoscopic discectomy. P-value was 0.883 which was not significant.

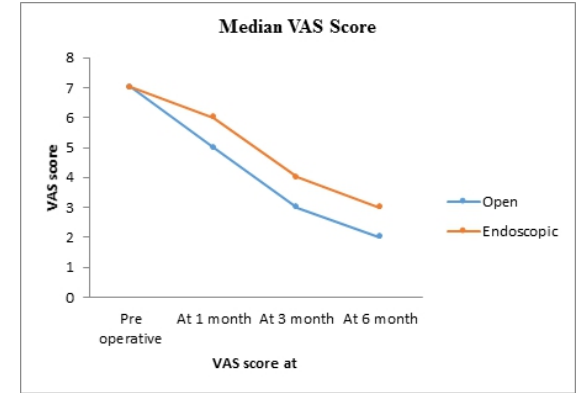
Median values of VAS score were compared at 1 month, 3 months and 6 months and there was no significant difference in the pain relief after patients were operated by both these surgeries. Pain relief was

almost the same.

Table 4

	Open	Endoscopic
Pre operative	7	7
At 1 month	5	6
At 3 month	3	4
At 6 month	2	3

Chart 2



CONCLUSION:

It was concluded from the above study that taking into consideration the VAS score and Oswestery Disability index both the surgeries give us almost the same result in terms of pain relief at 1 month, 3 months and 6 months.

However Endoscopic discectomy is a better technique taking into consideration the size of incision, lesser blood loss during surgery, can be performed under local anesthesia, duration of hospitalization is shorter and faster recovery to daily activities due to smaller incision size and postoperative pain and less chances of post operative wound infection.

For multiple level disc bulges with single or bilateral limbs radicular pain along with spinal canal stenosis the conventional open discectomy still remains the Gold Standard treatment option.

With advances in equipment and techniques, percutaneous endoscopic discectomy has a lot of scope in becoming an iconic surgical procedure for single level disc bulge with unilateral radicular pain over the Gold Standard Open Discectomy.

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