

# Surgical Outcomes of Lumbar Discectomy in Patients With and Without Degenerative Spinal Lesions

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## ABSTRACT

**OBJECTIVE:** To compare the outcomes of conventional open lumbar discectomy on lumbar prolapsed intervertebral disc in relation to the presence or absence of degenerative spinal lesions.

**STUDY DESIGN:** Observational descriptive study.

**PATIENTS & METHODS:** A total of 60 patients were included in the study having prolapsed intervertebral disc, divided into two groups. In group A, 30 patients having simple prolapsed intervertebral disc with radiculopathy with or without neurological deficit, while in group B 30 patients having prolapsed intervertebral disc and degenerative spinal lesion diagnosed on radiographs. MRI was main tool of investigation/diagnosis in both groups. Surgical procedure hemilaminectomy and discectomy was done at the involved interspace on the appropriate side.

**RESULTS:** In group A, 19 patients were male and 11 patients were female while in group B, 22 patients were male and 8 patients were female. Twenty-seven patients (90 %) in group A show good to excellent relief i.e. they are either completely pain free (23 patients) or had residual minor pain (4 patients), while 10 % of patients shows little or no improvement.

In group B, 76.6 % of patients shows good to excellent improvement i.e. they are either completely pain free (19 patients) or had residual minor pain (4 patients), while only 7 patients remained either same or shows little improvement ( $p = 0.29$ ).

**KEYWORDS:** Lumbar discectomy; Prolapsed disc; Degenerative spinal lesions; Hemilaminectomy; MRI.

## INTRODUCTION

Low back pain is one of the most common cause for seeking professional medical advice and most frequent cause of absence from work.<sup>1</sup> Degenerative disorders of the lumbar spine such as prolapsed intervertebral disc, spinal stenosis, ossification of posterior longitudinal ligament, ossification of ligamentum flavum, intraspinal synovial cyst, diffuse idiopathic skeletal hyperostosis, osteophytes are almost universal with increasing age.<sup>2</sup>

The intervertebral disc is responsible for the attachment of vertebral bodies to each other, providing flexibility, absorbing and distributing the load applied to the spinal column. Lumbar disc herniations are believed to result from annular degeneration that results into annular fissuring and tearing.<sup>3</sup> Tears often occur in the annulus and allow part of nucleus pulposus to be herniated through the annulus. The weakest part of the annulus is posterior lateral corner. A herniation here results nerve root being compressed in the lateral part of spinal canal. Disc protrusions, which are more central, can also occur. This can lead to compression of cauda equina. Progressive collapse of the disc space may allow additional movements. This put an extra strain on the apophyseal joints, in which sec-

ondary degenerative changes may lead to ligamentous hypertrophy. The bulging peripheral fibers of annulus may become calcified and even form osteophytes.<sup>2</sup>

The prolapsed intervertebral disc can result in localized or radicular signs and symptoms. The spectrum of disorders includes intermittent pain or sensory disturbance, muscular wasting or weakness and loss of bladder or bowel control. The common syndromes include sciatica, neurogenic claudication and cauda equine syndrome.<sup>4</sup>

Initially most patients are treated conservatively for 2-6 weeks. Conservative therapy consists of bed rest on a flat, firm mattress, analgesic and muscle relaxant. If conservative measures do not provide sufficient relief, if pain is intractable, if significant muscle weakness develops or if urinary hesitancy or retention occurs surgical treatment should be considered.<sup>5</sup> The standard surgical treatment of disc herniation consists of a partial hemilaminectomy and discectomy.<sup>6</sup> About 85-95 percent of patients treated for lumbar disc herniation by a partial hemilaminectomy and discectomy will have an excellent or good relief.<sup>7,8</sup> But the presence of serious degenerative spinal lesions such as ligamentum flavum thickness, vertebral body osteo-

phytes, facet joint hypertrophy or spondylolisthesis makes the outcome of discectomy less satisfactory.<sup>9</sup>

This study aims to identify the impacts of presence or absence of degenerative spinal lesions in association with the disc prolapse and whether their presence affects the outcome of surgery. Since very little work has been done in our setup so this study will significantly contribute to anticipate the possible success rates following surgery.

## **PATIENTS AND METHODS**

This study was conducted at Department of Neurosurgery, LUH Jamshoro for a period of 1 year from March 2007 to February 2008. In this observational descriptive study all 60 patients admitted for surgical intervention were divided into two groups. In group A, 30 patients having simple prolapsed intervertebral disc while in group B patients have prolapsed intervertebral disc and degenerative spinal lesions in the form of hypertrophied ligamentum flavum, ossification of posterior longitudinal ligament, osteophytes, facet joint, hypertrophy or spinal stenosis were included.

Patients having degenerative spinal lesions without prolapsed intervertebral disc, patients having prolapsed intervertebral disc with fractured vertebra, patients suffering from neoplastic disease, patients suffering from infections involving lumbar disc were excluded.

All enrolled patients underwent a complete clinical assessment on admission, including detailed history and examination with particular emphasis on neurological examination. The investigations that were performed in all patients were routine blood and urine investigations, chest x-rays as pre operative work up, plain radiology and MRI of lumbosacral spine.

The surgical procedure used for patients was a partial hemilaminectomy at the involved interspace on the appropriate side with removal of herniated disc material. Any protuberance from the facet joint causing root pressure or narrowing of the root canal was removed by medial facetectomy. Where hypertrophic ligamentum flavum found, it was removed. Large centrally placed discs were removed by a one or two level bilateral hemilaminectomy.

Post operatively patients were mobilized as soon as their pain is relieved usually on second post operative day. Data was recorded on preformed proforma. The study variables included gender, number of postoperative complication and improvement in symptoms (such as low backache, leg pain, muscle weakness, sensory deficit, and sphincter dysfunction) after a follow up period of six months.

MRC Scale for muscle strength grading

Grade	strength
0	no muscle contraction
1	flicker or trace of contraction
2	active movement with gravity eliminated
3	active movement against gravity
4	active movement against gravity and resistance
5	normal power

Sensory Deficit

0-25%: minimal sensory deficit

26-50%: moderate sensory deficit.

51-75%: severe sensory deficit

76-100%: complete loss of sensation

A senior doctor unaware about the assigned group was requested to help in evaluation of post operative improvement in the symptoms at fortnight intervals, for six months.

After completion of study, the data were entered and analyzed using SPSS version 10 for statistical analysis. Frequencies and percentages were calculated for categorical data and Chi square test was applied. P value of < 0.05 is considered significant.

## **Ethical Issues**

Individual enrolled in the study were informed prior to the treatment about the objectives of the study. They were briefed in about the chances of cure and possible side effects. They were given complete liberty to withdraw from the study without stating any reason. An informed consent was taken.

## **RESULTS**

Out of 60 patients males were 41 (68.3%) and females were 19 (31.6%). In the group A, 19 were males; 11 were females (M:F=1.7:1) whereas in group B, there were 22 males and 8 females (M:F=2.75:1). In group A patients' age ranged from 21 to 50 years with majority of patients in fourth decade. In group B patients' age ranged from 31 to 70 years with majority of patients in fifth decade.

The detailed account of patients' presentation is mentioned in **table I**.

In group A neurological deficit in the form of motor weakness was present in 25 patients and sensory deficit was present in 29 patients. Post operative improvement in motor weakness was seen in 22 (88%) patients, and sensory deficit improved in 24 (82.7%) patients as shown in table II. In group B neurological deficit in the form of motor weakness was present in 17 patients and a sensory deficit was present in 22 patients. Post operative improvement in motor weak-

ness was seen in 12 (70.5%) patients (p value 0.49) as shown in **table II**. The difference observed between two groups was statistically insignificant.

In group A sphincter involvement in the form of urinary retention was seen in one patient who improved after surgery and became catheter free by the end of one month. Similarly in group B sphincter involvement in the form of urinary retention was seen in one patient who regained bladder control after surgery.

The postoperative complications observed includes dural laceration in 4 (13.3%) patients of group B only, wound sepsis in 2 (6.6%) cases of group A and 3 (10%) cases of group B, and discitis in 1 (3.3%) case of both groups.

Subjective improvement of the symptoms in both the groups is judged by verbal rating scale. Verbal rating scale, which is less time consuming and easy to conduct in illiterate individuals, was used to depict the final outcome in patients of both groups is shown in **table III**. The difference observed between two groups was statistically insignificant (p value 0.29).

**TABLE I: BASELINE CHARACTERISTICS OF STUDY SUBJECTS**

Variables	Group A n=30	Group B n=30
<b>Age group</b>		
21-30 years	9 (30%)	0
31-40 years	20 (66.6%)	0
41-50 years	01 (3%)	15 (50%)
51-60 years	00	09 (30%)
61-70 years	00	06 (20%)
<b>Sex</b>		
Male	19 (63.3%)	22 (73.3%)
female	11 (36.6%)	08 (26.6%)
<b>Clinical features</b>		
Low backache	10 (33.3%)	30 (100%)
Leg pain	30 (100%)	30 (100%)
Restricted SLR	30 (100%)	25 (83.3%)
Sensory deficit	29 (96.6%)	22 (73.3%)
Motor weakness	25 (83.3%)	17 (56.6%)
Sphincter dysfunction	01 (3.3%)	01 (3.3%)

**TABLE II: MOTOR AND SENSORY DEFICIT**

Variable	Group A (n=30)		Group B (n=30)	
	Preoperative	Postoperative	Preoperative	Postoperative
<b>Motor Deficit</b>				
G0	0	0	0	0
G1	0	0	0	0
G2	0	0	0	0
G3	6 (20%)	2 (6.7%)	5 (16.7%)	3 (10%)
G4	19 (63.3%)	5 (16.7%)	12 (40%)	4 (13.3%)
G5	5 (16.7%)	23 (76.6%)	13 (43.3%)	23 (76.6%)
	25 (83.3%) had motor Weakness	22 (73.3%) improved	17 (56.7%) had motor weakness	12 (40%) improved
<b>No Sensory Deficit</b>	1 (3.3%)	12 (40%)	8	17 (56.7%)
1-25%	6 (20%)	10 (33.33%)	7 (23.3%)	5 (16.7%)
26-50%	19 (63.3%)	7 (23.3%)	9 (30%)	5 (16.7%)
51-75%	4 (13.3%)	1 (3.3%)	6 (20%)	3 (10%)
76-100%	29 (96.7%) had sensory deficit	24 (80%) improved	22 (73.3%) had sensory deficit	16 (53.3%) improved

**TABLE III: SUBJECTIVE IMPROVEMENT OF SYMPTOMS**

	Excellent or substantial improvement (VRS= 6-10)	Poor or no improvement (VRS=1-5)	Total
group A	27 (90%)	3 (10%)	30
Group B	23 (76.6%)	7 (23.3%)	30
Total	50	10	60

## DISCUSSION

Degeneration of the spine, particularly the moving section of spine i.e. lumbar region is the natural process of aging. Degeneration of spine may present in form of prolapsed intervertebral disc, ossification of posterior longitudinal ligament, ossification of ligamentum flavum, spinal stenosis, facet joint hypertrophy, osteophyte formation.

Disc herniation can result from general wear and tear, such as when performing job that require constant sitting. However herniations often results from jobs that require lifting. Lumbar disc herniation occur in the lower back most often between the fourth and fifth lumbar vertebral bodies or between fifth and sacrum.<sup>2,6,7</sup> The sciatic nerve is the most commonly affected nerve causing the symptoms of sciatica. Although the reasons are not entirely clear, the most likely explanation is that, stresses experienced by the spine are the greatest at these levels.

At least 80-90% of disc prolapse settled spontaneously and becomes relatively asymptomatic. Typically this process takes 6-8 weeks, but may take longer.

Surgery is offered only after physical therapies, rest and medications have failed to adequately relieve the pain, numbness and weakness over significant period of time. The standard surgical treatment of posterolateral disc herniation consists of a partial hemilaminectomy at the involved interspace on the appropriate side with removal of herniated disc material. Any protuberance from the facet joint causing root pressure or narrowing of the root canal is also removed. Large centrally placed discs may require a one or two level bilateral hemilaminectomy.<sup>6</sup> Recently herniated disc can be operated by minimal invasive methods such as micro discectomy or endoscopic discectomy.<sup>10, 11</sup>

In this study majority of the patients were males; this correlates with the other studies carried out on patients with prolapsed lumbar intervertebral disc.<sup>6,7,9,12</sup>

In this study 95% of the patients had disc herniation at L4-L5 and L5-S1 level, a finding correlated by Ali Akber et al<sup>2</sup> (86%), A Naylor<sup>7</sup> (94%), R K Jackson<sup>6</sup> (87%), Manzoor Ahmed et al<sup>9</sup> (92.4%) and Lal Rehman et al<sup>13</sup> (98%). Whereas Nancy E Epstein<sup>8</sup> reported 67% and L J O'hara et al<sup>12</sup> reported 55% patients had L4-L5, L5-S1 disc herniation. L3-L4 disc herniation is 5% in this study, A Naylor<sup>7</sup> and Lal Rehman et al<sup>13</sup> have reported same (6% and 4%) respectively. Whereas Nancy E Epstein<sup>8</sup> reported 37% and L J O'hara et al<sup>11</sup> reported 35% L3-L4 disc herniation.

In this study 78.3% patients had posterolateral disc herniation and 21.6% had central disc herniation; this correlates with Lal Rehman et al<sup>13</sup> who reported 76% posterolateral and 24% central disc herniation.

In this study 66.5% patients presented with low back-

ache. That is consistent with L J O'hara et al<sup>12</sup> who reported low backache in 65% patients. This is higher than reported by Ali Akber et al<sup>2</sup> (46.9%), R K Jackson<sup>6</sup> (46%), and S O'laoire et al<sup>14</sup> (37%). In this study the ratio of backache is higher than other studies due to the presence of degenerative spinal lesions in 50% of the patients under study.

In this study 100% of patients presented with radiating leg pain this is comparable with 100% of L J O'hara et al<sup>12</sup>, 94% of Lal Rehman et al<sup>13</sup>, 82.7% of S O'laoire et al<sup>14</sup> and 100% of J P Kostuik et al<sup>15</sup>. Whereas Ali Akber et al<sup>2</sup> reported 46.9% patients has leg pain in his study.

In this study 57 (95%) patients had positive SLR test, a clinical finding consistent with Nancy E Epstein<sup>8</sup>, M Kosteljanetz et al<sup>16</sup>, and Lal Rehman et al<sup>13</sup> who reported positive SLR test in 94%, 100%, and 94% patients respectively in their studies.

Eleven patients (18.33%) had facet joint hypertrophy a finding consistent with Nancy E Epstein<sup>8</sup> who reported facet joint hypertrophy in 17% of patients in his study.

Eight patients (13.3%) in this study had associated spondylolisthesis that is comparable with Nancy E Epstein<sup>8</sup> and L J O'hara et al<sup>12</sup> who reported spondylolisthesis in 14% and 20% patients in their studies.

Post operative wound infection seen in 8.3% patients in this study, whereas Ali Akber et al<sup>2</sup>, M Siddiq et al<sup>3</sup>, and R K Jackson<sup>6</sup> reported wound infection in 14%, 3% and 3% patients respectively. 3.3% patients in this study develop discitis that is comparable with M Siddiq et al<sup>3</sup>, M Arshad et al<sup>17</sup>, M Arshad et al<sup>18</sup> and S Pillaard<sup>19</sup> who reported 3%, 4%, 2.3%, and 3% respectively, but higher than Ford and Key<sup>20</sup> who reported discitis in only 0.27%. 6.6% patients sustained dural tear in this study that is consistent with M Siddiq et al<sup>3</sup> who reported 6.2% cases of dural tear in his study.

Over all improvement in this study was good to excellent in 90% of patients in group A, that is comparable with Ali Akber et al<sup>2</sup>, R K Jackson<sup>6</sup>, R Haqen et al<sup>21</sup>, and K Treven<sup>22</sup> who reported good to excellent results in 85.4%, 83%, 100%, and 89% respectively. In group B good to excellent results were obtained in 76.6% patients, which is consistent with Nancy E Epstein<sup>8</sup> who reported good to excellent results in 72% patients.

## CONCLUSION

The outcome of conventional open lumbar discectomy in lumbar prolapsed intervertebral disc in relation to the presence or absence of degenerative spinal lesions are statistically the same.

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