

# A Comprehensive Study of Outcome after Lumbar Discectomy for Lumbar Degenerative Spine Disease at 6 Months Post-Operative Period

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**Abstract:** *Study Design:* A perspective case control study.

*Introduction and background data:* The degenerative spine disease is a very common but complicated to treat and is prevalent in regions of Russia. The past decade has been witnessed with an increasing interest in evaluating the outcomes of medical care. Outcome research focuses on the meticulous measurement of symptoms, functional status, patient satisfaction with treatment, and health care costs associated with spinal treatment options. Whatsoever, no specific method exists that analyzes the effectiveness of the surgical procedures employed.

*Purpose of study:* To find out the early outcomes after lumbar discectomy for lumbar degenerative spine disease in the patients at 6 months post-operative period.

*Methods:* The study was performed on 75 patients (mean age of  $43.8 \pm 9.2$  years) who had undergone lumbar discectomy for lumbar degenerative spine disease in their pre and six months post-operative stages of treatment. The outcomes were measured using modified ODI, VAS ( for both leg pain and back pain).

*Results:* The questionnaire pertaining to severity of pain (VAS) and ODI was compared in the pre-operative and post-operative stages and was evaluated using paired 't test'. It was also noted that there was a significant change with reference to variables like pain severity in VAS and general well-being in ODI. It was also noted that 75% of the study population indicated that their pain was rapidly getting better in the post-operative stages; whereas only 2% of them indicated that their pain got worst even after the treatment.

*Conclusion:* From the findings it was evident that most of the patients indicated that they benefitted with the surgery for the spine disorders. The results will be useful and more accurate information could be provided to the patients. It also facilitates in the development of changes in the clinical practice of spine disorders.

**Keywords:** Lumbar discectomy , degenerative disc , lumbar degenerative spine disease (DSD), ODI-Oswestry Disability Index and VAS-Visual Analog Scale.

## INTRODUCTION AND BACKGROUND

From the experience of many years, the beneficial role of surgery in degenerative spine disease of the lumbar spine is a major point of discussion [1]. By making effective efforts the role of surgery for degenerative spine disease is understood. The promotion of realistic expectations and development of pre-screening tools to assist with patient selection procedure have prompted the search for risk factors [2]. The determinants of surgical outcomes have been identified by numerous studies over the last 10-15 years [1]. The findings of the results are either on the basis of some of the retrospective [3-5] or prospective researches [6,7]. Retrospective researches have formed the basis of a number of resulting events [4,5].

There have been reports that higher success rate (70-95%) has been achieved in case of surgical treatment of symptomatic lumbar disc herniation with degenerative spine disease, assessed through authenticate outcome scores and patient approval [8-10]. In addition, patients who have undergone surgical treatment are found to possess increased short term outcome instead of conservative treated patients [11]. The comparative results of patients treated with surgery and conservatively treated patients have revealed that surgical treatment is much better at short-term follow-up (up to 1 year) however no variations have been showed among treatments at long-term follow-up [12]. Still, it has been found that patients who had undergone surgical treatment had experienced fast pain relief, improvement of function and satisfaction in comparison to conservative patients [9,13]. In spite of major technical successes of the different operative procedures for various disorders it is established that some patients operated for spine disease are still left with poor results [14].

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Numerous outcome measures have been adopted and these measures range from limits which offer a numerical score to physical and psychosocial elements, for example, the low back outcome score [15]. The Oswestry Disability Index [16] was used for easy categorization of methods which includes good, fair and poor [2]. The “Visual Analog Scale” (VAS) used to measure the severity of pain is employed to visualize the suffering of the patient during patient’s clinical care. This tool was introduced in medical science by Clarke and Spear (1964) in order to assess patient’s health [17].

Against the backdrop this study is aimed to find out the outcomes after lumbar discectomy for lumbar degenerative spine disease in the patients at six months post-operative period. In this part of Russia, nearly half of the patients admitted in the Neurosurgery department of the hospital have lumbar degenerative spine disease and 50% of them require surgery. No prior study was done to find out the outcomes after lumbar discectomy surgery for degenerative lumbar disc disease in this region.

## MATERIALS AND METHOD

### Study Population

Patients from Tver state hospital, Russia, were recruited for the study. A population size of 75 with mean age of 43.8±9.2 years was taken in the research with patients diagnosed with lumbar degenerative spine disease, by MRI and scheduled for discectomy surgery for the first time. 40 (53.3%) patients were with L5-S1 disc disease and 35(46.7%) were with L4-L5 disc disease. The inclusion criteria for choice of subjects include identified lumbar degenerative spine disease with disc herniation for the first time, patients scheduled for discectomy surgery and willingness to accept the assessment questionnaire. Any patient showing

symptoms of other chronic or degenerative diseases, obesity, unusual medical problems, severe ailments of tumor, cardiovascular illness and spinal problems by other means such as trauma, etc. was excluded from the sample. The outcomes after discectomy were measured in pre-operative and 6 months post-operative stages by making use of the following tools of assessment.

### Assessment Tool

Questionnaires were used to assess the outcome in both pre-operative and post-operative periods. Questionnaires were given to the patients to record their responses. The questionnaires contained the parameters as mentioned below.

### Visual Analog Scale (VAS)

This assessment tool was used for visualizing the patients’ pain among the study population in both pre-operative and post-operative scenario. The severity of both leg pain and back pain was assessed. It consists 10 point scale of 0 to 10, where ‘0’ stands for no pain and ‘10’ stands for unbearable/ worst pain.

### Oswestry Disability Questionnaire

This assessment was presented in both pre-operative and post-operative periods. This involved a Likert scale to measure the degree of pain in terms of pain tolerance (0-5 points), employment/work (0-5 points), walking (0-5 points), personal care (0-5 points), standing (0-5 points), sitting (0-5 points), sleeping (0-5 points), traveling (0-5 points), lifting (0-5 points) and social life (0-5 points) in the pre-operative and 6 months post-operative period.

**Table 1a. Oswestry Disability Scale- ODI- ( Comparison of Pre and Post -operative Outcomes)**

ODI Variables↓	Pre-operative		Post-operative		Changes	P-value
	Mean	Std. Deviation	Mean	Std. Deviation		
pain tolerance	3.25	1.20	0.65	0.98	-2.6	0.000**
work/housework	2.75	1.164	1.1	1.41	-1.65	0.001**
lifting	3.15	1.26	1.7	1.38	-1.45	0.003**
social life	3.3	0.97	0.8	1.23	-2.5	0.000**
personal care	2.3	1.41	0.45	0.99	-1.85	0.000**
walking	3.2	1.39	1.4	1.23	-1.8	0.000**
standing	2.1	1.88	0.95	1.46	-1.15	0.011*
sitting	3.85	1.59	1.35	1.78	-2.5	0.000**
sleeping	2.25	1.33	0.7	0.92	-1.55	0.000**
travelling	4	1.48	0.8	1.32	-3.2	0.000**

Negative values indicate improvement for all variables

\*- not very significant improvement

\*\*Significant at 1% level by paired ‘t’ test

Change is calculated as score at post-operative minus score at pre-operative stage

**Statistical Analysis**

Statistical analysis was performed using SPSS V.18.0 (SPSS Inc., Chicago IL, US). Parametric data were expressed as mean ± SD. Paired ‘t’ test was performed to find out the differences in the variables between pre-operative and post-operative stages among the study population.

**Data Collection**

Patients were diagnosed with lumbar degenerative spine disease, by MRI. The grading of disc degeneration was done as per Pfirman’s grading on T2-weighted Mid-sagittal fast spin-echo images. The patients with Pfirman’s grade 5 and 6 were considered. Patients were assessed by independent observers (a neurologist and a radiologist). The data were collected from three surgeons of this hospital. Patients scheduled for discectomy surgery were interviewed and asked to fill up the questionnaire to assess their severity of pain and well-being pre-operatively and 6 months post-operatively. All the patients had received courses of conservative therapy and they did not get any benefit from it.

**Ethical Issues**

The ethics committee of hospital approved all the studies and the patients gave their informed consent for participation.

**RESULTS**

The study population comprised 75 patients who have completed their questionnaire in the pre-operative and post-operative stages of the study. The results examined the outcome measures as presented in pre and post operative conditions. The analysis of the Oswestry disability scale (Tables 1a, 1b and 1c) and VAS (Table 2) has clearly shown that there is a significant improvement after discectomy surgery in majority of the patients. In Tables 1a and 1b, the analysis of individual variants of ODI and in Table 1c the comparison of total ODI score are given.

The questionnaire pertaining to severity of pain (VAS) and ODI was compared in the pre-operative and post-operative stages and was evaluated using paired ‘t’ test. It was noted that there was a significant change (p<0.001) with reference to variables like pain severity in VAS and general well-being in ODI.

It is evident from Table 1c that there is a significant improvement in quality of life after surgery. The change of percentage is nearly 55% with a p value of < 0.001.

It can be seen from Table 2, that in comparison pre-operative and post-operative VAS shows a significant mean difference in both VAS leg pain and VAS back pain, which means there is a significant improvement in both.

**Table 1b. Oswestry Disability Scale in Paired ‘t’ Test**

ODI Variables ↓	Paired Differences		t	Significance. (2-tailed)
	Mean Difference	Std. Deviation		
Pain tolerance	2.600	1.392	8.355	0.000
Work/housework	1.650	1.843	4.003	0.001
Lifting	1.450	1.877	3.454	0.003
Social Life	2.500	1.504	7.432	0.000
Personal care	1.850	1.599	5.176	0.000
Walking	1.800	1.704	4.723	0.000
Standing	1.150	1.814	2.834	0.011
Sitting	2.500	1.850	6.045	0.000
Sleeping	1.550	1.504	4.610	0.000
Travelling	3.200	1.673	8.552	0.000

**Table 1c. Comparison of Total ODI Scores**

Descriptive Statistics				Paired T Test		
Pre-operative		Post Operative		Difference of Mean (Change)	t	P value
Mean	SD	Mean	SD			
30.15	10.66	8.05	8.60	-22.10	5.51	0.00**

Negative values indicate improvement for all variables  
 \*\*Significant at 1% level by paired ‘t’ test  
 Change is calculated as score at post-operative minus score at pre-operative stage

**Table 2. Visual Analog Scale (Pre and Post Operative Analysis of Both the Groups)**

VAS (0-10)	Mean (SD)		Change	P value
	Pre-operative	Post-operative		
Leg pain	8.45 (1.53)	1.1 (1.71)	-7.35	0.000**
Back pain	8.4 (1.3)	2.16 (1.62)	- 6.24	0.000**

Negative values indicate improvement for all variables

\*\*Significant at 1% level by paired 't' test

Change is calculated as score at post-operative minus score at pre-operative stage

It was noted that 75% ( $p < 0.001$ ) of the study population indicated that their pain was rapidly getting better in the post-operative stages; whereas only 2% of them indicated that their pain got worst even after the treatment.

## DISCUSSION

The aim of this study was to determine the surgical outcome after lumbar discectomy as a treatment option for lumbar degenerative spine disease. This study evaluated the outcomes after lumbar discectomy for degenerative spine disease at six months post-operative period. From the study it is evident that most of the patients indicated that they benefited from surgery. The ODI questionnaire pertaining to tolerance of pain, well-being, walking, standing, sitting, personal life, social life, lifting, traveling and sleeping was compared in the pre-operative and post-operative stages which indicated that there was a significant change with reference to nearly all variables among post-operative patients. The study goes in line with the findings of literature where it was also indicated that there was less severity in pain in the post-operative stages among the patients studied for same cause [17, 18]. There was a significant improvement in the quality of life in the post-operative stages indicated by the patients with reference to walking, standing, social and personal life and sleeping.

Furthermore VAS is a well-recognized outcome tool to assess the severity of pain. Physical and social limitations have also been well described by "Oswestry Disability Index" (ODI) [19]. This has come out as the extremely general suggested case particular outcome in context to spinal disabilities [20, 21]. ODI covers different dimensions of daily living and it contains questionnaire containing ten questions based on interviews. Furthermore global assessment scale was introduced to measure the outcomes where the patient satisfaction is measured by their improvement in pre-operative pain (satisfied, partly satisfied or not satisfied) [22]. There is a good correlation between earlier validated objective outcome scores and patient based assessments [23].

The results of visual analog scale for both leg pain and back pain indicated that the severity of pain was less in the post-operative stages. Due to this most of the patients stopped taking painkillers, anxiolytic or other preparations like sleeping tablets in the post-operative period. The improvement of leg pain is marked than that of back pain. The results coincide with the findings of literature where similar kinds of outcomes were indicated in the patients treated for spine disorders [23].

Most of the patients indicated that they had no pain over leg as well as back in post-operative stage. Some patients had marginal leg pain in their post-operative stages evident from the results. The result of the study correlates with the findings where the same outcomes in the patients treated for spine disorders were already established [19].

## CONCLUSION

From the above results it is found that most of the patients benefitted from lumbar discectomy surgery in terms of rapid reduction of pain. The results after a discectomy established reduction of both leg and back pain, relieved from disability and improvement of quality of life as well as return to their normal daily work/ employment. Majority of the patients were without any analgesics, anxiolytics or sedatives. The findings allow us to predict a positive and accurate outcome after surgery in long term.

The results will be useful as more accurate information could be provided to the patients in future. It also facilitates in the development of changes in the clinical practice of spine disorders.

## CONFLICT OF INTEREST

The authors confirm that this article content has no conflicts of interest.

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