

## **A Study On Laminectomy, Discectomy And Conservative Management For Prolapsed Intervertebral Disc And Assessment Of Recurrent Disc Herniation**

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**Abstract:** Disc herniation is one of the most frequent diseases in lumbar (L), cervical (C) region and the affected disc site is L4-S1 and C3-C4. Higher the degree of disc herniation, higher the likelihood of LBP. The aim of the study is to find out the functional outcomes of the laminectomy, discectomy in pre and post-operative, conservatively treated patients and assessment of recurrent disc herniation, to elucidate the risk factors of the PIVD. It is a prospective study conducted in 408 patients, among them 58 patients underwent surgical treatment and 350 patients were treated conservatively. 92 % of the patient population has shown significant p (0.0001) value with good to excellent outcome in surgical management with 6 months of follow-up. Whereas in conservatively treated, patients had fair to good functional outcomes observed in group I (with patient counselling) when compared to group II (without patient counselling). The study concluded that laminectomy and discectomy is a better management for a prolapsed intervertebral disc, which relieves disability and improves quality of life when compared to prolonged conservative treatment. The role of a clinical pharmacist in preventing the progression of PIVD and recurrence is by educating the patients regarding risk factors and lifestyle modification.

**Keywords:** PIVD (Prolapsed intervertebral disc), LBP (Low back pain), Disc herniation, Laminectomy, Discectomy.

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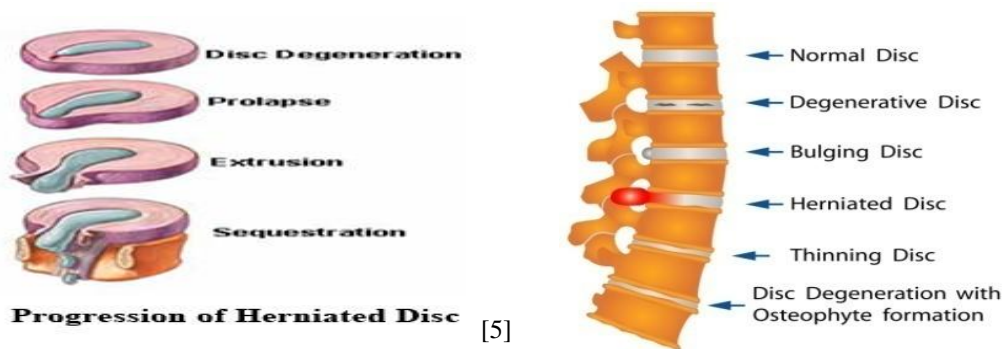
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### **I. Introduction**

Low Back pain is one of the most common medical problems that cause a significant amount of disability and incapability. Being the most common structure to be affected, the intervertebral disc is prevalent source of low back pain. The main feature of back pain is pain in the lumbar region, often accompanied by restriction in range of motion and functional limitations. Lumbar disc prolapse is estimated to account for approximately 37 % of cases of low back pain. Back pain and its related disability cause an important socioeconomic burden to society [1]. The symptom of disc herniation depends upon multiple factors like level of disc, stage of disc, percent canal compromise by the disc. Lumbar disc herniation (LDH), were the most common site is toward the bottom of the spine at L4-L5 or L5-S1 (95 %), makes up the vast majority of spinal disc herniation cases. LDH occurs when the nucleus in the center of the disc pushes out of its normal space [2]. Herniated lumbar disc is a displacement of disc material beyond the intervertebral disc space [3]. In fact, the higher the degree of disc degeneration (DD), the higher the likelihood of LBP [4]



**1.1. Epidemiology:** Disc herniation occurs mainly between the fourth and fifth decades of life (mean age of 37 years) although it has been described in all age groups [6, 7]. It has been estimated that 2 to 3 % of the population may be affected, with prevalence of 4.8 % among men over 35 years of age and 2.5 % among women over this age [8]. It is most prevalent in young and middle age group between the ages of 25 and 55years in Indian population [9].

**1.2. Causes:** A herniated disc can have a wide range of causes, including injury, posture, obesity and especially natural degeneration. With age, spinal discs begins to lose water content and become brittle, making them less able to cushion the vertebrae and absorb shock. This can cause tear to develop in a discs outer wall, pushing the gel- like inner disc material out into the spinal canal. Disc herniation can put pressure on surrounding spinal nerves, leading to debilitating symptoms [5].

**1.3. Risk factors:** Physical factors such as heavy physical strain, frequent lifting, postural stress, and vibration; social demographic characteristics and individual factors such as lifestyle and physical capacity, gender, age, race, genetic factors, height, and weight; habits such as smoking and alcohol consumption; poor general health; and, finally, psychosocial factors play a key role in disc herniation [10].

**1.4. Clinical manifestation:** Typical symptoms such as numbness, weakness, and/ or tingling sensation in the leg and/or foot, leg and/or foot pain, lower back pain, and/or pain in the buttock in lumbar disc degeneration. In severe cases, loss of control of bladder and/or bowels, Numbness, pins and needles sensation, or tingling in one or both arms or legs. Pain behind the shoulder blade in cervical disc degeneration. Pain running down one or both arms or legs. The location of these symptoms depends upon which nerve(s) has been affected. In other words, the precise location of the symptoms helps determine diagnosis [2].

**1.5. Treatment guidelines:** If a course of non surgical treatments (generally four to six weeks) is not effective for relieving pain from a herniated disc, lumbar decompression surgery may be considered as an option. Treatment of a herniated disc is complicated because of the individualized nature of each patient's pain and symptoms. A treatment option that relieves pain and discomfort for one patient may not work for other. However, by working with one or several types of spine specialists, patient can find the best combination of treatment options for their pain and can avoid surgery too soon or too late [11].

**1.5.1 Conservative Management:** For conservative treatment to be effective, it may take several months. Conservative treatment often takes the form of oral analgesics, gentle traction, and non dynamic spinal stabilization treatments and exercise. Most patients with low back pain respond well to conservative therapy, including limited bed rest, exercise and, in selected cases, injections [12].

NSAIDs are the medications that should be used most, since these exactly meet the physiopathological needs (which are basically problems of inflammation), while pure analgesics remain an additional therapeutic resource [8]. One alternative to help the conservative treatment is blockage of the affected root using anesthetics and corticosteroids. These act directly through reducing its volume, and on the root, through reducing its inflammatory response [13, 14].

**Medications:** NSAIDs: meloxicam (7.5 mg), diclofenac (50-150 mg) show no significant effect for overall pain, and leg pain, in a 2 week or shorter period.

- Neuropathic pain reliever: Gabapentin (100 mg – 400 mg), Pregabalin (75 mg).
- Narcotics: morphine with an initial dose of 15 mg/day incremented to 30 mg/day.

- Muscle relaxants: 5 mg dosage of Diazepam twice daily associated with physical therapy and analgesics showed less than 20 % equivalence. A 2 mg dosage of tizanidine twice daily for the first 3 months, combined with 100 mg tramadol per day for the first 2 months and 1200 mg ibuprofen per day in the first month has less than satisfactory results in improvement in pain
- Others: Anti depressants: Nortriptyline (5 mg – 25 mg), Amitriptyline (5 mg – 25 mg) once daily.

### 1.5.2. Surgical Procedures:

**Laminectomy:** A laminectomy is a surgical procedure that removes the entire back (posterior) portion of the vertebral bone called the lamina, and/or sometimes the attached ligaments and part of the spinous process, to allow visualization of the underlying neural elements (spinal cord and/or nerve roots that branch from it) and intervertebral disc. It is often performed to relieve pressure (compression) on a nerve root or spinal cord that is causing radiating pain and weakness.

**Complications:** A common complication of the laminectomy procedures is some degree of neck or back pain. Other complications with any type of surgery include uncontrolled bleeding that requires blood transfusions, injury to blood vessels, or injury to neighbouring structures.

Advantage of lumbar laminectomy is effective in relieving leg symptoms as it is a direct decompression of the nerves. A potential disadvantage of lumbar laminectomy is that by removing portions of the ligaments and joints, it could lead to lumbar instability which may require a lumbar fusion in the future.

**Discectomy:** A discectomy is the surgical removal of herniated intervertebral disc material that is compressing a nerve root or the spinal cord.

Complications: discectomy can include bleeding, infection, adverse reaction to anesthesia, and formation of blood clot [15].

## II. METHODOLOGY

This present prospective study has been carried out for six months on 408 patients suffering with herniated disc. Who were attending Neuro Hospital, Warangal , Telangana, India.

**Inclusion:** Subjects with low back pain since long time, Subjects with bulging, protrusion and extrusion stages of PIVD. Subjects with age between 20- 80years. Included retrospective PIVD IP cases (cervical and lumbar discs) from September to December of 2016 and also prospective outpatient and inpatient cases. Included recurrent cases of lumbar, cervical, prolapsed intervertebral discs were also included in the study.

**Exclusion:** Prolapsed intervertebral discs caused by traumatic injury, Structural scoliosis, Spondylolysthesis, Congenital anomalies, Developmental dysplasia, Infections of spine, Cauda- Equina syndrome, Failed back syndrome, Disc herniation at multiple levels, Tumours of lumbar spine.

**Statistical analysis:** Statistical analysis was done by using unpaired “t” test (graph pad prism software 5.0version) based on scores of ODI and NDI scales. This test is used to find out functional outcome in surgically treated and patients on conservative therapy. Statistical analysis was carried out for pre and post operative prolapsed intervertebral disc patients. ODI and NDI scores used to find out functional outcome and expressed in parameters such as Excellent, Good, Fair and Poor outcome in percentages.

## III. RESULTS AND DISCUSSION

According to Global Burden of Diseases 2010, it is estimated that low back pain was among the top 10 diseases and injuries that account for the highest number globally. Prevalence increases and peaks between the ages of 35 to 55. As the age of the people in the population increases, low back pain also increases proportionately due to the deterioration of the intervertebral discs. According to WHO, low back pain constituted 37 % of all occupational risk factors which occupies the first rank among the disease complications caused due to work. In the USA, back pain is considered to be a leading cause of disability. One-year prevalence of LBP has been found to 10-56 %.

**Table 1: Age groups and disease wise distribution of data**

Age group (years)	(PIVD)	(LDD)	(CDD)	(CDD&LD)	Recurrent PIVD	Total number of patients	%
20-30	9	12	17	3	1	42	10.2
31-40	10	38	27	9	9	93	22.7
41-50	18	33	33	16	14	114	27.9
51-60	10	29	18	13	11	81	19.8
61-70	11	25	11	5	6	58	14.2
71-80	0	9	8	2	1	20	4.9

Prolapsed Intervertebral disc (PIVD), Lumbar degenerative disc (LDD), Cervical degenerative disc (CDD)

A study conducted by Rishabh Gupta *et al.*, stated that majority (50.5 %) of the cases with chronic low backache lie in the age group of 31-40 years [9]. A study conducted by Luis Roberto Vialle, found that the disc herniation occurs mainly between the fourth and fifth decades of life i.e. mean age of 37 years [8]. Similarly, we noticed the highest prevalence (27.9 %) is at the age group of 41-50 years, 22.7 % in 31-40 years age group, and 19.8 % in 51-60 years. As the age progress gradually the nucleus pulposus becomes more fibrotic and less hydrated, therefore morphological changes occur in the disc and disorganized.

**Table 2: Occupation versus gender wise distribution**

Occupation	Male	%	Female	%	Total number	%
Agriculture	71	17.4	123	30.14	194	47.5
House-wife	0	0	113	27.6	113	27.6
Weight bearing workers	26	6.3	11	2.6	37	9.05
Daily wage earners	12	2.9	5	1.2	17	4.16
Drivers	4	0.9	1	0.24	5	1.2
Software engineers	9	2.2	2	0.49	11	2.69
Others	19	4.6	12	2.94	31	7.59

A study conducted by Supreeth Bindra *et al.*, stated that low back pain prevalence has been found to range from 6.2 to 92% with an increase in the prevalence with age and female preponderance [16]. In our study total numbers of patients were 408. Out of which 264 (64.7 %) were female and they were more compared to male 144 (35.3 %). Most of the female were from the occupation of agriculture 123 (30.14 %) and house-wives 113 (27.6 %), strenuous activity like weight-bearing works (lifting of heavy objects) and continuous bending and working may have lead to herniation of the disc, decrease in bone density as age processed in female compared to male.

A study conducted by Rishabh Gupta *et al.* stated that 37.5 % patients were non-sedentary workers, 31.5 % patients were house-wives and 31 % were sedentary workers [9]. Poppen and Nathan expressed that higher incidence of degenerative changes in persons engaged with heavy activities like carrying weights and prolonged standing [17, 18]. In contrast, Sharma and Shankaran stated that the majority of the cases were having protruded disc belong to office workers [19]. In our study, among 408 patients, 194 patients (47.5 %) agriculture, House-wives 113 (27.6 %), weight baring workers 37 (9.05 %), daily wage earners 17 (4.16 %), Drivers 5 (1.2 %), Software engineers 11 (2.69 %), others 31 (7.59 %). Out of which highest incidence was seen in agricultures, house-wives and weight bearing workers. Farmers were more prone to PIVD due to strenuous activity like weight-bearing works (lifting of heavy objects) which may lead to herniation of the disc. House wives were more prone to PIVD due to heavy workload and continuous bending and working.

**Table 3. Social habit wise distribution**

Social Habit	No of patients	%
Alcoholics/toddy	116	28.43
Smokers	6	1.47
Alcoholics and smokers	9	2.2
Usage of Tobacco	4	0.9

According to a study conducted by Shinji Miwa *et al.*, nicotine which is the main element of cigarette, induces intervertebral disc degeneration and causes vasoconstriction and by decreasing blood flow around the intervertebral disc [20]. In our study, we observed that the patients who had the habit of drinking alcohol/toddy accounts for 116 (28.43 %).Whereas smoking and tobacco account for 6 (1.47 %) and 4 (0.9 %) respectively. Some patients had both alcohol and smoking habits. There is a significant correlation between consumption of alcohol and LDH; increase in frequency of alcohol consumption is associated with significant increase in weight gain which can increase the risk of sciatic pain due to increased mechanical load on the intervertebral discs.

**Table 4:** Description of mean, standard deviation and p-value of functional outcome at pre and post operative stages of lumbar prolapsed intervertebral disc

ODI Variables	Pre-operative		Post-operative		P-value
	Mean	Std.Deviation	Mean	Std.Deviation	
Pain Intensity	3.81	0.52	1.2	0.84	0.0001***
Personal care(washing, dressing, etc)	3.61	0.63	0.91	0.88	0.0001***
Lifting	3.63	1.05	1.36	1.36	0.0001***
Walking	3.22	0.74	1.08	0.81	0.0001***
Sitting	3.41	0.76	1.04	0.81	0.0001***
Standing	3.38	0.81	1.26	0.7	0.0001***
Sleeping	3.71	1.29	0.18	0.79	0.0001***
Social life	3.85	1.15	1.38	1.03	0.0001***
Travelling	3.57	0.7	1.12	0.48	0.0001***

\*shows statistically significant

Manoj Kumar *et al*, stated that there is improvement in functional outcome after lumbar discectomy, and patients were benefited from surgery. The ODI questionnaire pertaining to tolerance of pain, well-being, walking, standing, sitting, personal life, social life, lifting, travelling and sleeping was compared in the pre-operative and post-operative stages which indicated a significant change with reference to nearly all variables among post- operative patients. They also reported that there was a significant improvement in the quality of life in the post-operative stage indicated by the patients with reference to walking, standing, social, personal care and sleeping [21]. Similarly, we measured functional outcome in the patients who underwent lumbar discectomy and laminectomy by using ODI variables such as pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life and travelling was compared in pre-operative and post-operative patients. We found that there was a significant improvement in functional outcome after surgery with follow-up of 6 months. In our study, functional outcome were measured in the patients who underwent cervical laminectomy and discectomy by using NDI variables such as pain intensity, personal care, reading, concentration, work, sleeping were compared in the pre-operative and post-operative patients. We observed that there was a significant improvement in functional outcome after surgery with follow up of 6 months in which lifting, headaches, driving and recreation was compared at pre and post-operative stages by using unpaired ‘t’ test.

**Table5: Functional outcome in prolapsed intervertebral disc patients**

PIVD condition	Excellent	Good	Fair	Poor
Lumbar PIVD	48%	44%	8%	0%
Cervical PIVD	12.5%	62.5%	25%	0%

Sanath Kumar Shetty *et al*, expressed that laminectomy and discectomy had an excellent outcome in terms of pain relief. The assessment was done by using ODI scale. In this study, 50 patients were included in the age group of 40-70 years and patients were divided into two groups, retrospective group as the group I and prospective group as group II. They stated that 76 % patient had an excellent outcome, 8 % patient has the good outcome, 16 % patient has with poor outcome on long-term follow up in group I and 96 % patients with excellent outcome, no patients with good scores and 4 % patient with poor outcome on short-term follow up [22]. In our study, the assessment was done by using ODI scale for lumbar laminectomy and discectomy. Out of 50 Lumbar PIVD patients, 48 %, 44 %, 8 % had excellent, good and fair functional outcome respectively. Among 8 Cervical PIVD patients, we observed 12.5 % patients had an excellent functional outcome, 62 % patients had good functional outcome, and 25 % patient had fair functional outcome and no patients with poor outcome. Our study depicts that laminectomy and discectomy had a fair to good functional outcome according to NDI scale.

In a study conducted by Maruthi CV *et al*, reported that patients had a good to excellent outcome in nearly 97 % of surgically treated patients. In conservatively treated group 90 % patients had a fair to good result [23]. Similarly, we observed 92 % of the patient population had good to excellent outcome. In conservatively treated group 91.09 % fair to good outcome was seen in lumbar degenerative disc patients. 94.65 % had fair to

the good outcome in cervical degenerative disc patients. 91.26 % fair to the good outcome was seen in lumbar and cervical degenerative disc patients.

In our study, conservatively treated patients (350) were subdivided into II groups, as group I and group II. Group I includes patients given with counselling (case) Group II includes patients without patient counselling (control). We found that fair to good outcome in 91.09 % with LDD, 94.65 % with CDD, 91.26 % with LDD and CDD patients of group I. Whereas, poor to fair outcome in 95.58 % with LDD, 99 % with CDD, 99 % with CDD and LDD in group II. From these II groups, we observed that group I had better functional outcome compared to group II. This indicates role of clinical pharmacist in educating patients regarding risk factors of diseases and lifestyle modifications.

In 6 months period of our study, of 408 patients, we have seen 58 (14.2 %) PIVD, 146 (35.7 %) LDD, 114 (27.9 %) CDD, 48 (11.7 %) LDD and CDD 42 (10.2 %) recurrent PIVD patients. In our study, Total recurrent cases were 42; out of which female were 26 (61.9%) and the male were 16 (38.09 %). The highest prevalence was seen in the age group of 41-50 years (33.3 %) followed by 51-60 years (26.1 %). In recurrent cases, patients with the occupation of agriculture were 73.8 % followed by housewives 16.6 %. In recurrent PIVD patients alcoholics were 33.3 %, followed by smokers 4.7 %. The reason of recurrence may be due to improper life style .

#### **IV. CONCLUSION**

This study was conducted to observe and measure the functional outcome in surgically and conservatively treated patients with PIVD and degenerative disc disease. The highest prevalence was seen in 41-50 years age group. Female (64.7 %) were affected more compared to male (35.3 %). In our study the highest prevalence was seen in patients with occupation of agriculture (47.5 %) and House-wives (27.6 %). Alcohol and smoking are the risk factors for developing of PIVD. The patients were suggested to reduce strenuous activity like weight-bearing works (lifting of heavy objects), continuous bending and working, avoid drinking alcohol and smoking. In our study, we observed 92 % of the patient population had good to excellent outcome after surgical treatment and we observed that there was a significant improvement in functional outcome with 6 months of follow up after surgery compared to before surgery. In conservatively treated patients, we observed fair to good functional outcome in group I (with patient counselling). Whereas in group II (without patient counselling) poor to fair functional outcome was observed. Group I had a better functional outcome compared to group II. In the overall study, we observed that surgically treated patients had a rapid reduction of pain and better functional outcome compared to conservatively treated patients. Occupational risk factors and social habits are the most prevalent risk factors in recurrent PIVD patients.

We conclude that laminectomy and discectomy is the better management of degenerative intervertebral disc prolapse, which relieves disability and improves quality of life and patients can lead their normal life compared to prolonged conservative treatment. There is a key role of a clinical pharmacist in preventing the progression of PIVD and recurrent PIVD by educating patients regarding risk factors of disease and lifestyle modifications.

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