



Original Article

The Surgical Outcome for Prolapsed Lumbar Intervertebral Disc Based on Visual Analog Scores

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ABSTRACT

Objective: To determine the surgical Outcome for a prolapsed lumbar intervertebral disc based on a visual analog score.

Materials and Methods: A prospective study was conducted in the Department of Neurosurgery at Jinnah Postgraduate Medical Centre, Karachi. A total of 55 patients were included in the study. Questionnaires were used to collect demographic data, presenting symptoms, and the level of the herniated discs. The patients underwent different surgical interventions and then these patients were followed for 2 weeks postoperatively and the surgical outcome was assessed using the Visual Analog Score (VAS).

Results: A total of 34 (61.8%) males and 21 (38.2%) females were included in this study. The average age of the patients was 36.14 ± 9.30 years. L5/S1 was the most commonly affected level. Laminar fenestration was the most common surgical procedure done in 23 (41.8%) patients followed by hemilaminectomy in 19 (34.5%) patients and bilateral laminectomy in 13 (23.6%). Post-operative pain was relieved in the majority of patients which is 43 (78.2%).

Conclusion: Medical management remains the mainstay in the majority of patients having lumbar disc prolapse. However, in cases where the pain is refractory to conservative management, surgery is considered after careful patient selection. It was seen that surgical intervention successfully reduced the intensity of pain and resulted in a symptomatically improved patient. Hence it is safe to conclude that surgery is an effective measure and ultimately enhances the quality of life.

Keywords: Prolapsed disc, Discectomy, Pain score, Laminar Fenestration, Visual analog Scale.

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INTRODUCTION

Low back pain radiating to one or both lower limbs is one of the most common symptoms in neurosurgical patients. It is the 2nd most common symptom for seeking medical attention with an estimated prevalence of around 84%.¹ It leads to

a decrease in the quality of life and limits the functions of the musculoskeletal system.²

Lumbar disc herniation is a fairly common condition affecting patients in the young and middle age group.³ Most Lumbar disc herniations do so posteriorly, slightly off to one side. This characteristically leads to compression of the nerve root just before it exits through the neural foramen of the level below it.

It begins with a low back ache which gradually leads to pain in the lower limbs with or without reduction in the backache. There is usually a "cough effect" with the pain increasing on coughing, sneezing, or straining, found in approximately 87% of patients.⁴ The pain associated with lumbar radiculopathy occurs due to a combination of ischemia and inflammation of the nerve root because of the pressure from the disc as well as the inflammatory factors present in the disc material.⁵

The most efficient method of treatment of a symptomatic lumbar disc is controversial.⁶ No preoperative factors have been identified that would predict an improvement in the symptoms of pain and radiculopathy with surgery. It is currently believed that although surgery provides more rapid relief of symptoms, a large number of patients will eventually get better on conservative treatment.⁷ When disc herniations are followed on MRI, it has been found that over time the herniated nucleus pulposus reduces in the size of protrusion and that is why a short period of rest, analgesics and active physical exercise helps in the improvement of symptoms.⁸

However, there are certain surgical indications which include failure of conservative management to control pain after 5 – 8 weeks, Cauda equina syndrome, intractable pain, and progressive motor deficit.

Surgical options include Trans-canal approaches such as Laminectomy & Discectomy and Intradiscal procedures. Lumbar laminectomy happens to be one of the most common spinal surgeries.⁹ Most of the literature shows an earlier

relief of pain-related symptoms and a higher chance of restoration of function in patients undergoing surgical intervention.¹⁰ If symptoms have already been present for a long period, surgical management may have a better chance of relief of symptoms than continued non-operative management.¹¹ Surgery aims to not only relieve the pain but also prevent late sequelae like neuropathic pain or permanent paresis to prevent prolonged sick leaves leading to undesirable lifestyle and decreased motivation to work.¹²

It has been found that among patients undergoing standard open laminectomy and discectomy, 65 – 85% reported no sciatica one year post-operatively compared to 36% for conservative treatment.¹³ In another series of 100 patients undergoing discectomy, 73% had complete leg pain relief and 63% had complete back pain relief at 1 year.⁴ A study conducted in Pakistan showed that 91.5% and 69.3% of patients had improvement in leg pain and back pain after discectomy respectively.¹⁴

Patients with tolerable pain and minimal disability can be managed conservatively with good results whereas patients who have severe, persistent pain or pain that has been getting worse or those with a neurological deficit are more likely to have an excellent surgical outcome.¹⁵

Therefore, the objective of this study is to identify which surgical procedures lead to better relief of symptoms and whether the surgical intervention improves the quality of life by reducing the pain, in both the back and/or the legs. Improvement in the perception of pain in post-operative patients would be defined as a 'good surgical outcome' based on effective pain relief.

MATERIAL AND METHODS

Study Design and Setting

This is a Descriptive Study, conducted in the

Department of Neurosurgery, Jinnah Postgraduate Medical Centre, and Karachi from February 2020 to January 2021.

Inclusion Criteria

All patients, male and female, who were admitted for surgical management of a single-level disc herniation, were included in the study.

Exclusion Criteria

Patients with a previous history of spinal trauma or surgery or involvement of two or more levels were excluded from the study.

Data Collection

Patients admitted for surgical disc removal were included in the study by way of non probability, consecutive sampling technique. The confidence interval was set at 95% with 0.05% precision. Questionnaires were used to collect the demographical data, which included age, gender, and medical record number. Also included were presenting complaints, the level of the prolapse, surgical intervention, and the subsequent outcome which was determined using a visual analog scale, two weeks postoperatively.

A good outcome was defined as a more than 50% reduction of pain intensity postoperatively, determined by comparing the preoperative and postoperative VAS scores. Similarly, a bad outcome was considered when the reduction in pain was less than 50%.

Confidentiality of data was maintained as data was kept under the personal lock of the primary investigator.

Data Analysis

The data were analyzed through SPSS version 22. For quantitative characteristics such as age, level of lumbar spine involvement, and VAS score before and after surgery, mean and standard

deviation were determined. Frequency and percentages were calculated for qualitative variables, i.e. gender, affected spinal levels, and operation performed.

Age, gender, disease duration, level of lumbar spine involvement, backache, and leg discomfort were all used to control effect modifiers. After stratification, the chi-square test was used to see how these effect modifiers affected the outcome variable. P value ≤ 0.05 is taken as significant. The outcome (good and bad) was assessed in terms of change in VAS score before and after surgery.

RESULTS

Gender and Age

There were 34 (61.8%) males and 21 (38.2%) females. The average age of the patients was 36.14 ± 9.304 years. The majority of the patients i.e. 26 (47.2%) were above the age of 45 years, followed by 20 (36.3%) in the 31 – 45 years age group. The least number of patients i.e. 9 out of 55 (16.3%) were less than 30 years of age.

Duration of Symptoms

The majority of these patients had chronic backache lasting more than 6 months (49%) and had sought surgery after conservative management had failed to significantly control their symptoms (Table 1).

Table 1: Duration of symptoms of disc herniation.

| Duration of Symptoms | Number of Patients |
|-------------------------|--------------------|
| Less than 1 month | 4 (7.2%) |
| 1 to 3 months | 13 (23.6%) |
| More than 3 to 6 months | 11 (20%) |
| More than 6 months | 27 (49%) |

Most patients (35 [63.6%]) in our study have pain radiating to 1 leg while 36.4% (15 patients) had pain radiating bilaterally. L5/S1 was the commonest level of lumbar spine affected.

Surgical Procedure

Laminar fenestration was the most common surgical procedure (42%) followed by hemilaminectomy (34%) and bilateral laminectomy (24%) (Table 2).

Table 2: Surgical procedures performed.

| Procedure Performed | Percentage |
|-----------------------|------------|
| Fenestration | 23 (41.8%) |
| Hemilaminectomy | 19 (34.5%) |
| Bilateral Laminectomy | 13 (23.6%) |

VAS Scores

Both the pre-op and post-operative VAS scores were determined and compared. Post-operative pain relief was seen in the majority of patients 43 (78.2%) in our study (Table 3).

Surgical Outcome

Good surgical outcome was observed in 85% of patients. Surgical outcome concerning different patient parameters is shown in the following tables; however, none of the p values were significant.

Table 3: Preoperative VAS scores.

| VAS Scores | Pre Op |
|------------|------------|
| 8 | 34 (61.8%) |
| 9 | 16 (29%) |
| 10 | 5 (9%) |

Table 4: Postoperative VAS scores.

| VAS Scores | Post Op |
|------------|------------|
| 1 | 22 (40%) |
| 2 | 14 (25.4%) |
| 3 | 8 (14.5%) |
| 4 | 2 (3.6%) |
| 5 | 3 (5.4%) |
| 6 | 1 (1.8%) |
| 7 | 2 (3.6%) |
| 8 | 3 (5.4%) |
| 9 | - |
| 10 | - |

Table 5: Outcome in terms of age

| Outcome | Outcome | | Total | p-value |
|---------|---------|-----|-------|--------------------------------|
| | Good | Bad | | |
| < 30 | 8 | 1 | 9 | 0.95 (insignificant result) |
| 31 – 45 | 17 | 3 | 20 | |
| > 45 | 22 | 4 | 26 | |
| Total | 47 | 8 | 55 | |

Table 6: Outcome in terms of duration.

| Duration | Outcome | | Total | p-value |
|--------------|---------|------|-------|---------------------------------|
| | Good | Good | | |
| < 1 month | 3 | 1 | 4 | 0.891 (insignificant result) |
| 1 – 3 months | 11 | 2 | 13 | |
| 3 – 6 months | 10 | 1 | 11 | |
| > 6 months | 23 | 4 | 27 | |
| Total | 47 | 8 | 55 | |

Table 7: Outcome in terms of VAS.

| Pre Op VAS | Outcome | | Total | p-value |
|------------|---------|------|-------|---------------------------------|
| | Good | Good | | |
| 8 | 31 | 3 | 34 | 0.155 (insignificant result) |
| 9 | 13 | 3 | 16 | |
| 10 | 3 | 2 | 5 | |
| Total | 47 | 8 | 55 | |

Table 8: Outcome in terms of Surgery.

| Surgery | Outcome | | Total | p-value |
|-----------------------|---------|------|-------|---------------------------------|
| | Good | Good | | |
| Hemilaminectomy | 15 | 4 | 19 | 0.525 (insignificant result) |
| Fenestration | 21 | 2 | 23 | |
| Bilateral Laminectomy | 11 | 2 | 13 | |
| Total | 47 | 8 | 55 | |

Postoperative Complications

Wound infection was the most common complication in our study, which occurred in 4 patients (7.3%). CSF leak was observed in 2 (3.6%) patients, discitis in 2 (3.6%), and recurrent disc prolapse in 2 patients (3.6%).

DISCUSSION

Low back pain remains an important cause of disability and poor quality of life worldwide. The

chronicity of the disease, the prolonged use of medications, and lifestyle changes have significant psychological and physical implications. The goal of surgical treatment is to improve quality of life by reducing pain and eliminating medication overuse, as well as the negative effects that come with it. Surgical treatment is usually deployed when lifestyle modifications and pharmacological therapies fail to produce the desired effect. The way success is measured affects the definition of a satisfactory surgical outcome.¹⁶ In the past, surgeons' perspectives were used to measure outcomes, as "excellent", "good", "moderate" and "bad". Despite technical accomplishments and satisfactory post-operative radiology, surgeons' perceptions do not always correspond to patient satisfaction.¹⁷ More patients with degenerative lumbar spine illness have had various complex lumbar spine procedures in recent years, with varying satisfactory or unsatisfactory outcomes. As a result, there is rising concern about the operations' safety, clinical results, and overall patient confidence. As a result, there is a need to employ patient-related outcomes of these operations as a trustworthy method to justify or reject the effectiveness of these treatments using established clinical indicators such as VAS and ODI (Oswestry disability index).

In this study, the majority of our patients (47.3%) were in the age group comprising adults over the age of 45 years. Similar statistics were seen in another study conducted by Cheung KM et al.¹⁸ Majority of our study participants were males (61.8%), Takatalo et al, showed similar results where males were the predominant gender.¹⁹ However, Evans found women to be at greater risk than men.²⁰ One recently published article showed that about 60% of their patients were admitted within a year of the onset of symptoms which coincided with this study.²¹ The majority of patients (63.6%) in our study had pain radiating to one leg, which is confirmed by another study that found 53.6% of

lumbar disc herniation patients had radiating leg pain due to nerve root compression.²¹

About three-fifths of our patients had a maximum pre-op VAS of 8 at presentation. Similar findings were seen in another study when the majority of patients (78%) registered a pain score of >7 on the VAS.²¹ Cheung KM et al in their study reported that L5/S1 level is the most commonly involved level of herniation.¹⁸ Takatalo J et al and Evans W et al, also reported similar results in their study that degenerative disc findings were more common at the L5-S1 level.^{19,20}

The neurosurgical stratosphere has now developed a tendency to veer towards more minimally invasive approaches such as Microdiscectomy and fenestration.^{22,23,24} our study included patients treated with open surgery. Of our patients, about two-fifths were treated with fenestration and discectomy while one-third were treated with hemilaminectomy. Only about one-fourth of the patients needed a bilateral laminectomy due to the severity of the compression. This was decided on the location of the prolapsed disc segment and the severity of compression. Fenestration was done in laterally placed discs with nerve root compression while laminectomy was done in predominantly midline discs or those having significant thecal compression. Improvement in post-op pain, when asked subjectively by patients, was seen in three-quarters. Post-op evaluation showed a significant improvement in VAS with about 85.5% showing a more than 50% decline in VAS score. Such a significant improvement is also seen in the literature where VAS dropped from a mean pre-op score of 8 to a mean post-op score of less than 2.²¹ We compared results to age, length of symptoms, pre-op VAS, level of prolapsed disc, the severity of prolapsed disc on MRI, and surgery type. There was no significant relationship between these factors found with the outcome in our data set (p-value > 0.05). Also, in both unilateral and bilateral leg pain, there was no significant difference in outcomes. Postoperative

spine infection can be a devastating complication after spine surgery on both a short-term and long-term basis. We observed in our studied patients that 7.3% had post-op wound infections. The literature review showed wound infections ranged from 2.4% to 5%.^{21,23} Another recently conducted meta-analysis also showed similar results with a surgical site infection rate of 3.1%²⁵

LIMITATIONS

The Study is limited by the small sample size which might not be truly representative of this disease as it is quite common. Another limitation would be the use of a single pain grading scale to assess the clinical outcome. Although pain is the major factor determining the quality of life of these individuals, certain other parameters such as occupation, mobility, and dependency also play a role in lasting debility in these patients. Also, stronger scales measuring not only the pain but also the postoperative neurological stability or improvement should be added to this study for a better evaluation and assessment of the benefits of surgical intervention.

CONCLUSION

We conclude that surgery is the treatment of choice for the refractory, symptomatic prolapsed lumbar disc and it improves post-op pain significantly. VAS is one of the simplest and most reliable ways to assess post-op pain and can be used in case of lumbar disc prolapse. More scoring systems can be designed with additional parameters like duration of symptoms and severity of pre-op nerve root compression.

Patient Consent

Written, informed consent was taken from all the participants before inclusion in the study.

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Additional Information

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Human Subjects: Consent was obtained by all patients/participants in this study.

Conflicts of Interest:

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

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AUTHORS CONTRIBUTIONS

| Sr.# | Author's Full Name | Intellectual Contribution to Paper in Terms of: |
|-------------|------------------------------|--|
| 1. | Tanweer Ahmed | 1. Study design and methodology. |
| 2. | Sana Akbar | 2. Paper writing. |
| 3. | Tanweer Ahmed, Raheel Gohar | 3. Data collection and calculations. |
| 4. | Farrukh Javeed, Rabail Akbar | 4. Analysis of data and interpretation of results. |
| 5. | Tanweer, Sana Akbar | 5. Literature review and referencing. |
| 6. | Rabail Akbar, Lal Rehman | 6. Editing and quality insurer. |