Early Outcome of Single Level Lumbar Discectomy in Patients with Prolapsed Intervertebral Disc

Aimon Zia[1], Muhammad Ayaz Khan[2], Syed Abdur Rub Abidi[3], Luqman[4], Sohail[5], Anwar Imran[6], Hassan[7]

[1]Department of, Orthopedics & Trauma Khyber Teaching Hospital, Peshawar.
[2] Professor Department of Orthopedics & Trauma Khyber Hospital, Peshawar.
[3]Assistant Professor, Department of Orthopedic Jinnah Medical & Dental College/JMCH Karachi, Sindh-Pakistan.
[4,5,7] Post graduate Trainees Department of Orthopaedics & Trauma Khyber Teaching Hospital, Peshawar.
[6] Paediatric Fellow Department of, Orthopedics & trauma, GGTH, Lahore

Authorship and contribution Declaration: Each author of this article fulfilled ALL 4 Criteria of Authorship: 1.Conception and design or acquisition of data, or analysis & interpretation of data.2) Drafting the manuscript or revising it critically for important intellectual content.3) Final approval of the version for publication.4)All authors agree to be responsible for all aspects of their research work.

Correspondence Author: Aimon Zia
Email: aimonz@gmail.com

ABSTRACT

Objective: To determine the early clinical outcome of single level lumbar discectomy in patients with prolapsed intervertebral disc.

Methods: This descriptive study was conducted from 3rd January 2018 to 23rd January 2020 in Orthopaedics and Spine Department Khyber Teaching Hospital Peshawar. All patients with prolapsed intervertebral disc in the lumbar spine and fulfilling the inclusion criteria were operated for single level lumbar discectomy. Post operative clinical outcome at one year was assessed with Oswestry Disability Index(ODI) and Modified Stauffer-Coventry criteria. The clinical outcome through Oswestry Disability Index (ODI) was interpreted as minimal, moderate, sever, crippled and bed bound disability while results of Modified Stauffer-Coventry criteria were graded as excellent, good, fair and poor clinical outcome. The clinical outcome score among stratified patient age, gender, occupation and education level was compared and *P* value was calculated with Chi-square test($P < 0.05$ was considered significant).

Results: The total number of patients in our study were 50. The mean age was 42.6 ± 9.56 years(18-50 years). Male patients were 22(44%) and female 28(56%).Post operatively minimal disability was noted in 33(66%) patients, moderate in 9(18%) and severe in 8(16%) patients as assessed with ODI. Clinical outcome assessment with Modified Stauffer-Coventry criteria reported excellent outcome in 19(38%), good in 15(30%), fair in 12(24%) and poor in 4(8%) patients. Male patients with light physical work had better score than female patients and male patients with heavy manual work($P < 0.05$). No major complication reported.

Conclusion: Single level lumbar discectomy in patients with prolapsed intervertebral disc produced satisfactory outcome with minimal disability in majority of our patients.

Keywords: Intervertebral disc, Lumbar Discectomy, Modified Stauffer-Coventry criteria, Oswestry Disability Index, Radicular pain.

This article may be cited as: Zia A, Khan MA, Abidi AR, Luqman, Sohail, Imran A, *et al*. Early Outcome of Single Level Lumbar Discectomy in Patients with Prolapsed Intervertebral Disc.Pak Orthop Assoc. 2020;32(2):

INTRODUCTION

Radiculopathy is a very common problem and occurs due to protrusion of intervertebral disc leading to irritation or inflammation of a nerve root.[1] The impingement of the nerve subsequently results in certain neurological deficits, including weakening of reflexes, paresthesia, or numbness sensation which

may be accompanied by pain. Radicular pain is the most common initial symptom and usually radiates down the affected limb.[2-3] This pain usually resolves with non-surgical conservative therapy in 6 to 12 weeks. However, for those cases which are refractory to conservative management, radicular pain is alleviated promptly with lumbar discectomy.[4]

Lumbar discectomy although a very commonly performed surgical treatment, its indications are yet not clearly established and inconsistent clinical outcome had been reported in the literature.[4-7]

Some studies have shown a success rate of over 90%.[3] The clinical outcome most likely depend on factors such as patient selection, varying follow-up intervals, and differences in analyzing outcomes. [8-10] Other studies have reported a successful surgical outcome rate of 40 to 80% for lumbar discectomy with a minimum 7-years follow-up. [10-11]

In our department the treatment of symptomatic lumbar disc herniation is surgeon dependent and the management usually include physical therapy, anti inflammatory drugs, caudal epidural steroid injection and surgery. The objective of our study was to determine the clinical outcome of single level lumbar discectomy in patients with prolapsed intervertebral disc.We hoped that the results of our study would enable us to lessened the morbidity of patients and standard treatment guidelines would be formulated in our institution.

METHODS

We conducted this descriptive study from 3rd January 2018 to 23rd January 2020 in Orthopaedics and Spine Department Khyber Teaching Hospital Peshawar. Prior approval of the study protocol was taken from Institutional Review Board of our hospital. Patients of either gender and age with pain, paresthesia with or without neurological deficit for 8 or more weeks, restricted straight leg raising test and confirmed single level lumbar disc herniation on MRI were included in our study. All patients with spinal instability, cauda equine syndrome, other spinal pathologies, recurrent disc herniation and patients with previous lumbar surgeries were excluded. In the enrolled patients complete history, physical examination, radiographs and MRI was taken. Informed written consent was obtained from all participants of the study.

Under general anesthesia single level lumbar discectomy was performed by the same team of spine surgeons through standard technique of O'Connel[12](through laminotomy fenestration the lumbar disc was curetted out).Post operatively all patients were rehabilitated through supervised physical therapy and follow up was done at 2nd week,4th week and 6th week initially and then monthly for one year. In each visit general well being of the patients, improvements in symptoms and any complications were noted. At last follow up visit clinical outcome was assessed with Oswestry Disability Index(ODI)[13] and Modified Stauffer-Coventry[14] criteria. The results of ODI was evaluated as minimal disability(0-20% score),moderate(21-40%),severe(41-60%), crippled(61-80%) and bed bound(81-100%) disability. The outcome score of Modified Stauffer-Coventry criteria was graded as excellent(more than 90% pain relief and returned to previous job),good(70-90% pain relief and returned to accustomed job), fair(30-70% pain relief and returned to accustomed job with limitation) and poor(.0-30% pain relief or pain worsened, disabled for job).The excellent and good outcome were labelled as satisfactory outcome while fair and poor outcome as unsatisfactory outcome.

For data stratification purpose important variables like patient occupation and education levels were further categorized. Depending upon physical exertion patient occupation was divided into three categories. Category I occupation involved light physical work like office job. Category II occupation required mild to moderate physical exertion and category III involved severe physical exertion like manual laborers, farmers and construction workers. Level of patient education was divided into 4 categories: Category I patients had no formal education, category II had primary school education, category III had high school education and category IV patients were undergraduate or had graduate degrees.

The data was analyzed with SPSS version 22. Quantitative data like age and outcome scores were represented as mean and standard deviation while categorical data like gender was presented as frequency and percentages. Stratification of patient age, gender, occupation and education level was done and post stratification outcome score was compared and *P* value calculated. ($P < 0.05$ was considered significant) with Chi-square test.The data was presented in table where necessary.

RESULTS

A total of 50 patients with mean age 42.6 ± 9.56 years(18 to 50 years) were included in our study. Majority(56%,n=28) were female while male were 22(44%).MRI revealed prolapsed intervertebral disc at L4 L5 level in 32(64%) patients, L5 S1 in 11(22%)

and L3 L4 in 7(14%) patients. Pre operative back pain was noted in 19(38%), back pain with radiation in 12 (24%), back pain with paresthesia in 11(22%) and foot drop in 8(16%) patients. The mean follow up period was 14±7 months (range 12.3 to 16 months). No patient was lost to follow up during the study period. At last follow up visit mild disability was noted in 33(66%) patients(mean score 7.3±1) ,moderate in 9(18%) patients(mean score 30.5±2) and severe in 8(16%) patients(mean score 52.9±7) as assessed with ODI. Female patients had mean ODI score of 32.1±7 while male patients had 13.1±2(P< 0.05). Clinical outcome assessment with Modified Stauffer-Coventry criteria revealed excellent outcome in 19(38%), good in 15(30%), fair in 12(24%) and poor in 4(8%) patients. Satisfactory outcome as per Modified Stauffer-Coventry criteria was noted in majority (68%,n=34) of our patients while unsatisfactory in 16(32%) patients(table I). Paresthesia and foot drop recovered in all patients. Male patients with light physical work had better score than female patients and male patients with heavy manual work(P< 0.05). Superficial wound infection was noted in 2(4%) patients and CSF leakage in 1(2%) but all resolved with antibiotics and dressing. No major complication noted.

Table I: Stratification of important variables and comparison of post stratification Modified Stauffer-Coventry criteria scores.

Variable	Satisfactory Score (n=34)	Unsatisfactory Score (n=16)	*P* value
Age stratification			
18 to 35 Years	15 (44.1%)	7 (43.8%)	0.556
36 to 50 Years	8 (23.5%)	5 (31.3%)	
> 50 Years	11 (32.3%)	4 (25%)	
Gender			
Male	17 (50%)	5 (31.3%)	0.0001
Female	17 (50%)	11 (68.8%)	
Occupation			
Light Work	10 (29.4%)	2 (12.5%)	
Mildly Strenuous work	18 (52.9%)	5 (31.2%)	0.03
Heavy Manual Work	6 (17.6%)	9 (56.2%)	
Education			
No formal Education	4 (11.7%)	3 (18.7%)	
Primary School	11 (32.3%)	7 (43.7%)	0.544
Secondary School	11 (32.3%)	4 (25%)	
Graduated	8 (23.5%)	2 (12.5%)	

DISCUSSION

In this study we assessed the outcome of single level lumbar discectomy in relieving chronic pain and improving function. At mean follow-up duration of 1 year we reported a satisfactory surgical outcome in 68% patients, while an unsatisfactory rate of 32%. This finding is in accordance with a previous study by Korres[15] where 92 patients of lumbar discectomy were evaluated for the surgical outcome with a mean follow-up duration of 8.8 years. A satisfactory surgical outcome of 62% to 84% was reported. It was not possible to have an adequate comparison of our findings with that of earlier studies as the measures used to determine the outcome vary greatly and substantially from study to study. Subjective outcome measures give more favorable results as compared to objective outcome measures.[16] However, a thorough literature review suggests that the results of the present study are comparable with past studies.

The two most valuable measures to determine the surgical outcome are the visual analogue scale(VAS) and Oswestry Disability Index(ODI).[17] In the present study, we used ODI to assess our post operative outcome. We noted mild disability in 33(66%) patients(mean score 7.3±1), moderate in 9(18%) patients(mean score 30.5±2) and severe disability in 8(16%) patients(mean score 52.9±7).In a comparison between a national spine register in a prospective observational study by Elkan[18] it was found that at 2 year follow-up the surgical outcome as measured with the Oswestry disability score was 18 in the Swedish Spine Register while 21 in a Lumbar Disc Herniation Study (LDHS) in Stockholm (P=0.038).

It has been shown that studies evaluating short-term outcomes of less than a 2-year follow-up tend to give better surgical outcomes that may exceed 90%.[19] In contrast to the findings of the present study, some earlier data evaluating the long-term surgical outcome reported about sixty percent of the patients were unsatisfied with their outcome. [20] In our study the follow-up period was one year but it is suggested that in order to adequately evaluate the patient outcome and their satisfaction with the surgery for lumbar radicular pain, the follow-up period should at least be four years or more. This was supported by Salenius and Laurent**[21]** in their study, revealing a satisfactory early outcome of 70% that was decreased to 56% after 6 to 11 years of surgery.

We also found that gender was interlinked with patient outcome and that the female patients reported a significantly less favorable outcome compared to their male counterparts (P=0.0001). This was in contrast to a recent Iraqi study which reported male gender to be a negative predictor of the surgical outcome.[22] We also noted that the patients with heavy manual occupation had an unsatisfactory outcome score (P=0.03). Although this finding was supported by some authors, [20,21] others oppose it and Hurme and Alaranta[23] were of the opinion that this difference was because of different ways to classify the strenuousness of occupation.

One study conducted at Neurosurgery Department Liaquat University of Medical and Health Sciences Jamshoro Sindh**[24]** noted that single level lumbar discectomy resulted in improvement of numbness in 82.2%(n=37), back pain in 62.2%(n=28) and leg pain in 11.1%(n=5) patients at one year follow up. This study however, reported CSF leakage in 8.8%(n=4) and recurrent disc in 8.8%(n=4).In contrast all 11(22%) patients of pre operative paresthesia and 8(16%) patients with foot drop completely improved after surgery in our series.

In our study female patients had mean ODI score of 32.1±7 and male patients 13.1±2(P< 0.05) at one year follow up. Ahsan**[25]** reported post operative ODI score of 6.6±3.1 at the end of two year follow up. Their clinical outcome was excellent in 46.3%(n=640),good in 32.2%(n=455),fair in 18.4%(n=255) and poor in 2.8%(n=40) patients as assessed with Modified Mcnab criteria.

The sample size of our study was small. We recommend further comparative studies with large sample size and longer follow up period on this topic to confirm our results.

CONCLUSION

Single level lumbar discectomy in patients with prolapsed intervertebral disc produced satisfactory outcome with minimal disability in majority of our patients.

Conflicts of Interests: None
Grants/Funding: None

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