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Outcome following fenestration discectomy among cases with lumbar disc disease

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Abstract

Background: Low back ache, a common orthopedic morbidity caused due to lumbar disc disease. Fenestration discectomy as a surgical procedure is less time consuming, with lesser blood loss, lesser post-operative complications and does not compromise with stability of spine when compared to other procedures.

Objectives: To assess the functional outcome in terms of pain relief and the neurological recovery following the procedure of fenestration discectomy among the cases with lumbar disc disease.

Methods: Cross sectional study was conducted among the patients admitted with lumbar disc disease in department of Orthopedics in Sri Muthukumaran Medical College Hospital and Research Institute, Chennai during month of June 2016 to April 2018, for elective surgical procedure, fenestration Discectomy. Thirty patients were included and the functional and economic outcome was assessed using Prolo scale. Data was analyzed using SPSS 17.

Results: Mean Preoperative Functional Score was found to be 2.64 and mean Preoperative Economic Score was found to be 2.66. Similarly mean Post-operative Functional Score was found to be 4.19 and mean Post operative Economic Score was found to be 4.27. Outcome using prolo scale was found to be 70% and 305 of cases ion good and moderate outcome and there was no case with poor outcome.

Conclusion: Functional outcome of fenestration technique in terms of return to work and complete pain relief at end of six months had been satisfactory in this study irrespective of the duration of symptoms.

Keywords: Fenestration discectomy, lumbar disc disease, prolo scale, functional outcome

Introduction

Low back ache is a musculoskeletal disorder; one of the most commonly reported problem in every outpatient orthopedic departments. Approximately 70% to 80% people have experienced low back pain at some point in their life. The annual prevalence of low back ache ranges from 15% to 45% based on the study population [1].

Major cause of low back ache is lumbar disc prolapse, a severe morbidity commonly affecting the middle aged population and in recent decades it was reported among the younger generation too. Degeneration of disc due to various factors leads to prolapse of intervertebral disc into intervertebral foramina especially into L4-L5 and L5-S1 level. The L3-L4 and L2-L3 account for the majority of remaining prolapse [2].

Prolapsed intervertebral disc occurs in about 5-10% of all backache patients and is a common cause of sciatica. Even a small prolapsed disc in the presence of a narrow spinal canal can lead to compression of cauda equina and its roots. Mainstay treatment of lumbar disc prolapse has been removal of disc (discectomy). Several studies have reviewed that traditional wide laminectomy produced increased morbidity compared to less extensive procedures like inter-laminar fenestration [3]. The end point of assessment of any therapeutic modality is functional outcome, because that is what matters to the patients.

Lumbar disc disease being a benign condition and pain is predominant factor limiting the activities of the patient, it is anticipated that after the therapy, the patient should have good functional outcome and go back to premorbid state. However, the fact is that the good outcome varies from 49-90% in different studies. This only implies that there should be many factors which influence the outcome [4].

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Since outcome of surgery depends on many factors, such as careful selection of patients, detailed clinical history, physical examination supported by relevant radiological investigations helps to differentiate disc prolapse from other causes of low back pain and sciatica [2].

Surgical removal of prolapsed disc offers a simple and effective solution in management of severe sciatic pain and this method has established its position as reasonably safe procedure with satisfactory results in most of patients. Technique of fenestration for removal of offending disc has been used extensively for years since it has certain advantages over commonly employed laminectomy technique [5].

The technique of lumbar discectomy has undergone significant modifications. In 1982, Spengler [6] described limited disc excision, only the ligamentum flavum and if necessary small portion of lamina inferiorly is removed to expose the prolapsed disc space and the extruded disc were removed. Naji [7], in 1985, reported 93.5% good to excellent result with discectomy by fenestration method and found it to an extremely satisfactory method. Technique of fenestration discectomy is reputed to be less time consuming, with lesser blood loss, with few postoperative complications and it does not compromise stability of spine compared to laminectomy due to inherent minimally invasive nature of surgery [8].

Objectives

Aim of this study is to assess the functional outcome in terms of pain relief and the neurological recovery following the procedure of fenestration discectomy among the cases with lumbar disc disease.

Materials and Methods

This prospective cross sectional study was conducted among the patients admitted with lumbar disc disease in department of Orthopaedics in Sri Muthukumaran Medical College Hospital and Research Institute, Chennai during month of June 2016 to April 2018, for elective surgical procedure, fenestration discectomy. Thirty patients who were between the age group of 20-60 years were included in the study.

Inclusion Criteria

1. Patients with back ache and/radicular pain who showed no signs of improvement with non-operative management
2. Definitive and progressive neurological deficits.
3. Single level disc herniation.
4. MRI proved significant disc herniation.

Exclusion criteria

1. Presence of other associated spine pathology.
2. Multiple level disc prolapse.
3. Previous history of spine surgery.

The study was approved by the ethical committee of this institution. Informed consent was obtained from the patients, before starting the study. Patients' neurological status were assessed using Prolo economic- functional outcome rating scale during pre-operative period and also on the first and 12th post-operative day during the hospital stay and presence of back pain, ability to do their daily work and the neurological

status of the patient were checked after twelve weeks of surgery. Functional and economic outcome was assessed using Prolo scale [9], in this study.

Prolo economic - functional outcome rating scale [9].

This scale is used to determine the outcome following spinal surgeries and it is a sum of the scores given for the economic and functional status of patients. It is graded from 1 to 5. Total score 5 or less is considered to be a poor outcome, a score of 6 or 7 is considered as a moderate outcome and a score of 8 to 10 is considered as a good outcome.

Economic Status

- E1:** Completely invalid
E2: No gainful occupation including ability to do housework/continue retirement activities
E3: Able to work but not at previous occupation.
E4: Working at previous occupation part – time/limited status.
E5: Able to work at previous occupation with no restriction of any kind

Functional Status

- F1:** Total incapacity (or worse than before operation).
F2: Mild to moderate level of back pain / sciatica
F3: Low level of pain and able to perform all activities except sports where applicable
F4: No pain but patient has had one or more recurrence of LBA/Sciatica
F5: Complete recovery, no recurrent LBA, able to perform all previous activities.

Data entry was done in Microsoft excel and analyzed using statistical package for social sciences (SPSS) version 17.

Results

In this study, there were a total of 18 males (60%) and 12 females (40%). The age of the patients varied from 21-55 years with the mean age of 40.01 years.

The duration of symptoms varied from 3 months to 8 months with mean duration of 5.4 months. The symptoms of the patients were back pain (56.67 %), radicular Pain (100 %), Weakness (63.33 %) and numbness (43.33 %).

L4-L5 disc space and L5-S1 disc space was involved in 53.33% and 46.67% of cases respectively in this study. Complications like wound infection and postoperative ileus was reported among 6.67% and 3.33% of the participants and there was no case with dural tear, in this study.

Prolo Scale: The Mean Preoperative Functional Score was found to be 2.64 and mean Preoperative Economic Score was found to be 2.66. Similarly mean Post-operative Functional Score was found to be 4.19 and mean Post-operative Economic Score was found to be 4.27. Outcome of prolo scale is shown in figure 1, which shows 70% of cases in good outcome group and 30% of cases in moderate outcome group and there was no case with poor outcome. Based on the outcome of Prolo scale the characteristics of the patients were grouped in table 2.

Table 1: Pre and post-operative prolo scale

Prolo Scale	Pre-operative		Post-operative	
	Frequency	Percentage	Frequency	Percentage
Economic Scale				
E 1	3	10	0	0
E 2	8	26.67	0	0

E 3	16	53.33	5	16.67
E 4	3	10	12	40
E 5	0	0	13	43.33
Functional Scale				
F 1	2	6.67	0	0
F 2	10	33.33	1	3.33
F 3	15	50	5	16.67
F 4	3	10	11	36.67
F 5	0	0	13	43.33

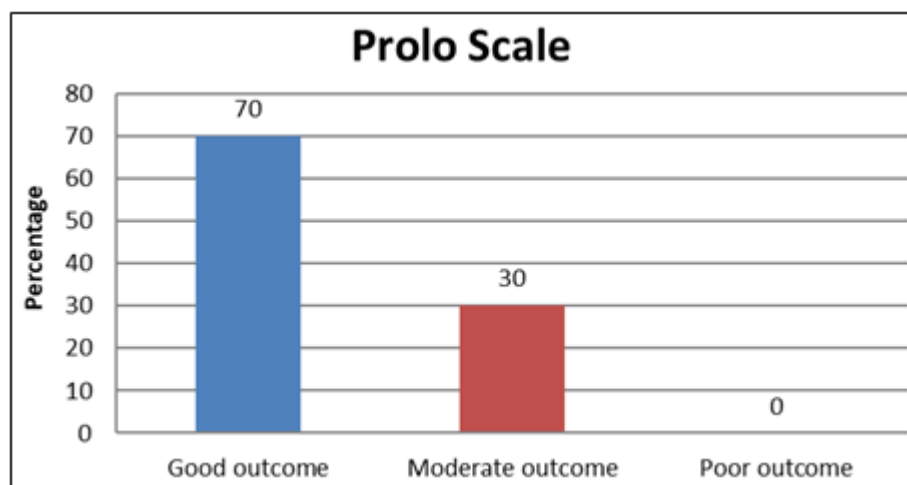


Fig 1: Outcome of Prolo Scale

Table 2: Proportion of cases in different variables and outcome

Variables	Total	Good outcome (%)	Moderate outcome (%)
Age			
< 30 years	7	5 (71.42)	2 (28.58)
30-40 years	11	9 (81.81)	2 (18.19)
> 40 years	12	7 (58.33)	5 (41.67)
Gender			
Male	19	14 (73.68)	5 (26.32)
Female	11	7 (63.63)	4 (36.37)
Occupation			
Light work	14	10 (71.42)	4 (28.58)
Heavy work	16	11 (68.75)	5 (31.25)
Duration of symptoms			
< 4 months	12	8 (66.67)	4 (33.33)
4-6 months	10	8 (80)	2 (20)
> 6 months	8	5 (62.5)	3 (37.5)
Duration of pre-operative unemployment			
< 2 months	13	8 (61.53)	5 (38.47)
3-6 months	11	9 (81.81)	2 (18.19)
> 6 months	6	4 (66.67)	2 (33.33)
Motor Deficits			
Neurological deficit	11	8 (72.73)	3 (27.27)
Motor deficit	8	3 (37.5)	5 (62.5)

Discussion

The present study has been compared to Sangwan *et al.* [3] and Guo *et al.* [10] and the distribution of levels of disc surgery and their complications have been compared. The average duration of pre-operative symptoms were 7.5 months and 14.6 months in Guo *et al.* [7] and Sangwan *et al.* [6] study, respectively whereas in our study it was found to be 5.4 months.

L4-L5 disc space was involved in 46.41%, 60.78% and 53.33% of cases in Sangwan *et al.* [3] Guo *et al.* [10] and in the present study, respectively. L5-S1 disc space was involved in 49.22%, 61.53% and 46.67% respectively in Sangwan *et al.* [3], Guo *et al.* [10] and in the present study.

Complications like wound infection, postoperative ileus and dural tear were 7.84% and 5.88% and 8.77% respectively by

Guo *et al.* [10] and similarly wound infection and dural tear was reported in 3.84% and 11.53% of cases respectively by Sangwan *et al.* [3] and in the present study it was found to be 6.67% and 3.33% without any dural tear.

The present study analyses the results of this surgical procedure on the basis of clinical and functional outcome of the patient. The Prolo economic-functional outcome score has been used to analyse the outcome. The results of this study have been compared to those studies conducted by Pappas *et al.* [11] and Richard *et al.* [12] studies whose outcome as also been analysed using the Prolo scale. Pappas *et al.* [11] reported post-operative mean economic and functional score as 4.5 and 4.05, respectively whereas Richard *et al.* [12] reported mean economic and functional score as 4.6 and 4.5, respectively. These reports were consistent with the present study which

reported mean economic and functional score as 4.27 and 4.19, respectively.

Good, moderate and poor outcome was reported by Pappas *et al.* ^[11] as 77.3%, 15.5% and 7.2%, respectively. Similarly Richard *et al.* ^[12] reported 89%, 7.7% and 3.3% of cases with good, moderate and poor outcome. Whereas in this study proportion of good and moderate outcome cases were reported as 73.33% and 26.67% with no cases in poor outcome group. The present study showed a moderate result of 26.67 % which is higher than the reports of Richard Davies *et al.* ^[12] and Pappas *et al.* ^[11] Good outcome was reported in 73.33 % as compared to 77.30 % reported by Pappas *et al.* ^[11] study and 89 % in the study conducted by Richard Davies *et al.* ^[12] This could probably be due to other factors that affect the outcome of surgery like psychological factors, age distribution, sex distribution, duration of symptoms and other social factors.

Irrespective of duration of symptoms the results were found to be uniform and hence it can be concluded that in this study the outcome of surgery was not dependent on the duration of symptoms.

Patients with mild motor deficits had better outcome when compared to those with moderate or severe deficits and correlated with Sangwan *et al.* ^[3] study. In this study good outcome was found in patients without neurological deficits than those with deficits which is in agreement with Guo *et al.* ^[10] study.

Conclusion

Good functional and neurological recovery has been noted following the surgical procedure of fenestration discectomy in majority of the cases with no cases in poor outcome group. Thus we conclude that the procedure of fenestration technique of lumbar discectomy is a simple and reliable method for treatment of meticulously selected lumbar disc prolapse patients having advantages of less morbidity and devoid of spinal instability. Functional outcome of fenestration technique in terms of return to work and complete pain relief at end of six months had been satisfactory in this study irrespective of the duration of symptoms.

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Declarations

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Conflict of interest: None declared

Ethical Approval: This study was registered with Institutional Human Ethical Committee

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