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Analysis of the Functional Outcome of Discectomy in Lumbar Disc Prolapse

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I. Introduction

Low back pain is thought to occur in almost 80% of adults in some point in their life. Among chronic conditions, back problems are the most frequent cause of limitations of activity in persons less than 45 years. Only routine examination, post operative checkups and upper respiratory tract symptoms surpass back problems as a cause of office visits to physicians. It is the responsibility of the Orthopaedic surgeon to diagnose and appropriately treat this ailment of which lumbar intervertebral disc prolapse is a very common cause. Discectomy is a common procedure carried out for treatment of lumbar disc prolapse. In lumbar disc surgery pain is the most important indication, but neurologic symptoms and signs are also considered, although they are usually of far less functional consequence. Perhaps because they appear to be more objective than the pain related signs. In most reports the post operative changes in neurological signs and functional recovery from pain has shown striking variations. These variations may be caused by several factors, including differences in patient selection and examination technique, but this is difficult to assess because methodologic details are rarely provided. The reproducibility of neurologic signs is moderate and opinions on the value of neurologic signs are divergent. Standard laminectomy and discectomy is a common surgical procedure done for lumbar disc prolapse.The functional recovery including the extent of pain relief and neurological recovery following standard discectomy and the need for any permanent change in the patient's life style post operatively is the topic of this current study.

II. Material And Methods

This study is a randomized prospective analysis of 40 cases treated in NARAYANA MEDICAL COLLEGE AND HOSPITAL,NELLORE duringSeptember 2009 - August 2011. 40 patients who were operated on disc prolapse, during this period were available for follow up. Minimum follow up in this study was 2 months and maximum follow up was 20 months. Consecutive patients of either sex, in the age group 20yrs - 55yrs, who fulfilled the understated criteria, were operated on by conventional standard discectomy without fusion.

- Predominant leg pain that has been present for at least 6 wks.
- Pain should have been decreased by Rest, NSAID's or Epidural Steroids but recurred to the initial level after a minimum of 6-8 weeks of conservative care. Patients with sphincter involvement were not tried with conservative treatment.
- Physical examination should reveal signs of sciatic irritation and possibly objective evidence of localizing neurological impairment in the form of motor or sensory deficits or sphincter involvement.
- Conforming imaging study - Myelogram/ CT Scan / MRI showing the level of neural compression consistent with the patient's physical findings.
- No evidence of spinal canal stenosis, lateral recess syndrome, spondylolisthesis, spondylosis etc. that could mimic disc lesion.
- No previous back/disc operation.

Clinical Examination

A careful and detailed history is essential in the diagnosis of prolapsed intervertebral disc, and often it may be the only guide to the localization of the lesion since the other signs may not be conclusive.

Symptoms like pain,stiffness of the back, tingling, paraesthesia, sensation over the distribution of nerve, bowl and bladder disturbances are clearly interpreted and then various signs like postural deformity, para

spinal muscle spasm, local tenderness, movement of spine, Straight leg raising test, Sciatic nerve stretch test, patrict test, gaenslen test are demonstrated followed by complete neurological examination was done. Routine Xray was taken for patients with significant complains .For patients not relieved by conservative management MRI was taken.After confirmation of disc prolapse, all patients (except those with sphincter involvement) were treated conservatively with Bed rest, NSAID's / muscle relaxants, Physiotherapy, Pelvic traction and in some patients Epidural Steroid infiltration. Most of the patients had a transient improvement in symptoms / signs, but none had a persistent overall improvement. In all patients included in this study, the surgical procedure done was conventional standard discectomy without fusion. All the patients on admission under went all routine investigations for confirming disc prolapse and for their general medical fitness to undergo surgery

Surgical Procedure Under

General Anesthesia, the patient in prone position spine moderately flexed position. A midline incision centered over the affected interspace measuring 8 - 10cms is taken. The lumbo- dorsal fascia is divided in the midline and the muscles are separated close to the bone on one side, exposing the spinous process and laminae adjacent to the suspected space. The spinous process and the para, inter spinous ligaments are cut. The ligamentum flavum is then -incised longitudinally near the mid line. A pledget of wool in inserted underneath it for the protection of the theca and roots and the excision of ligamentum flavum is completed. Laminectomy is done and a window is made by nibbling the surrounding lamina using a rounger, as a rule in an upward direction (cephalad), since it is preferred to identify the root above the disc The theca and the nerve root may be immediately evident upon opening the epidural space or may be hidden under a layer of epidural fat, traversed by numerous veins.The nerve root is fully exposed and its position in relation to the protrusion is verified. The nerve root is gently mobilized by blunt dissection if adherent to the protrusion and retracted medially. If the protrusion lies medial to the root, retraction of the root medially may be made easier by decompression of the protrusion.With safe retraction of the root, the protrusion is clearly visualized as a white/yellow glistening bulge on which a cruciate incision is made with a pointed knife. The extruding disc material is removed using a disc forceps. The canal patency is checked using a rubber catheter to confirm adequate decompression of the nerve roots. Wound is washed with saline and closed in layers using vicryl.

Post-operative management:

- All patients were put on spinal muscle strengthening exercises, when they could tolerate, and advised to continue after discharge from hospital.
- All patients received routine antibiotics from the night before surgery upto 4 days after surgery.
- One patient who had superficial wound infection received antibiotics for an extended period.
- After surgery and discharge from hospital all patients were regularly followed up and evaluated at 6 weeks, at 6 months and at one year

Minimum follow up in this study was 2 months and maximum follow-up was 20"months with a mean of 9.8 months

Criteria For Evaluation Of Patients
[Pre- Operative & Post – Operative]

The PROLO Economic functional outcome rating scale was used to evaluate all the patients pre-operatively and post operatively at time of discharge and during regular follow-up visits.

Prolo Scale: Economic Status:

E1. Completely invalid
E2.No gainful occupation including ability to do house work orcontinue retirement activities
E3. Able to work but not at previous occupation.
E4. Working at previous occupation part time or limited status.
E5. Able to work at Previous occupation with no restrictions of any kind

Functional Status:

F1. Total incapacity (or worse than before operation)
F2. Mild to moderate level of back pain or sciatica (or pain same as before operation but able to perform all daily tasks to living)
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 low back pain or sciatica.
F5. Complete recovery, no recurrent episodes of low back pain, ableto perform all previous activities, including sports where applicable.

In the prolo scale, the total score represents the sum of individual functional and economic scores. The outcome designation of POOR was a total score of < 5, a MODERATE outcome was a score of 6 or 7, and GOOD outcome was a score of 8 to 10

III. Results

This series consisted of 40 patients with disc prolapse treated with laminectomy and discectomy. This study is conducted on patients with age ranging from 20 to 65 years with a mean age of 37.55 years at the time of surgery.. Out of 40 patients, 32(80%) are males and 8(20%) are females thus showing a male preponderance. 60% of patients in this study had onset of symptoms at work place or in doing household work in case of housewives. The events which had precipitated the symptoms were analyzed and found as in (table 1). Lifting / carrying inappropriate weight was the commonest cause for onset of symptoms (48%) . Of the 40 patients 23 had onset of symptoms at work place or in doing household work (in cases of housewives). 62.5% of patients in this series were engaged in strenuous work and 37.5% in light work. The commonest complaints in this series was back pain (95%) and radicular pain (100%). 1 patient had bladder involvement along with other motor and sensory deficit. Out of 40 patients 19 patients (47.5 %) had radiating pain on L-side & 6 patients (15 %) had bilateral radiating pain The commonest finding on examination was positive SLRT (90%) and restricted spinal movements (92.5%). Motor deficits were noted in 62.5% & sensory deficits in 45%. Motor and sensory deficits were divided into three categories mild, moderateand severe. Sensory deficit was defined as Mild upto 25% sensory' loss in a particular dermatome, Moderate upto 75% sensory loss in a particular dermatome, Severe - 100% - sensory loss and involving other dermatomes as well. Motor deficit was defined Mild grade 4/5 in the muscle group, Moderate grade 3/5 and Severe grade 2/5 and less or foot drop and involving other groups of muscles and these deficit is interpreted in (table 2) Mean duration of symptoms before surgery in our series was 6 months All patients were given a trial of conservative treatment except for one patient who had sphincter involvement. Level of disc prolapse is shown in (table 3) and commonest level of disc prolapse was found to be L-4-L5in our study. Pre operative PROLO scores are given in (table 4a and b) Of the 40 patients 35 underwent a partial laminectomy and discectomy and 5 underwent a total laminectomy and discectomy. Type of disc prolapse is shown in (table 5) Complications noted during and after surgery is shown in (table 6) and mean complication rat was 7.5%. Meanfollow-up of 40 patients was 9.98 months with a minimum follow up of 2 months and maximum of 20 months. At the first evaluation after surgery out of 40 patients, in 30 sciatica improved fully while 7 had partial improvement and **1** had no improvement. In 2 patients the neurological deficit worsened after surgery from mild to moderate degree**.** POST OPERATIVE ECONOMIC & FUNCTIONAL OUTCOME SCORES AFTER A MEAN FOLLOWUP OF 9.98 MONTHS are shown in (table 7a and 7b). COMPARISON OF PRE-OPERATIVE AND POST-OPERATIVE PROLO SCORE **is shown in (table 8a and b) Out** of 40 patients post operatively 30 patients had GOOD outcome, 7 patients had MODERATE outcome, 3 patients had POOR outcome The mean pre-operative economic and functional scores were 1.875 and 1.9 respectively. The overall post-operative change of economic score was 2.225 and the overall change of functional score was 2.275

IV. Discussion

Laminectomy and discectomy for herniated lumbar disc is one of the most common operation performed by orthopaedic surgeons [(64)]. Ever since its introduction into clinical practice, the indications for surgery have been subjected to debate as explained in previous section. There have been many descriptions of lumbar disc disease, addressing diagnosis, non-operativetreatment, and indications for surgery, surgical technique and patient outcome. The outcome studies of lumbar disc surgery document a success rate between 38-99% according to used evaluation criteria[1,2,3]In literature, there are no common criteria In measuring the outcome in the objective assessment of the results of lumbar disc surgery. Interestingly the results of lumbar disc disease presents a challenge to surgeons [4]. Dissimilarity among population undergoing surgery compared the problems of wide variability in analyzingresults [5]. This subjective and objective observation and the implication from data assembled tend to confuse rather than to illuminate. Clearly there is a need for simple systematic protocol for analyzing results of lumbar disc disease. Among several often-referenced studies there is a tendency to analyze data in various ways. Therefore while doing our study also it was dilemma to grade patients postoperatively in terms of functional outcome. After going through many studies we found that the common method to categorize patient's outcome as Excellent, Good, Fair or Poor. Criteria for assignment of responders to a group also vary. Outcome of a few reference studies with different criteria have been mentioned below[6,7,8]In general those with 'EXCELLENT results have no back or radicular pain and are able to perform all occupational and recreational activities. 'GOOD' indicates minimal pain and slight restriction. 'FAIR' implies significant pain and restriction or no response to treatment. 'POOR' means patient has major impairment or is further

compromised by treatment. Some authors express observation essentially in same manner with same category responses differing only in name, i.e. complete relief of pain, partial relief, no relief or pain worse[9]In the study of **Harish Chandra et al,**Loon's criteria was used. Excellent results were seen in 56.4%; Good result in 25.6%, fair 10.3% and poor in 7.7%. In all, 82% had satisfactory outcome[10,11] Joel **N Abramowitz categorized** patient's outcome into 3 groups Good, Fair & Poor. A good outcome was defined as a situation where patient had returned to premorbid **level of activity and where he was not limited** by residual symptoms and was not taking narcotic medication. A fair outcome was defined as a situation where patient had not returned to work or was taking narcotic medication but had improved after surgery. A poor outcome was defined as a situation where patient had not improved[12]In his study of 108 patients, 72 patients showed Good outcome, 34 -Fair and 2 Poor outcomes. In the study of **Lewis et al** (1987) the outcome was divided as completely relieved, same or worse. 100 patients were followed for 5 - 10 years[13].The results of lumbosacral Disectomy appear favorable as compared to Weber,s study[14,15]S.K. **Gupta et al** (1989) used modification of grading by **Sharmaand Shankaran**. - They used 5 criteria's which includes -- back pain, relief of leg pain, spinal movement, occupation and patient's satisfaction[16].In the study of **Junge et al -** out of 381 patients 89% and 86% were followed up for 6 months and 12 months respectively.. Low back pain of 6 or more on Visual Analog Scale, reduced working ability of more than half a year, no return to previous job, regular visits to treating physicians or hospital stay have been chosen as a criteria for bad outcome.Good- None of the above mentioned criteria, Moderate - One of the criteria or two of the criteria if back pain is between 0 and 3.Bad - Two criteria and back pain more than 3 or all these criteria. 51.5% had good outcome, 28.4% moderate and 20.11 % bad outcome at 12 months follow up. There was no difference in 6 months outcome and 12 months outcome[17]. It is evident from the above that for analyzing outcome of lumbar disc disease various authors have chosen criteria which differ from study to study and duration of follow up also differ significantly. For analyzing functional. Status there are long descriptive functional status questionnaire for low back pain which have a scoring pattern and are too complex to be used bed side clinically e.g. Million visual analog scale, Roland disability questionnaire, Waddell disability index and Oswestory disability questionaire.Although these scales define functional status more accurately they are too complex to be used in clinical practice[18].Individual author's criteria for placement of patients within a group vary greatly. There is a definite need of criteria, which should consist both of patient's estimates of his/her condition in quantitative fashion and physician's judgment of patient's condition. The former is addressed in comprehensive manner by Oswestry low back pain disability questionnaire. This does not include physician's judgment. So patient, for secondary gain may rate his/her degree of disability higher than objective observation. Further it does not assess economic capacities before and after treatment.A simple semiquantitative, universally acceptable and applicable scale analysing the data from a treatment regimen is imperative. Such a scale must permit the treating physician to categorize the patient's functional and economic status before and after treatment as objectively as possible. Some hold the opinion that neither the patient nor the treating physician can impartially evaluate the results. Therefore assesement should be left to a disinterested party. In practice such an ideal arrangement can be afforded only rarely by major teaching centers. Alternatively, some scale that quantifies the patient's pre and post operative status with minimal potential for observer bias can be used[19].The functional economic outcome rating scale or PROLO scale based on modification of rating scale used by Urist **and Dawoon -** is receiving increasing consideration by orthopaedic and neuro surgeons in evaluating the outcome[20,21]This simple ordinal scale is intended to provide surgeons with a common means by which to evaluate and express the outcome of lumbar spine procedure and to compare the economic and functional status of populations at the time of admission and after operation. This scale can also be used as a common standard to compare the status of population undergoing different treatment and their effectiveness as glasgow coma scale in head injury evaluation.The advantage of such a system like the Prolo scale are obvious. A simple ordinal rating scale can be used to compare patient's within groups and patients in other institutions. unless a standardized scale is accepted for rating patient's out come, this problem of evaluating differently will continue. But in our study we used Prolo scale to evaluate the patients which uses both economic and functional outcome as Good , Moderate and poor outcome . We found it as suitable scale to measure improvement in the patient from pre operative condition to postoperative condition. The limitation in our study is that the sample size is less and the follow up duration is not very long so as to demonstrate the long term complications

V. Conclusion

Younger patients, age group(20-35yrs) have statistically better outcome compared to higher age groups (> 35yrs). .In this study Good outcome is seen in 75% of patients, Moderate outcome in 17.5% and Poor in 7.5%. Change in the outcome score(from pre-op to post-op) in additional to the total post-operative score gives a better idea of the recovery as compared to the pre-operative state.The Prolo functional economic outcome

rating scale for evaluation of patients with disc prolapse appears to be a useful tool. As use of this scale becomes more widespread, the outcome with respect to different variables, and also with respect to different techniques / treatment modalities can be compared more objectively to improve the final outcome. Standard discectomy is an excellent surgical procedure with good functional outcomes .

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Case illustration

Figure 1a and b

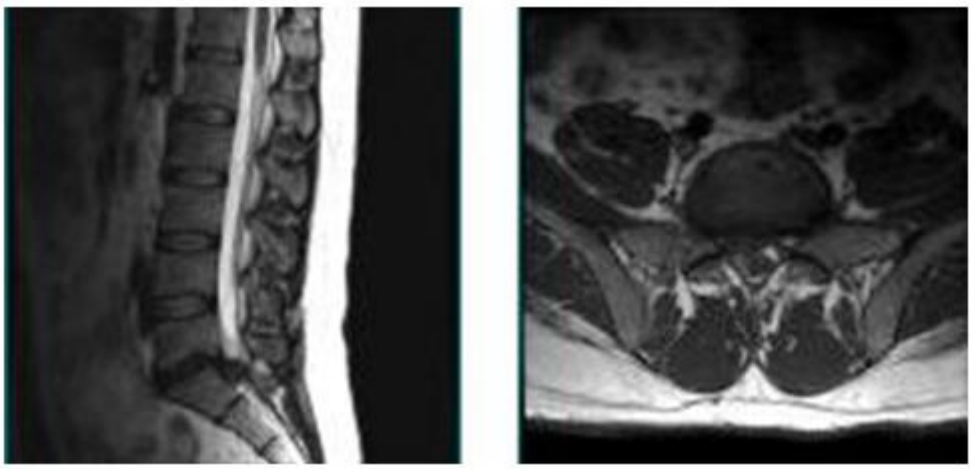

Figure 2

Figure 3

Figure 4a

Figure 4b

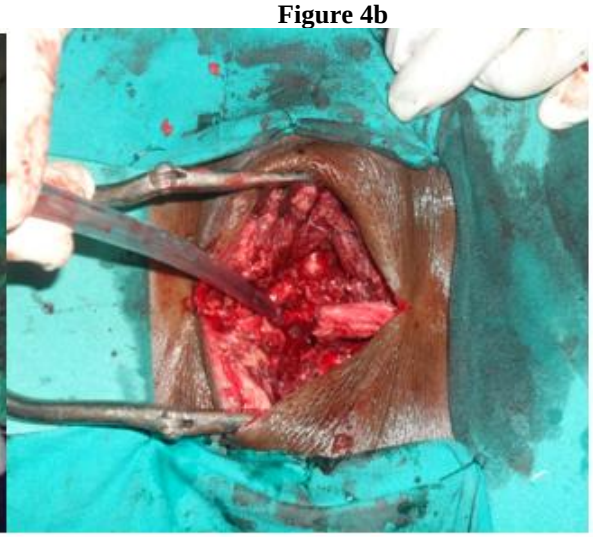

Figure 4C

Legends

Figure 1a and **1b** shows intervertebral disc space L5-S1
Figure 2 shows pre operative X – Ray L.S. Spine lateral view shows decreased intervertebral disc space L5-S1
Figure 3 shows postoperative X Ray L.S. spine AP view shows Spinous process being removed
Figure 4a and **4b** shows intraoperative phothographs
Figure 4c shows closure with drain fixed.

Tables:

Table 1

Mode of onset	No of patients	Percentage
Lifting or carrying inappropriate weight	19	47.5%
Twisting injury	2	05.00%
Trauma/Fall	2	05.00%
Insidious	17	42.5%

Table -2

	Mild	**Moderate**	**Severe**
Sensory deficit	13	3	1
Motor deficit	17	6	2

Table -3

Level	**No. Of Patients**	**Percentage**
L2 - 3	1	1.5%
L 3 - 4	2	3.0%
L 4 - 5	32	80.5%
L 5 - S 1	05	15.0%

Table 4a Economic status

Scores	No of patients	Percentage(%)
E1	08	20
E2	29	72.5
E3	03	07.5
E4	00	0
E5	00	0

Table 4b Functional status

Score	Np Of Patients	Percentage(%)
F1	08	20
F2	28	70
F3	04	10
F4	0	0
F5	0	0

Table -5

Type	**No. Of Patients**	Percentage
Protrusion	25	42.5%
Extruded	11	47.5%
Sequestered	07	17.5%
No Bulge	01	02.5%

Table - 6

Complication	**No. Of Patients**	**Percentage**
Dural tear	1	02.5%
Retention of urine	0	0%
Wound infection	1	2.5%
C.S.F. leak	0	0%
Neurological deficits	1	2.5%

Table 7a Post Operative

Economic Status

'Score	**No. Of Patients (N=40)**	**Percentage**
El	0	0%
E2,	02	5%
E3	08	20%
E4	12	30%
E5	18	45%

Functional Status: TABLE -7b

Score	No. Of Patients (N=40)	Percentage
F1	0	0%
F2	02	5%
F3	07	17.5%
F4	15	37.5%
F5	16	40%

Economic
Post-Operative **Pre-Operative**

Table – 8 (a)

Economic	**El** (N=8)	**E2** (N=29)	**E3 (N=3)**	**E4(N=O)**	E5(N=O)
El	0	0	**0**	.0	0
E2	1	1	0	0	0
E3	1	7	0	0	0
E4	**4**	.6	2	0	0
E5	2	15	1	0	0

Functional
Post-Operative Pre-Operative

Table – 8(b)

Functional	**F1 (N=8)**	**F2 (N=28)**	**F3 (N=4)**	**F4(N=O)**	**F6(N=O)**
F1	0	0	0	0	0
F2	.1	1	0	0	0
F3	1	5	**1**	.0	0
F4	4	9	2	0	
F5	2	13	1	0	0