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A Prospective Clinical Study of Surgical Management of Lumbar Intervertebral Disc Prolapse in Adults by Laminectomy and Discectomy

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Abstract
Back pain, is now appearing as a modern international epidemic. Upto 80% of people are affected by this symptom at some time in their lives. Intervertebral disc disease and disc herniation are most prominent in otherwise healthy people in the 3rd and 4th decades of life. It accounts for a majority of cases of low backache seen by an orthopaedician in clinical practice and is a major contributor of functional disability.In 1934, Mixter and Barr published their study that concluded that laminectomy with decompression and extraction of herniated lumbar disc could, improve suffering caused by sciatic pain. Open discectomy is one of the standard procedure for operative intervention in patients with herniated limber discs whose conservative treatment has failed. However, the outcome studies of lumbar disc surgery document a success rate of 51 to 89%, in spite of advances in investigations, operative technique and postoperative care. Therefore the need for appropriately presenting and reviewing this subject is important.

Aims and Objectives

1) *To study the outcome of the surgical management of lumbar intervertebral disc prolapse in adults by laminectomy and discectomy*
2) *To know the complications following laminectomy and discectomy for lumbar intervertebral disc prolapse*

Methods: *30 Cases of lumbar disc prolapse treated with laminectomy and discectomy satisfying inclusion and exclusion criteria treated in MGM Hospital fromjuly 2015 to oct 2017 were studied.*

Results: *The present study comprised of 30 Cases of lumbar disc prolapse treated with laminectomy and discectomy. The follow up of upto 2 years. Male patients (60%) outnumbered female patients (40%) in incidence. More common in 40 to 60 years age group with the average of 44.9 years (18 to 64 years). Radicular pain was the most common symptom. Positive SLRT was the most common sign.76.67% of cases had a pre-op JOA score between 6 and 10.L4 -L5 was the most common disc to herniated. Average duration of hospital stay was 10.3 days ranging from 6 days to 24 days.93.3 % of cases had a post-op JOA score between 11 and 15.86.6% cases had a good outcome. Complications were superficial infection in 2 cases (6.6%), dural rupture in 2 cases(3.3%).*

In our study we achieved 86% excellent to good results, 10% of fair results with a complication rate of 3.3% only. The results were comparable to other studies.

Keywords: *laminectomy, Discectomy, Lumbar Disc prolapsed*.

1. Laminectomy and Discectomy

Numerous retrospective and some prospective review of open disc Surgeries are available. The results of these series vary greatly with good results ranging from 46-97% and re operation rate of 9%.

The need for this study is to evaluate the results of laminectomy and discectomy for Lumbar disc prolapse. With regard to patients post operative subjective evaluation of low back pain and radicular symptoms, the objective physical findings and the complications

2. Materials and Methods

30 Cases satisfying the inclusion and exclusion criteria in MGM Hospital Warangal from July 2015 to Oct 2017 were studied.

Inclusion Criteria

1. The patient with predominant unilateral/ bilateral leg pain extending below knee that has present for at least 6 weeks.
2. Patients with low back pain with radiculopathy with neurological deficits which is not relieved by conservative means.
3. Patients with less than 3 level disc prolapse.

Exclusion Criteria

1) Patients with Acute disc prolapse
2) Patients with disc lesion along with spondylolisthesis, spondylosis, scoliosis
3) Patients who are medically unfit for surgery
4) Patients with multi level disc prolapse

2.1. Method of Collecting Data

All the patients were assessed clinically. A detailed history was obtained and they were subjected to a thorough clinical examination. Radiological investigations (plain x-ray and MRI) were carried out to confirm the diagnosis and know the level of the lesion. The patients were also assessed preoperatively and postoperatively with the Japanese Orthopaedic Association low backache score.

All patients underwent conventional open laminectomy and discectomy surgery in the prone position. The level and type of disc protrusion was observed intraoperatively. Postoperatively the patients were followed up in the immediate post-operative period. 1 month and 6 months after the surgery.

2.2. Operative Procedure

Under general anaesthesia the patient is positioned in a modified kneeling position (in this position abdomen hangs free, minimizing epidural bleeding; preferred approach). A mid line skin incision is made centring over the spinous process as per the preoperative location of the level, soft tissues are elevated sub periosteally from the spinous process and lamina. spinous process is removed ,followed by laminectomy . The dura and the nerve root are retracted to identify the disc pathology. The disc is removed extradurally. Haemostasis is achieved and the wound is closed in layers.

2.3. Post Operative Management

Neurological function is closely monitored after surgery. The patient is allowed to turn in bed at will. Patient is allowed to sit up and walk using a lumbosacral orthosis. Lifting, bending and stooping are prohibited for the first several weeks. The sutures are removed in ten to fourteen days and patient is discharged. As the patients strength increases, gentle isotonic leg exercises are started. Between the fourth and sixth post-operative week, back school instruction is resumed or started provided pain is minimal. Lifting, bending and stooping are gradually restarted after the sixth week.

Increased sitting is allowed after the fourth week, but long trips are to be avoided for at least three months. Lower extremity strength is increased from the eighth to twelfth post-operative weeks. Patients with jobs requiring heavy labour or long periods of driving are not allowed to return to work until twelve weeks and then to modified duty.

Some patients with jobs requiring exceptionally heavy manual labour may have to permanently modify their occupation or seek a lighter occupation.

Keeping the patient out of work beyond 3 months rarely improves recovery or pain relief.

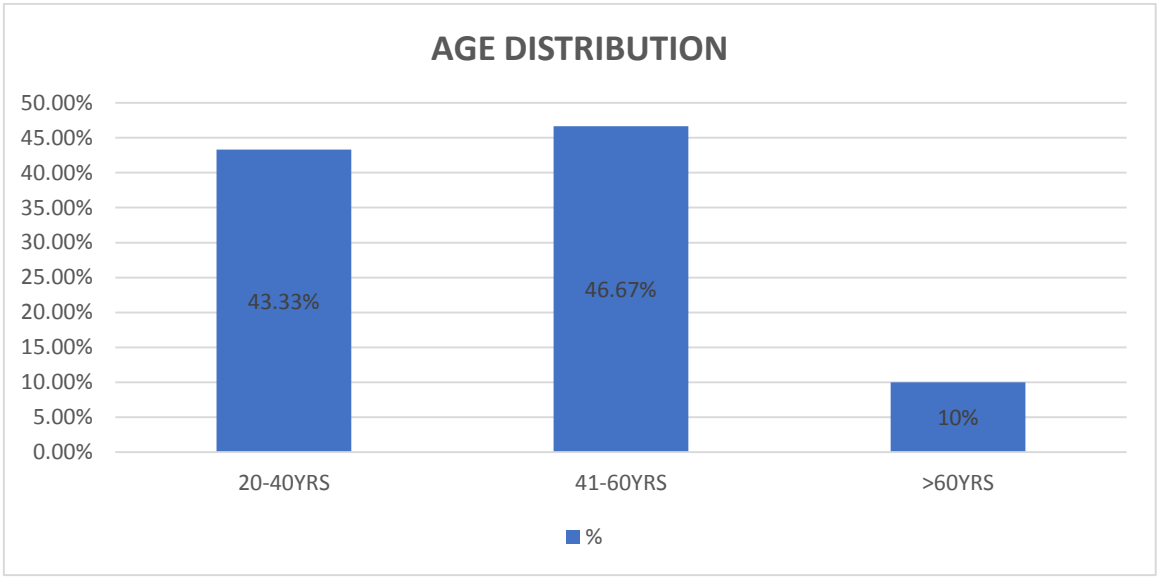
2.4) Follow up

Postoperatively the patients were followed up in the immediate post-operative period. 1 month and 6 months after the surgery.

The Japanese Orthopaedic Association low backache score was used pre and postoperatively to assess the outcome analysis of functional status.

3) Table 1 Age Distribution

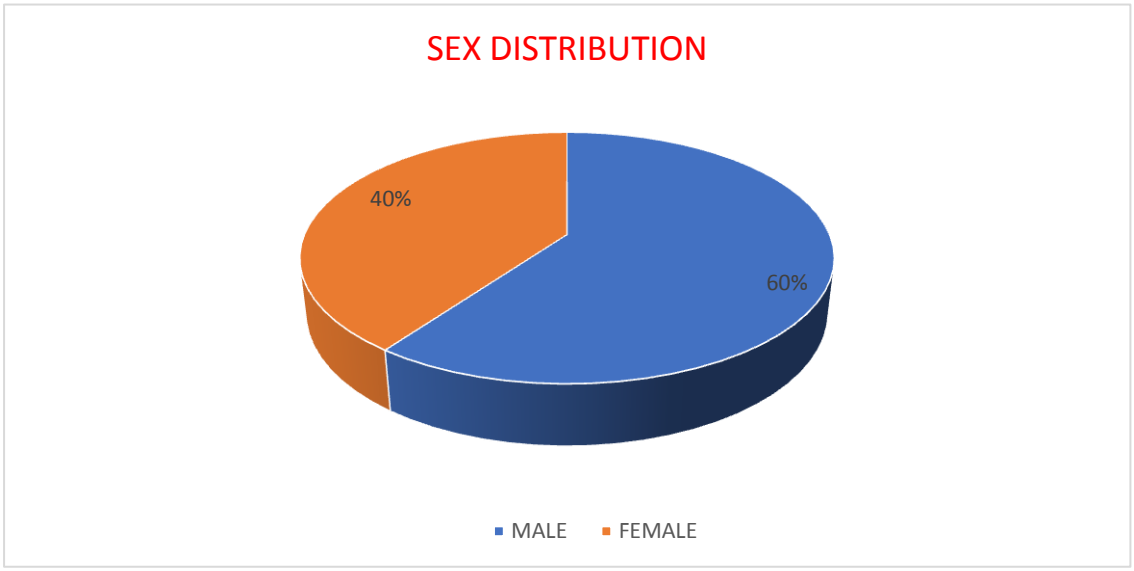
AGE	NO. OF CASES	PERCENTAGE
20-40yrs	13	43.33%
41-60yrs	14	46.67%
>6oyrs	3	10%
TOTAL	30	100%



In our study out f 30 patients, 13 cases (43.33%) were in age group of 20-40yrs, 14 cases (46.67%) were in age group of 41-60yrs, 3 cases (10%) were in age group of>60yrs.

Table 2 Sex Distribution

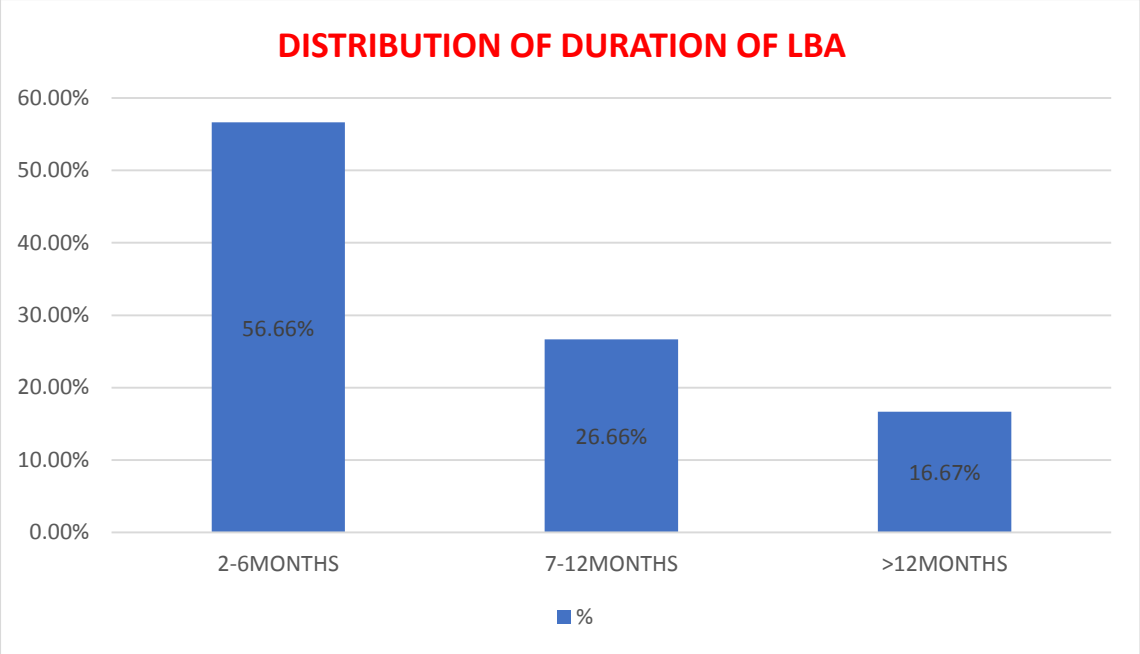
SEX	NO. OF CASES	PERCENTAGE %
MALE	18	60%
FEMALE	12	40%
TOTAL	30	100%



In our study among 30 patients, 18 cases (60%) were males and 12 cases (40%) were females.

Table 3: Distribution of Duration of LBA

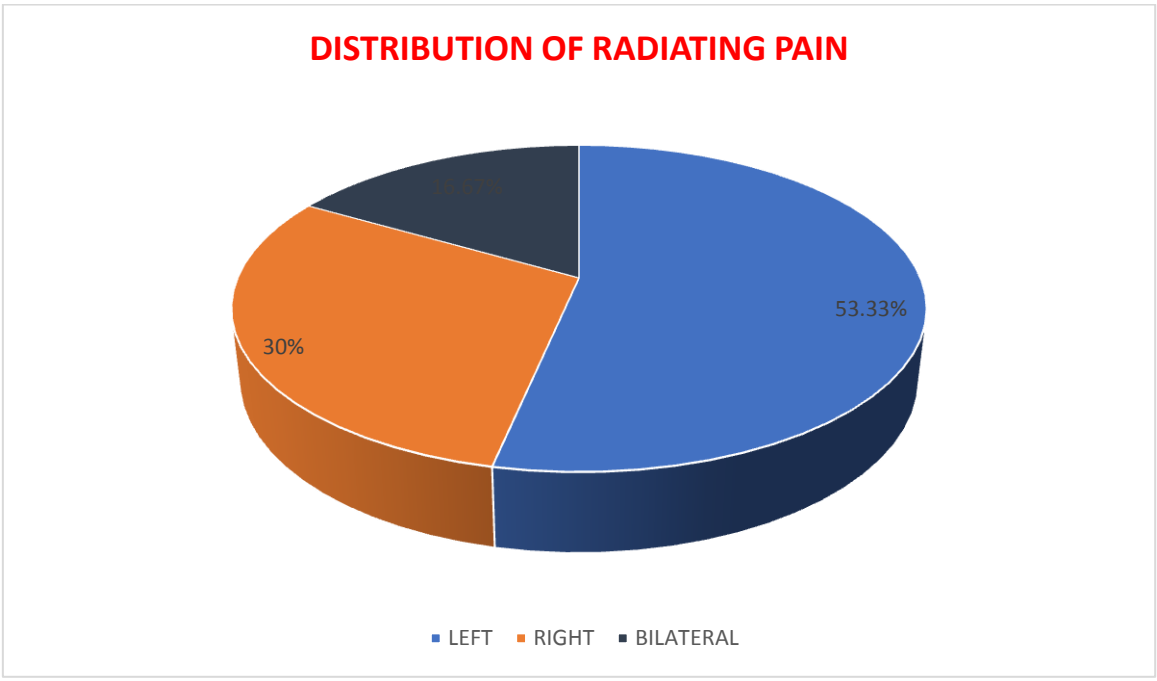
LBA DURATION IN MONTHS	NO. OF CASES	%
2-6MONTHS	17	56.66%
7-12MONTHS	8	26.66%
>12MONTHS	5	16.66%



In this study out of 30 cases,17 cases(56.66%) had low back ache with duration 2-6 months, 8 cases (26.66%) had low back ache with duration 7-12 months, 5 cases (16.67%) had low back ache with duration >12 months.

Table 4: Distribution of Radiating Pain

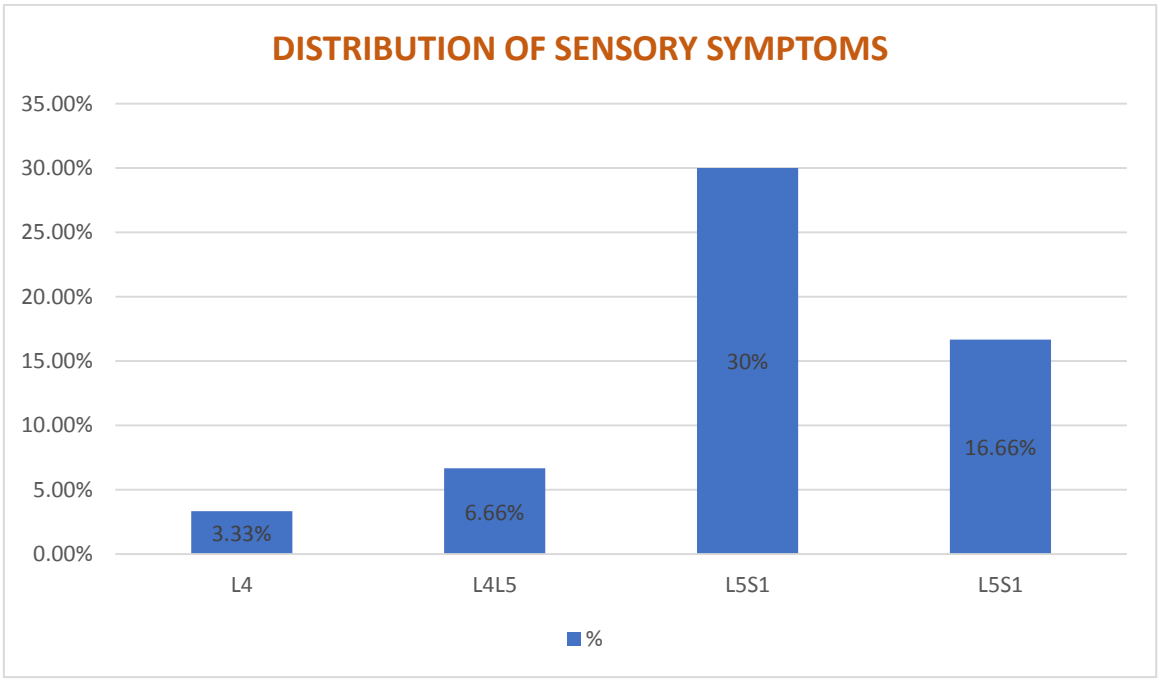
RADIATING PAIN	N0. OF CASES	%
LEFT	16	53.33%
RIGHT	9	30%
BILATERAL	5	16.66%



In this study out of 30 patients, 16 patients (53.33%) had left radiating pain,9 patients (30%) had right radiating pain, 5 patients (16.66%) had bilateral radiating pain

Table 5: Distribution of Sensory Symptoms

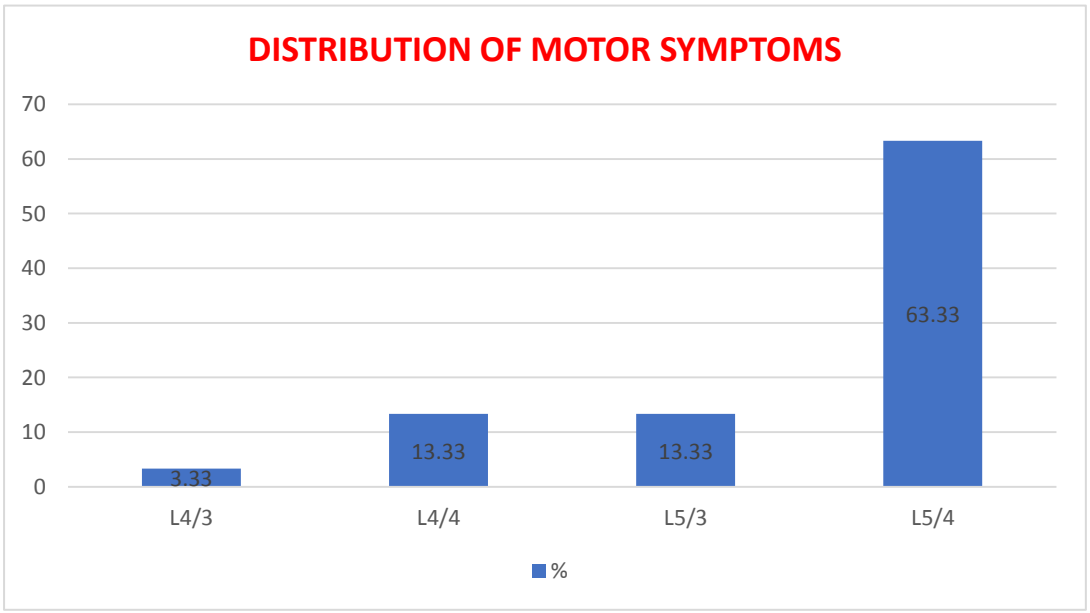
SENSORY SYMPTOMS	NO. OF CASES	%
L4	1	3.33%
L4,L5	2	6.66%
L5	9	30%
L5S1	5	16.66%



In this study out of 3o patients, one patient (3.33%) had sensory deficit in l4 dermatome, 2 patients (6.66%) had sensory deficit in l4,l5 dermatome, 9 patients(30%) had sensory defocit in l5 dermatome, 5 patients(16.66%) had sensory deficit in l5, s1 dermatome

Table 6: Distribution of Motor Symptoms

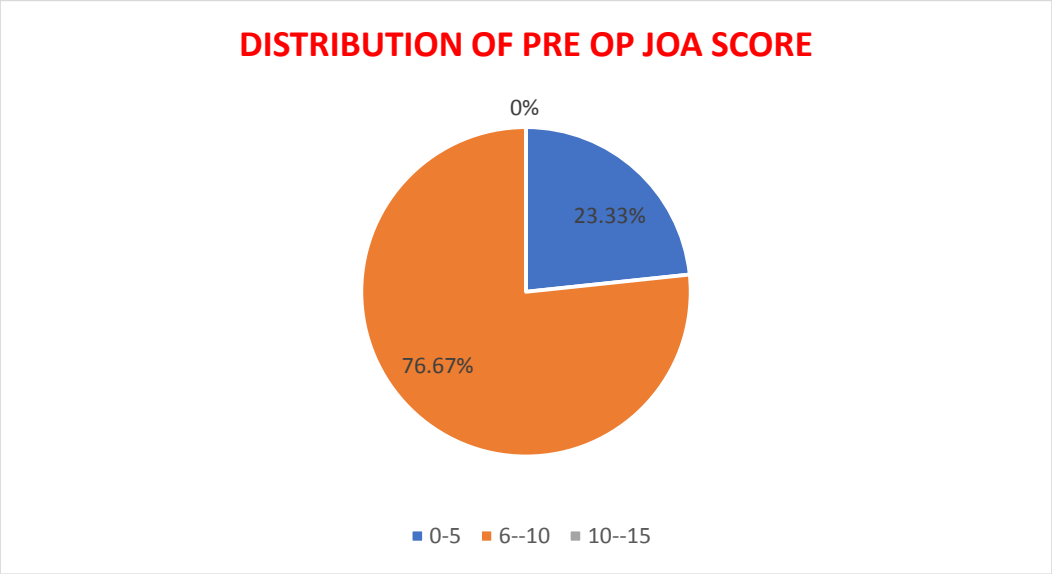
MOTOR SYMPTOMS / GRADE	NO. OF PATIENTS	%
L4/3	1	3.33%
L4/4	4	13.33%
L5/3	4	13.33%
L5/4	19	63.33%



Out of 30 patients, 1 patient (3.33%) had 3/5 power in l4 nerve root supply, 4 patients(13.33%) had 4/5 power in l4 nerve root supply, 4 patients (13.33%) had 3/5 power in l5 nerve rooot supply, 19 patients (63.33%) had 4/5 power in l5 nerve root supply

Table 7: Distribution of pre-op JOA score

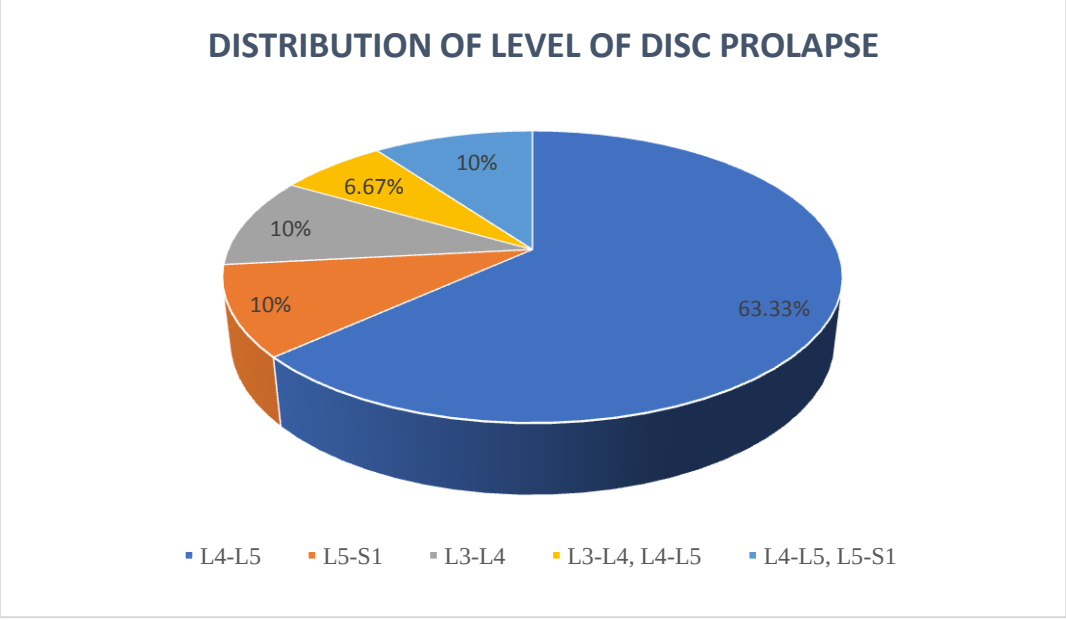
Pre-op JOA score	No. of cases	%
0-5	7	23.33%
6-10	23	76.67%
11-15	0	0



In our study among 30 patients, 7 patients (23.33%) were having pre-op JOA score of 0-5, 23 patients (76.67%) were having pre-op joa score of 6-10, zero patients were having pre-op JOA score of 11-15.

Table 8: Distribution of Level of Disc Prolapse

LEVEL OF DISC PROLAPSE	NO. OF CASES	%
L4-L5	19	63.33%
L5-S1	3	10%
L3-L4	3	10%
L3-L4, L5-S1	2	6.67%
L4-L5, L5-S1	3	10%
TOTAL	30	100%



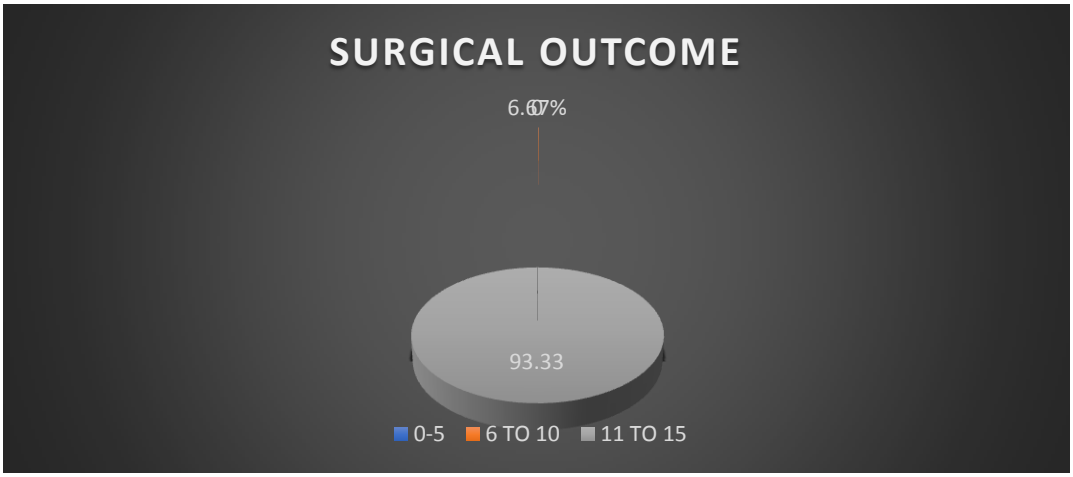
In our study among 30 patients, 19 cases(63.33%) were with l4-l5 disc proplapse, 3 cases(10%) were with l5-s1 disc prolapse,3 cases(10%) were with l3-l4 disc prolapse, 2 cases(6.67%) were with l3-l4, l4-l5 disc prolpse, and 3 cases(10%) were with l4-l5, l5-s1 disc prolapse.

Surgical Outcome

The post operative JOA score after a follow up of upto 2 years is given below.

Table 9: Distribution of Post-Op JOA Score

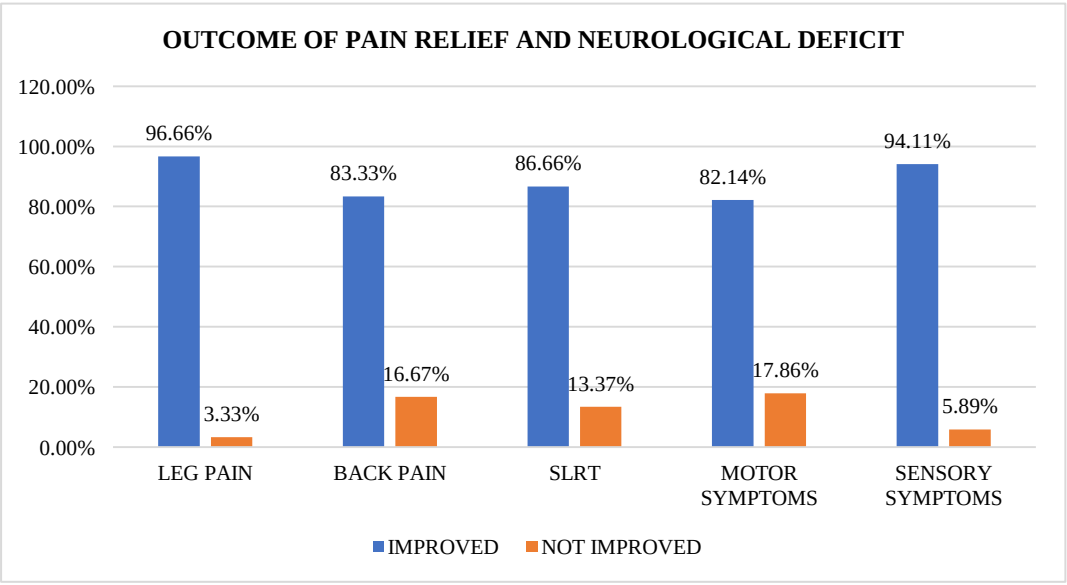
POST OP JOA SCORE	NO. OF CASES	%
0-5	0	0
6-10	2	6.67%
11-15	28	93.3%
TOTAL	30	100%



Out of 30 cases, zero cases had post op JOA score of 0-5, 2 cases (6.67%) had post op JOA score of 6-10, 28 cases (93.33%) had post op JOA score of 11-15.

Table 10: Outcome of Pain Relief and Neurological Deficit

OUTCOME	IMPROVED{%}	NOT IMPROVED{%}
LEG PAIN	29{96.66%}	1{3.33%}
BACK PAIN	25{83.33}	5{16.67%}
SLRT	26{86.66}	4{13.37%}
MOTOR SYMPTOMS	23{82.14}	5{17.86%}
SENSORY SYMPTOMS	16{94.11}	1{5.89%}

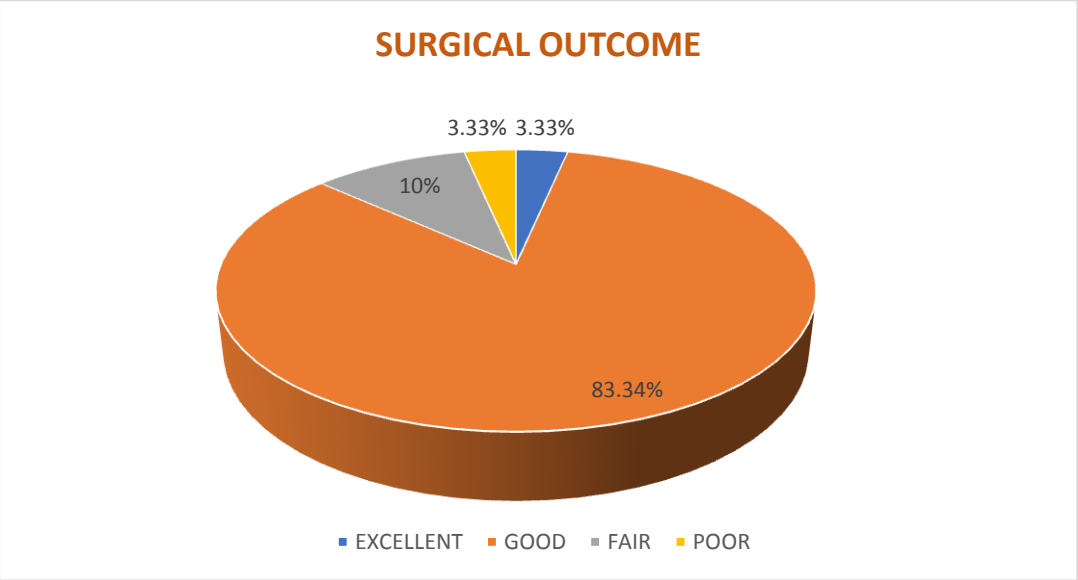


Out of 30 patients, all 30 had leg pain, back pain and positive SLRT, among them leg pain subsided in 29 patients, back pain subsided in 25 patients, and SLRT improved in 26 patients

28 patients had motor deficits, 23 patients improved, 5 patients had not improved, 17 patients had sensory symptoms, 16 patients improved,1 patient not improved

Table 11: distribution of surgical outcome on the basis of JOA score

OUTCOME	NO.OF CASES	%
EXCELLENT	1	3.33%
GOOD	25	83.34%
FAIR	3	10%
POOR	1	3.33%

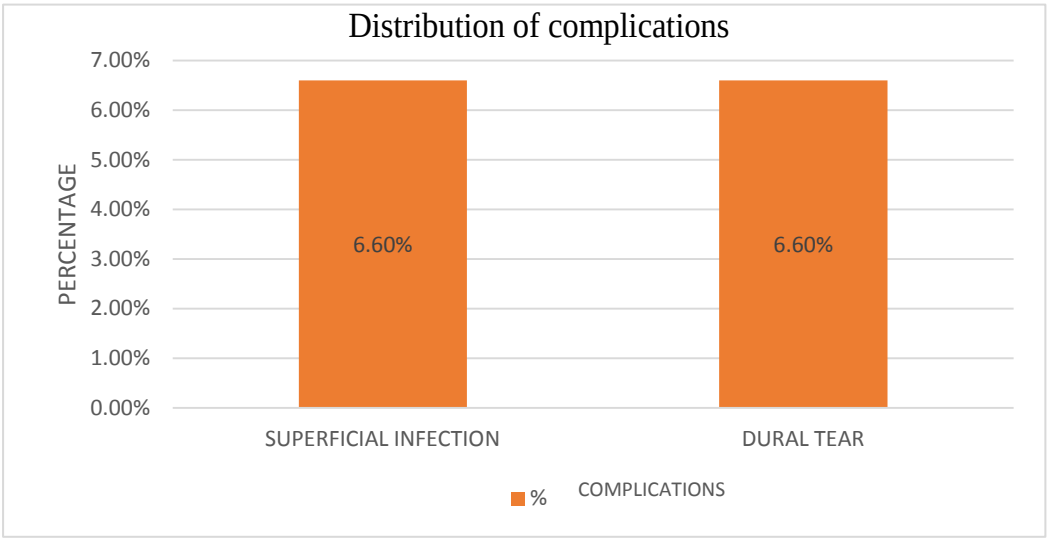


In this study out of 30 patients, 1 patient (3.33%) had excellent outcome, 25 patients (83.34%) had good outcome, 3 patients (10%) had fair outcome, 1 patient(3.33%) had poor outcome.

Complications encountered in our study were

Table 12: Distribution of Complications

COMPLICATIONS	NO. OF CASES	%
SUPERFICIAL INFECTION	2	6.66
DURAL TEARS	2	6.66



In our study among 30 patients, 2 cases (6.66%) had superficial infection and 2 patients(6.66%) had dural tear as complication.

Japanese Orthopaedic Association low backache score

1. Subjective symptoms	Score
A. Low Back pain	(3 points)
a. No Low back pain	3
b. Occasional mild low back pain	2
c. Low back pain always present / severe low back pain occurs Occasionally	1
d. Severe low back pain always presents	0
B. Leg pain and / or tingling	(3 points)
a. No lower extremity pain or numbness	3
b. Occasional mild lower extremity pain and numbness	2
c. Lower extremities pain and numbness alwayspresent / Severe lower extremities pain and numbness occur occasionally	1
d. Severe lower extremities pain and numbness	0
C. Ability to walk	(3 points)
Normal walking	3
b. Walking at least 500m is possible, but pain, numbness & weakness are felt	2
c. In walking 500m or less, pain, numbness and weakness occur, and walking becomes impossible	1
d. In walking at most 100m, pain, numbness and weakness occur and walking becomes impossible	0

2. Clinical Findings	Score
SLRT	(2 points)
a. Normal	2
b. 30 degrees – 70 degrees	1
c. Less than 30 degrees	0
B. Sensory Abnormality	(2 points)
a. Normal	2
b. Mild sensory disturbance (Hypoesthesia)	1
c. Distinct sensory symptoms (Anaesthesia)	0
C. Motor Abnormality	(2 points)
a. Normal	2
b. Slightly decreased muscle strength	1
c. Markedly decreased muscle strength	0
Total score	15

Rate of Improvement = post treatment score – pre treatment score /15 –
Pre treatment score x 100

Results after treatment are assessed according to the rate of improvement

- Excellent: >90%
- Good: 75% to 89% improvement
- Fair: 50% to 74% improvement
- Poor: <49%

Overall in our study we had a favourable outcome following laminectomy and discectomy for lumbar disc prolapse. A comparison of our results to those of microdiscectomy is given below.

Authors	Good	Fair	Poor
Ebeling et al	73%	19%	9%
(Microdiscectomy)			
R.Silvers	95.5%	3%	1.5%
(Microdiscectomy			
Caspar et al	74%	18.1%	7.9%
(Microdiscectomy			
Nagi et al	93.3%	5%	1.7%
(Fenestration)			
Present study	86.6%	10%	3.4%
(laminectomy)			

Conclusion

Several conclusions can be drawn from our study. The laminectomy and discectomy is an extremely useful and effective surgery for treatment of lumbar disc prolapse. Consistently good results (86.6%) in our study could be attributed to proper selection of cases and a meticulous surgical protocol. The results of lumbar discectomy are good when there is agreement between clinical presentation and imaging studies as was seen in our study. All our patients had radicular pain at presentation.

The variables which were found to have no correlation with outcome were age, sex, duration of symptoms and neurological deficits.

The Japanese Orthopaedic Association low backache score appears to be an useful tool for evaluation of disc surgery. Widespread use of this score will allow different studies and procedures to be compared more objectively to improve the outcome of disc surgery. In addition to the postoperative score, change of the postoperative score as compared to the preoperative score is also a useful indicator of outcome. The only imitation of this study was a small sample size.

In our study we achieved results comparable to that achieved with microdiscectomy.

Microsurgical techniques may have some advantages in terms of a less invasive approach; shorter hospital stay etc., but one must understand the demands, requirements, and limitations of this technique. It also has a long learning curve and is technically a more demanding procedure in terms of surgical skills of the surgeon and equipment required and thus is available only in multispeciality hospitals. Also laminectomy and discectomy is more cost effective than microdiscectomy.

Therefore for the Indian scenario laminectomy and discectomy is still the “Gold standard” in operative treatment of lumbar disc prolapse.

Summary

The present study comprised of 30 Cases of lumbar disc prolapse treated with laminectomy and discectomy. The follow up of upto 2 years.

- Male patients (60%) outnumbered female patients (40%) in incidence.
- More common in 40 to 60 years age group with the average of 44.9 years (18 to 64 years).

- Radicular pain was the most common symptom.
- Positive SLRT was the most common sign.
- 76.67% of cases had a pre-op JOA score between 6 and 10.
- L4 -L5 was the most common disc to herniated.
- Average duration of hospital stay was 10.3 days ranging from 6 days to 24 days.
- 93.3 % of cases had a post-op JOA score between 11 and 15.
- 86.6% cases had a good outcome.
- Complications were superficial infection in 2 cases (6.6%), dural rupture in 2 cases(3.3%).

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