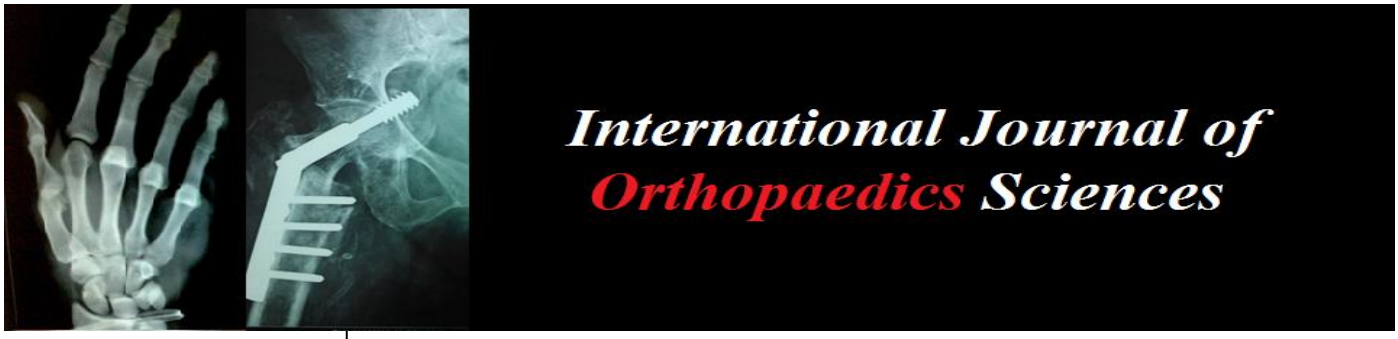

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Clinical and functional outcomes after posterior decompression for prolapsed intervertebral disc at lumbosacral spine: A Prospective study

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Abstract
Introduction: Lumbar decompression surgery is one of the most commonly performed spine surgery with numerous variations in the techniques till date.
Aim: the aim of the present study was to assess the clinical and functional outcome in patients with lumbosacral disc prolapse after decompression surgery.
Materials and Method: A prospective study was conducted on 25 patients with single level lumbar disc prolapse between June 2016 and June 2017. The inclusion criteria were intervertebral disc prolapse at L3-L4/L4-L5 or L5-S1 level with symptoms of radiculopathy for more than 6 weeks who failed conservative line of management. Patients with marked instability, history of previous spine surgery, multiple level involvement and patients with infection were excluded from the study.
Results: The mean age of the patients was 44.56+/- 4.34 years. The mean duration of symptoms was 30.24+/-6.20 weeks. The average duration of surgery was 89.32+/-21/15 mins. 52% of the patients had L4-L5 level involvement. The average duration of stay in the hospital was 4.72+/-2.08 days. The pre-operative Visual analog scale score was 6.24+/- 2.34 which decreased to 1.72+/- 0.65 at 24 months. The Mean Oswestry Disability Index questionnaire score was 63.83 pre-operatively which decreased significantly to 19.18 at the end of 12 and 24 months ($P< 0.001$).
Conclusion: Lumbar decompression surgery by standard posterior approach gives a good functional outcome in patients with lumbar disc prolapse and symptoms of radiculopathy without instability.

Keywords: Posterior decompression, lumbar disc prolapse, radiculopathy

Introduction
Lumbar disc herniation is one of the leading cause for consultation in a spine office. The lifetime incidence of sciatica has been reported to be between 13 and 40% [1]. Majority of the patients with disc prolapse presenting with radiculopathy respond well to conservative line of management while surgery is required in only 2-10% of the cases [2, 3]. The conservative methods include rest, non-steroidal anti-inflammatory drugs, physical therapy, ozone therapy and transforaminal or epidural steroid injection. There has been an evolution in the operating techniques for disc prolapse from standard discectomy to microdiscectomy and micro endoscopic discectomy with varying rates of success. The aim of the present study was to assess the functional and clinical outcomes in patients with prolapsed intervertebral disc at lumbosacral spine treated by standard posterior decompression surgery.

Material and Methods
A prospective study was conducted at a tertiary care institute in Navi Mumbai on 25 patients with single level lumbar disc prolapse between June 2016 and June 2017. The inclusion criteria were intervertebral disc prolapse at L3-L4/L4-L5 or L5-S1 level with symptoms of radiculopathy for more than 6 weeks who failed conservative line of management. Patients with marked instability, history of previous spine surgery, multiple level involvement and patients with infection were excluded from the study. All the patients were examined clinically (Positive root irritation signs) and the diagnosis was confirmed on magnetic resonance imaging studies before enrolling them in the study. All the patients were explained in detail

about the procedure. Ethical committee approval was obtained prior to the commencement of the study.

Procedure

All the patients were operated under general anaesthesia. Prone position on a Jackson table with head on a gelatine headrest and both the shoulders and elbows in 90 degrees' flexion was given. Proper padding was done below the elbows and knees. A total of three doses of second generation cephalosporin were administered intravenously (first dose 30 mins before the incision and two doses at 12 hours apart post-operatively).

The affected level was marked with a sterile 18G needle using fluoroscopy in both the orthogonal views. Local infiltration of adrenaline with normal saline (1:300) was done at the incision site. A linear incision of about 3-5cms was taken 0.5 cm off the midline was taken. Dorsolumbar fascia was separated followed by insertion of a self-retaining retractor into pathological place. Ligamentum flavum was sharply incised and removed. Laminotomy was performed on the pathological side followed by separation of the nerve root. The extruded disc was then removed with a William pituitary rongeur and the decompression was completed. The foramen was addressed using an up and down going roungeur. Bleeders were identified and cauterized. After thorough inspection of the disc remnants, decompression on the nerve root was checked followed by a wound wash and meticulous closure. No drain was used in the present study in any f the case due to limited exposure. The final outcome was measured using the visual analog scale and Mean Oswestry Disability Index questionnaire pre-operatively and then at 6, 12 and 24 months respectively.

Statistical analysis

Two sample independent t-test was used to assess the Mean Oswestry Disability Index questionnaire. The results were expressed as mean with standard deviation and $p< 0.05$ was considered to be statistically significant. Analysis was done using the Epi- info software (Version 3.4.3) and Microsoft Excel 2013 (Microsoft Office v15.0).

Results-

There were 16 (64%) males and 09 (36%) females in the present study. The mean age of the patients was 44.56+/- 4.34 years. The mean duration of symptoms was 30.24+/-6.20 weeks. The average duration of surgery was 89.32+/-21/15 mins. Thirteen (52%) patients had L4-L5 level involvement, 08 (32%) patients had L5-S1 whereas 04 (16%) patients had L3-L4 level involvement respectively. The average duration of stay in the hospital was 4.72+/-2.08 days.

One patient (4%) patient had a superficial dural tear which was repaired intra-operatively. However, the patient did not had complaints of post-operative hypotension or any further complications. There were no cases of superficial or deep infection in the present study. There was no case of root injury in the present study.

The pre-operative Visual analog scale score was 6.24+/- 2.34 which decreased to 4.18+/- 3.42 at 6 months, 2.82+/-1.89 at the end of 12 and 1.72+/- 0.65 at the end of 24 months respectively. The Mean Oswestry Disability Index questionnaire score was 63.83 pre-operatively which decreased significantly to 41.24 at 6 months' period, 31.12 and 19.18 at the end of 12 and 24 months respectively ($P< 0.001$). The Mean ODI score is used to assess the effect of low back pain on activities of daily living. It includes questions on ability to walk, sit, sleep, stand, pain intensity, employment/Homemaking, travelling, social life, Lifting and personal care (Eg. Washing, Dressing). For each possible section mentioned above (total 10), the total score is 5. If the first statement is marked, then the score is 0 and if the last statement is marked then the score is 5. The final score is calculated as Example: 16 (Total score)/50 (Total Possible score) X 100 = 32%

Discussion

The operative treatment for lumbar disc prolapse has evolved since Mixter and Barr suggested first described wide open posterior transdural approach for lumbar disc herniation in 1934[4]. Later in 1939, Love described the standard discectomy procedure involving the release of the nerve root which forms the basis of all decompressions till date [5]. Various techniques have been mentioned in the literature since then in order to reduce the soft tissue trauma namely microdiscectomy and Microendoscopic discectomy using extraforaminal or transforaminal approaches [6].

With these aforementioned techniques, the basic principles remain the same. The goal of surgery is to achieve sufficient decompression with minimal soft tissue injury. The functional long term outcome is what establishes the success of a particular procedure. More extensive surgeries are associated with complications such as epidural scarring and damage to the soft tissues with some amount of instability.

In a large series from multiple centres across USA, the SPORT trial, a comparison was made between non-operative treatments versus surgery, the conclusion was in favour of surgery at 2 years' follow-up. Although, both the groups had substantial improvement, the patients who underwent surgery had greater improvement overall in terms of back pain and sciatica [7]. All the patients operated in the present study were given a 6 weeks trial of conservative treatment before the surgery.

In a study by Katayama *et al.* [8], blood loss during surgery was found to be more after standard decompression as compared to the microsurgical techniques. However, the blood loss did not affect the final outcome in any of the groups. Similar observations were reported by Huang *et al.* [9] in their study. There was not much of the intra-operative blood loss in any of the patients in the present study.

A systematic review by Gotfryd and Avanzi [10], compared the standard microdiscectomy with microdiscectomy and microendoscopic discectomy and found that the microdiscectomy and microendoscopic discectomy are superior to the standard discectomy in respect to the volume of blood loss, systemic repercussions and duration of hospital stay. However, there was no clinically significant difference in the terms of final outcome amongst all the three techniques. A recent meta-analysis11 compared the microendoscopic discectomy with the standard discectomy and found more studies showing higher rates of incidence in terms of dural tear, nerve root injury and recurrence along with limited field of vision in cases where microendoscopic discectomy was done as compared to the conventional surgery. However, there was no major statistically significant difference in long term follow up of patients in both the groups. Thus, microdiscectomy and microendoscopic discectomy has a longer learning curve initially as compared to the standard discectomy. In the present study, there was one patient with dural tear. The cause of that can be attributed to the adhered tissue and less invasive nature of the surgery.

The present study, there was male preponderance with 64%

involvement. Similar findings were reported by Pappas *et al.* [12] and Davis *et al.* [13]. Amongst the level involved, L4-L5 were the commonest in the present study (54%) which was similar to the studies by Pappas *et al.* [12].

The mean Oswestry disability index questionnaire is a simple and one of the most commonly used scoring system to assess the effect of low back pain in activities of daily living [14]. It is one of the most commonly used questionnaire system in spine surgery. There was a constant decrease in the score post-operatively which was statistically significant.

Limitations

Small number of sample size and shorter duration of follow-up remains the limitations of the present study.

Conclusion

Lumbar decompression surgery by standard posterior approach gives a good functional outcome in patients with lumbar disc prolapse and symptoms of radiculopathy without instability.

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