Original article:

Microlumbar discectomy in Lower Lumbar and Lumbosacral disc prolapse- A Prospective Study

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Abstract

Background: Lumbar Disc prolapse surgery due to sciatica is one of the commonest procedurethat has evolved from the open techniquesto the microdisectomy.

Objective: To assess the functional outcome in patients undergoing microlumbardisectomy.

Methods: 40 patients with single level, unilateral Lumbar disc prolapse were included over period of 2 years between June 2013 and June 2015. Inclusion criteria were patients with disc proplase at L3-L4/L4-L5/L5-S1 Level with radiculopathy, Conservative treatment failure, Presence of positive root tension signs and Claudication with or without neurodeficit. Exclusion criteria were multiple level involvement, previously operated patients involving the diseased level,marked instability.

Results: The mean age was 41.26+/- 6.07,average hospital stay was 32.45 +/- 9.33 hours and patients returned to their work in 18.34 +/- 4.23 days. 35 patients (87.5%) had low back pain with radiculopathy and claudication. 3 (7.5 %) had leg pain and radiculopathy and 2 (5%) had leg pain with motor weakness. The mean surgical time was40 minutes. One case (2.5%) had superficial wound infection responded to antibiotics. Patients were followed up at 6months, 1 year and 2 years. Final outcome was determined using Japanese Orthopaedic Association score,which was 9.65 pre-operative and 23.35 at 2 years follow up(P<.001). Mean Oswestry Disability Index questionnaire pre-op was 63. 83 which decreased significantly to 19.18 at 2 years(P<0.001). Conclusion: Microdisectomy with a curved incision gives fairly good results with less tissue trauma, early recovery and better quality of life.

Keywords: Low back pain, Intervertebral disc displacement, prolapse, Back pain

Introduction

Sciatica due to disc pain in lumbar spine is one of the major and important cause for disability with 2-10% of the patients requiring surgery[1]. The history of surgical treatment of lumbar disc prolapse shows a continuous effort, to minimize invasiveness of the procedure, at first being a transdural approach via wide laminectomy, then hemilaminectomy, and finally microdiscectomy through fenestration of the yellow ligament (LigamntumFlavum) as the current gold standard[2,3]. In the1960s the first methods of transcutaneous intervertebral discDecompression were introduced: First Chemonucleolysis[4], Transcutaneous mechanical disectomy[5], Laser disectomy[6], Microsurgical discectomy[7]and microendoscopic disectomy[8]. We hereby prospectively reviewed, the results of microlumbar discectomy performed with a curvilinear incision without the use of endoscope.

Materials and Methods

40 patients with single level, unilateral Lumbar disc prolapsed between June 2013 and June

2015presenting at a tertiary care hospital at pune city were enrolled in the study. The inclusion criteria were patients with intervertebral disc proplase at L3-L4/L4-L5/L5-S1 Level with radiculopathy and Leg pain more than Back pain, Failure to respond to all forms of conservative treatment, Presence of positive root tension signs and Claudication history with or without neurodeficit. The Exclusion criteria wereMultiple level involvement in spine, previously operated patients involving the diseased level, Bilateral Radiculopathy, marked instability at the pathological level, or infection of the working level of the spine. All the patients were screened pre-operatively clinically and radiologically andx-rays and MRI (Fig.1 and Fig.2) were taken before the surgery. The institutional Ethical committee approval was obtained. All the patients were explained in detail about the procedure and written consent was taken all the enrolled patients.

Procedure

All the patients were given General anaesthesia followed by second generation cephalosporin intravenous antibiotics 30 mins before the incision. Prone position on a radiolucent table with headon a gelatine headrest and both the shoulders and elbows in 90 degrees flexion was given. Proper padding was done below the elbows and knees.

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 curved incision was taken 0.5 cm off the midline on the affected side pathology with whole length of the incision ranging between 1.5-2cms. Dorsolumbar fascia was separated (Fig.3) followed by insertion of a casper self-retaining retractor into pathological place (Fig.4).Ligamentumflavum was sharply incised and removed. The epidural veins were retracted,when possible andif needed, they were cauterized.Laminotomy was performed on the pathological side followed by retractionof the nerve root. The extruded/sequestrated disc was then removed with a William pituitary rongeur (Fig.5).

An upcutrongeur was used to reach the midline, and a downcutrongeur was used to reach into the foramen laterally. No attempt was made to aggressively clean the disc material.

Two hooks,4mm and 6mm, were used to reach across the midline and out to the foramen to search for loose fragments. 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 (Fig.6). Closed suction drain was not used in any of the patients, due to limited exposure and soft tissue dissection.

Final outcome was measured using the Japanese orthopaedic association score (Table 1) and Mean Oswestry Disability Index questionnaire.

Results

Out of 40 patients, there were23males (66%) and 17females (34%)showing predominance of males in our study.The average mean age of the patients was 41.26+/- 6.07. The Demographics, Levels affected, Mean Operative time, duration of hospital stay and time to return to work were as shown in Table 2.

Thirty five patients (87.5%), presented with low back pain with radiculopathy and claudication. Threepatients (7.5 %) presented with leg pain more than back pain and radiculopathy with no claudication. Two patients (5%) had leg pain more than back pain with motor weakness of the extensors of the foot. Twenty Threepatients (57.5%) had right sided leg pain and 17patients (42.5%) had left sided leg pain. There was no case of bilateral leg pain.The operative time ranged from 50 minutes(in early patients) to 30minutes(in the last patients), with a mean surgical time of 40 minutes.

All the patients were discharged from the hospital on second or third postoperative day. Two patients (5%) reported no improvement and later noted worsening of symptoms. Repeated magnetic resonance (MR) imaging revealed persistent compression of neural structures, despite the performed sequestrotomy in these patients. These patients were re-operated using standard open surgical procedure with favorable results. In one patient (2.5%) the dural sac was lacerated, so we converted it to open standard laminectomy approach. The tear was linear and was repaired easily. Patient did not had any complaints, and no symptoms of intracranial hypotension, despitedural sac injury. One case (2.5%) had superficial wound infectionresponded to antibiotic injection. There was no case of root injury found in our study. There was no case of missed level as fluoroscopy was used in all the patients.

The Japanese Orthopaedic Association score was 9.65 pre-operatively which increased significantly to 17.33 at 6 months followed by 19 and 23.35 at 12 months and2 years respectively (P<0.001).

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 months and 2 years 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%

I- Motor Function of the Upper Limb	
- Impossible to eat with cutlery or to button shirt	0
- Possible to eat with cutlery, impossible to button shirt	1
- Possible to button shirt, with great difficulty	2
- Possible to button shirt, with difficulty	3
- Normal	4
II- Motor Function of the Lower Limb	
-Impossible to walk	0
-Needs Cane or assistance or flat surface	1
-Walks unaided, but slowly	2
-Normal	3
	4
III- Sensory Function	
Upper Limb	
-Apparent Sensory disorder	0
-Minimal Sensory disorder	1
-Normal	2
Lower Limb	
-Apparent sensory disorder	0
-Minimal sensory disorder	1
-Normal	2
Trunk	
-Apparent sensory disorder	0
-Minimal sensory disorder	1
-Normal	2
IV- Bladder Function	
-Urinary retention or incontinence	0
-Sensation of retention or slight loss of flow	1
-Urinary retention and/or increase in urinary frequency	2
-normal	3

Table 1. Japanese Orthopaedic association score

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Demographics		
1	Age (years)	32 to 53
2	Level	
	L3 – L4	3
	L4 – L5	21
	L5 – S1	17
3	Duration of symptoms	16 weeks to 2 yrs.
4	Mean Operative Time (Mins) First 25 cases Last 15 cases	40 50 30
5	Mean Duration of Hospital Stay (Hours)	32.45±9.33
6	Mean time to return to work (Days)	18.34±4.23

Table 2. Demographics, Levels affected, Mean Operative Time, Duration of hospital stay and time to return to work

mm

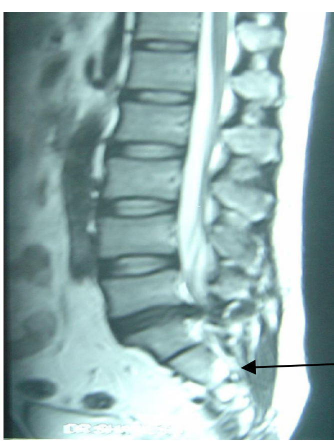

Fig.1 Sagittal MR image showing L5-S1 Disc Prolapse

Fig. 2 Axial T2W MR image showing L5-S1 Disc Prolapse

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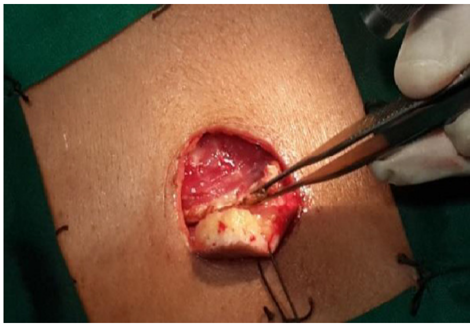

Fig.3 Curved Incision with Dorsolumbar Fascia Exposure

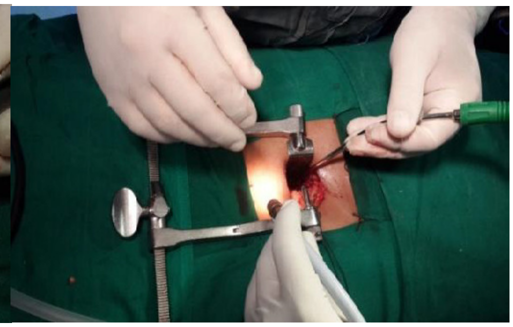

Fig.4 Casper self-retaining Retractor

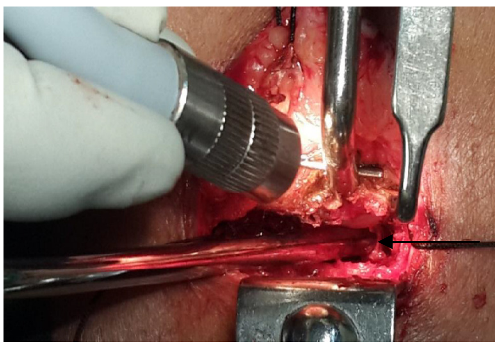

Fig. 5 Prolapsed Disc delivery

Fig. 6 Closure

Discussion

Lumbar disc prolapse accounts for less than 5% of all low back problems but is the most common cause of nerve root pain (sciatica) with majority responding well to the conservative line of management. Patients with persistent pain and worsening of symptoms with or without neurological involvement treated conservatively for more than 6 months usually do benefit from surgical decompression[1].

Ever since Mixter and Barr in 1934[8],attributed sciatica to lumbar disc prolapse and suggested effective surgical treatment for the same, the traditional surgical treatment has evolved from an open laminectomy with visualization and extraction of herniated fragments to the use of endoscope assisted with microscope using the mini incision and percutaneous techniques. It is important to emphasize that less is the muscle dissection, less is the potential dead space for haematoma formation and the faster is the healing process.

The goal of surgical treatment of lumbar disc prolapse is sufficient decompression with minimal soft tissue injury.Although the conventional surgeries are associated with good results, but one of the operative consequence is scarring of the epidural space which may be apparent on magnetic resonance imagingbut becomes clinically symptomatic in 10% or more of patients[9]. Epidural scaring, scarred tissues and operation induced destabilization of the posterior elements makes the revision surgery more difficult[10].

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With the advancement in various microsurgical techniques, the benefits of minimally invasive discectomy are less tissue trauma allowing direct visualization of the nerve root and disc pathology, allowing bony decompression and enabling the surgeon to address not Only contained lumbar disc prolapse, but also sequestrated disc fragments and lateral recess stenosis. The use of microscope in lumbar disc prolapse reduces the incidence of the post-discectomy syndrome by more than twice[11]. The post surgery recovery rate and the rate of return to work are improved following microlumbar surgical intervention.

Muramatsuet al[12]reported a series of 70 patients, who underwent microlumbar discectomy and 15 patients for whom Love's method was used to treat lumbar disc disease. A significant difference in mean operative blood loss and the mean number of days before the patients became ambulatory was observed. Meanwhile, patients in the microlumbar discectomy group required less postoperative analgesia than the open group during their stay[13].Garget al on the other hand, had better results with the conventional techniques[14].

A recent meta-analysis[15] compared the microendoscopic discectomy with the conventional open 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 group. Another metaanalysis[1] compared the results of microsurgical discectomy with microendoscopic discectomy and showed that microendoscopic discectomy has significantly increased the surgical time, total complications, disc herniation recurrence, dural tear and hospital costs as compared to the conventional microsurgical discectomy. In the present study we used microsurgical technique with an incision of around1.5 cm, being the same for both slim and obese patients. With this incision, it is also possible to explore two spinal levels from the same skin incision.

We used JOA score and Mean ODI to determine the final outcome both of which showed statistically significant difference ($p<0.001$). There was an increase in JOA score showing good improvement in motor, sensory and bladder functions, whereas there was a decrease in the ODI score, thus indicating improvement in activities of daily living.

Conclusion

Microlumbar discectomy techniques involve a learning curve that must be diligently overcome. The field of view is limited, making it difficult to expose and decompress the nerve root. Ensuring satisfactory excision of disc and canal decompression while keeping the integrity of the facet complex and neural elements will obviously require additional training and experience but these difficulties resolve with the number of procedures performed. The smaller approach decreases the length of hospital stay, which improves cost-effectiveness of the procedure. Additionally, microlumbar discectomy best meets patient's expectations of using novel, minimally invasive surgical techniques. We do believe that such technique has very good to excellent results with a little learning curve in indicated patients.

Limitation

Less number of sample size and less duration of follow up.

Acknowledgement- NIL

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