

Management of Prolapse Intervertebral Disc by Lumbar Discectomy by Interlaminar Fenestration – A Review of 30 Patients

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ABSTRACT

Background: We are presenting 30 patients who had disc prolapse and surgically treated by interlaminar fenestration and disc excision. **Methods:** All of them had pain and sciatica for a period of three months prior to surgery. Initially all the patients were treated by conservative measures which failed in the cases which were taken up for the surgery. **Results:** The diagnosis in all the cases was made on Magnetic Resonance Imaging (MRI), additional computed tomography (CT) scan was done in the cases presenting with sciatica and claudication or suspected LCS. We encountered no difficulty by this approach for the localization of the disc and decompression of the nerve root. **Conclusion:** This method is a safe, effective and reliable method for treating patients of prolapse intervertebral disc (PIVD).

Keywords: Lumbar Disc Prolapse, Foraminectomy, Sciatica, Limited Disc Surgery, Microlumbar Discectomy, Free Fat Transfer.

INTRODUCTION

For approximately six decades, the “standard laminectomy procedure” was successfully done for lumbar root decompression in cases of PIVD. Mixer and Barr described a surgical procedure for the lumbar disc excision where PIVD was present at multiple levels.^[1] Williams described “conservative surgical approach to the virgin herniated lumbar disc” which needed operating microscope, special instruments and skill update of the treating surgeon,^[2] which is unavailable at majority of the centers in this country. Majority of the authors have recommended a complete lumbar discectomy including thorough curettage of the disc space with removal of the adjacent cartilage end plates (Cauchoix et al.^[3] and Holmes et al.^[4]). Hirsch and Nachmeson,^[5] however, had advocated a limited lumbar discectomy, removing only sequestered and excluded loose fragments of disc, with minimal removal of disc fragments from the

intervertebral disc space. They cited the advantage of his procedure of lumbar disc excision was the decrease in the manipulation of the neural elements thereby decreasing the perineural fibrosis, in addition, a limited disc excision decreases the likelihood of anterior penetration of the annulus with potential injury to the vessels. The rationale for this limited procedure seems to be justifiable, especially in the light of good results now been reported with micro lumbar discectomy using a microscope, Goad,^[6] Williams,^[7] Caspar.^[8] Mishra et al.^[9] compared laminectomy and fenestration for disc excision and found the superiority of the fenestration in respect to early post-operative mobilization, early return to work and low incidence of post-operative back ache and it is less extensive. The advantages of fenestration and interlaminar approach have also been demonstrated by Nagi ON et al.^[10] Nijhawan et al.^[11] and Casper et al.^[12] In our setup the fenestration is very effective and reliable surgical technique for treating properly selective cases of herniated lumbar disc. This approach is free from spinal instability which is seen after laminectomy by Garg et al.^[13] Bhavuk Garg et al.^[14] compared the results of microendoscopic and open discectomy for lumbar disc herniation and concluded that both the methods were equally effective in relieving radicular pain by reducing the tension on the nerve

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root caused by the herniated disc. Shiju A Majeed et al.^[15] compared the results of fenestration and micro lumbar disc excision (MLD) and found slightly better outcome in the MLD group at 2 years follow up. In his opinion both techniques-MLD and fenestration give overall good results.

MATERIALS AND METHODS

30 consecutive patients who have undergone lumbar discectomy from March 2015 to June 2019 were included in this series.

All patients had unrelenting sciatic pain with positive straight leg raising and limited spine movements. The positive localization of the lumbar root lesions was done by physical examination.

In most of the patients the duration of the episode of sciatica ranged from 4 weeks to 8 months. The duration of the symptoms prior to surgery are given in [Table 1].

All patients had preliminary course of conservative treatment consisting of bed rest, local heat, anti-inflammatory analgesics, muscle relaxants and anti-anxiety drugs. Only those patients who failed to respond to the above conservative treatment regimen were considered for the surgery. All patients undergoing for surgery were subjected to Magnetic Resonance Imaging scans without contrast medium. The type and level of disc extrusion and compression of the neural elements was studied in detail in both T1 and T2 weighted images. In patients who had symptoms suggestive of lumbar canal stenosis were excluded from this study. In one study, Magnetic Resonance Imaging was reported to be slightly more accurate than myelography in the evaluation of lumbar disc disease and spinal stenosis. Results of imaging were co-related with us with the symptoms and physical findings before undertaking the surgery.

To avoid failure, the surgeon should consider the entire spectrum of pathological changes of the disc, the patient's symptoms, physical findings and any adverse psychosocial factors. The symptoms and signs should correlate with the results of imaging. With careful selection of the patients, excellent post-operative results can be expected.^[17]

The operation was performed in knee chest position; some patients were operated in the prone position [Figure 1]. The disc was approached by fenestration. In this technique the ligamentum flavum was removed along with lower 1/4 to 1/3 of the cranial hemi lamina, so that the dissection is sufficient laterally. After adequate lateral wall exposure, the dural sac and nerve root were retracted medially and the pathological changes in the disc were identified. The extruded disc fragment was excised along with loose fragments near the annular defect with a small pituitary rongeur. When a protruded disc was identified, the annulus was incised and all the loose disc tissue

was removed. After the disc removal the neural foramina was assessed and a foraminectomy was performed if the root was found to be compressed, care should be taken not to be damage the facet joint. While closing, the root was covered by an approximately 5mm thick layer of free fat to prevent post-operative adhesions and scarring as suggested by Kiviluoto,^[18] Jacobs et al.^[19] and Bryant et al.^[20] All the patients were allowed to get up on the second day and gradual walking was encouraged. Prolonged sitting, lifting of weight, bending and stooping were prohibited for 6 weeks. The patient's with sedentary jobs returned to work within 4 weeks, but those requiring heavy labor or long periods of driving did not return to work until the 12th week. Some patients with jobs requiring exceptionally heavy manual labor were advised to modify their occupation. Keeping the patient out of work beyond 3 months rarely improves recovery or pain relief.^[21] All the patients were advised to follow regular post-operative back exercises programme and maintain a proper posture. The results were evaluated by using the criteria given by Mac Nab as given in [Table 2].

RESULTS

Out of 30 patients, one level fenestration performed in 28 (93.3%), and two level in 2 (6.66%) patients. One patient who had Cauda Equina Syndrome was excluded while evaluating the results. Our experience with negative disc exploration has been minimal. At the end of one month and at six months assessment was done by subjective and objective findings with the Japanese Orthopaedic Association's low back score 22 [Table 3].

The average duration of surgery was approximately 75 minutes with average blood loss of 150 mL ranging from 100 mL to 250 mL. The average duration of hospital stay was 7 days post operatively.

The incidence of post discectomy back pain in our cases was 35%. The pain was mainly observed after patients full day activity and on exertion, in about 10% of the patients, the back pain interferes with daily activity [Table 4].^[23,24] The incidence of disc space narrowing was observed in 30% of the patients after discectomy at 6 month follow up, except in one case which was followed up for three months only. There was no relationship between disc space narrowing and back pain. If there was pain, it was mainly due to osteoarthritis and hypertrophy of the facet joints. Lumbosacral support (Corset) was advised if the pain was troublesome.

Complications [Table 5] included dural tear in two patients during surgery due to associated stenosis at the level of disc prolapse, calf wasting in one patient and superficial wound infection in one case and nerve root fiber damage in one patient, this

occurred while decompressing the nerve root with rongeur.

The dural tear that occurred in two patients was insignificant and we put free fat over the tear to prevent the leakage of cerebrospinal fluid (CSF) and we did not encounter any leakage of CSF from the wound or fistula formation.

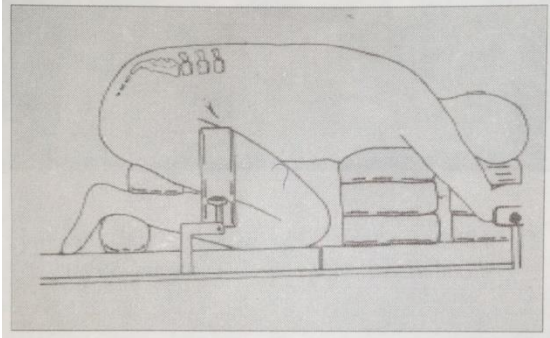


Figure 1: Knee Chest position for Lumbar Discectomy

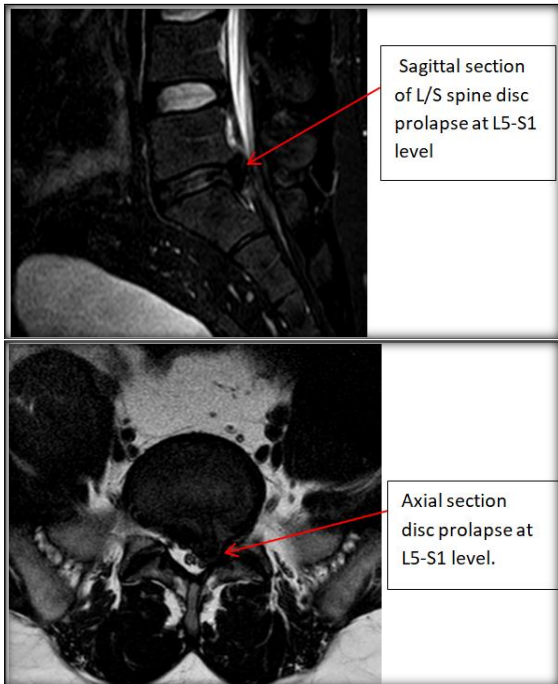


Figure 2: Disc prolapse.

Table 1: Duration of Complaints prior to surgery N = 30

Months	Number	%
0-1	10	33.3
1-3	5	16.6
>3	15	50

Table 2: Mac Nab's criteria of outcome.

A. Excellent- No pain; no restriction of mobility return to normal work & level of activity
B. Good- Occasional non-radicular pain relief of presenting symptoms; return to modified work
C. Fair- Some improved functional capacity still handicapped and unemployed
D. Poor- Continued objective symptoms of root involvement; additional operative intervention needed at the index level irrespective of length of postoperative follow-up.

Table 3: Japanese Orthopaedic association's low back ache score.^[22]

I	Subjective symptoms	Score
A Low back pain (3 points)		
a)	No low back pain	3
b)	Occasional mild low back	2
c)	Low back pain always present/severe low back pain occurs occasionally	1
d)	Severe low back pain always present	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 always present/severe lower extremities pain and numbness occur occasionally	1
d)	Severe lower extremities pain and numbness always present	0
C Ability to walk (3 points)		
a)	Normal walking	3
b)	Walking at least 500 m is possible, but pain, numbness and weakness are felt	2
c)	In walking 500 m or less, pain, numbness and weakness occur, and walking becomes impossible.	1
d)	In walking at most 100 m, pain, numbness and weakness occur, and walking becomes impossible.	0
2 Objective findings		
A Straight leg raising test (SLRT)		
a)	Normal	2
b)	30 degree –70 degree	1
c)	Less than 30 degree	0
B Sensory abnormality		
a)	Normal	2
b)	Mild sensory disturbance (Hypoesthesia)	1
c)	Distinct sensory symptoms (Anesthesia)	0
C Motor abnormality		
a)	Normal	2
b)	Slightly decreased muscle strength	1
c)	Markedly decreased muscle strength	0
Total score	15	

Table 4: Sciatica and pain after discectomy by interlaminar approach.^[23,24]

Sciatica & Pain	Spurling & Grantham (1949) ^[23]	O' Connel (1951) ^[24]	Present series
Complete relief of sciatica	46%	77.6%	85%
No relief of sciatica	8.3%	0.7%	6%
Post-operative back pain	60%	40%	35%

Table 5: Complications (n=30)

Complications :-	
Dural tear	2
Superficial wound infection	1
Calf wasting	1
Nerve root fiber damage	1

DISCUSSION

Results of this study done by lumbar discectomy performed with a limited disc excision by fenestration is safe, effective and reliable method for treating selective patients with herniated lumbar discs. None of our patients became worse by this procedure. The time taken for the recovery after lumbar discectomy appeared to be strongly influenced by environmental factors and patient's motivation; the recovery period was surprisingly shorter in the self-employed patients.

In majority of the patients with good results, the preoperative sciatic symptoms improved within the first three days after the surgery.

Proponents of lumbar microdiscectomy using an operating microscope reported a cure rate exceeding 96% but the microdiscectomy is associated with certain limitations like long learning curve, costly equipments.

The approach herein differs from microdiscectomy only in the extent of exposure. The disc removal per se in both is limited; however additional exposure in fenestration has the advantage of correcting the lateral recess stenosis. Such an advantage is important since it has been observed that the patients of disc herniation responding to conservative treatment have wider bony canals, while those not responding had narrow canals.^[25]

Thus the surgeon must be prepared to perform a foraminectomy in addition to discectomy if the nerve root remains tight after disc excision. In our cases the blood loss was minimal and blood transfusion was not required. Complications were encountered, but fortunately, none permanently affected the outcome. The most important criterion for success in disc prolapse remains proper selection of the case.

CONCLUSION

The interlaminar discectomy by fenestration without the use of operating microscope is a safe and reliable method for treating patients with lumbar disc prolapse who have been closely scrutinized for surgery. We add an excellent outcome in 26 patients (85%) and 4 (15%) had good outcome. It is a safe procedure compared to extensive laminectomy which can destabilize the spine. This procedure has the advantages of less morbidity, low blood loss, inexpensive and devoid of spinal instability. Functional outcome of fenestration in terms of return to work and complete pain relief at the end of six months had been satisfactory in our study.

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Clinical Message

In the peripheral hospital the fenestration technique is quite reasonable procedure to surgically treat prolapse intervertebral disc without any significant complications. This procedure has good functional outcome.

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