

A comparison between excision of lumbar disc by laminectomy and fenestration: a retrospective study.

Partha Sarathi Chakrabarty¹, Rajarshi Roy², Sabari Devi³

¹ (Department of Orthopaedics, Jorhat Medical College and Hospital, India)

² (Department of Orthopaedics, Gauhati Medical College and Hospital, India)

³ (Department of Pathology, Gauhati Medical College and Hospital, India)

Abstract: Lumbar disc disease is a common cause of medically authorized work. Fenestration provided better results in comparison to laminectomy procedure, and at the same time preserved the spinal stability and provided the early mobility & early return to previous job. It is a retrospective study of 47 cases of prolapsed lumbar inter vertebral disc. The cases of low backache and sciatica were identified by defined criteria and treated surgically for disc prolapse. Patients with clinical signs and symptoms of prolapsed lumbar intervertebral disc having radiological correlation by MRI study were subjected to disc excision by laminectomy or interlaminar fenestration method.

Keywords: fenestration, intervertebral disc, laminectomy, lumbar disc, prolapsed.

I. Introduction:

Patients having lesions of lumbo sacral region causing low backache with sciatica are commonly encountered in orthopaedics practice¹. The pain is said to be due to the irritation of the dura covering of nerve root by the protruded part of inter vertebral disc². When the nucleus of a lumbar intervertebral disc extrudes through the enveloping annulus fibrosus capsule the adjacent nerve roots may be compressed³. The recent advances in computed tomography (CT) and MRI and a better understanding of the causes of the leg pain make consistently accurate diagnosis of the patient's symptom producing disorders. The surgical management of prolapse of a lumbar disc has been practiced since mixter and barr⁴ discovered the link between sciatica and herniation of a lumbar disc in 1934. They started operations upon the patient via extensive laminectomy. Shortly afterwards hemilaminectomy became the favourite procedure in cases with unilateral symptoms. Love described extradural removal of herniated disc and devised interlaminar fenestration for treatment of lumbar disc prolapse⁵. Williams described refinement of fenestration technique where he required the use of operating microscope to facilitate better visualization of dural sac, nerve roots and other interspinal structures including disc⁶. Mishra et al compared laminectomy and fenestration for disc excision and concluded the superiority of later approach in respect to early postoperative mobilization, early return to work and low incidence of postoperative backache as it is less extensive. It is very safe, effective and reliable surgical technique for treating properly selected patients with herniated disc⁷. Disc excision through fenestration is the procedure which can be performed by majority of orthopaedic surgeons even in small peripheral centers. Numerous retrospective and some prospective reviews of open disc surgery are available. The results of these series vary greatly with respect to patient selection, treatment method, evaluation method, length of followup, and conclusions⁸. The purpose of this study was to find out whether these surgeries are effective in the long-term and if not then what are the problems faced by the patients, specially back pain and leg pain, after these surgeries.

II. Materials and methods:

Forty seven patients with signs and symptoms of prolapsed lumbar intervertebral disc who failed to respond to conservative treatment of minimum 6 weeks duration were studied retrospectively. Presence of neurological impairment (paresthesia, motor/sensory deficit) alongwith at least three of the following clinical features formed the criteria for selection of patients for surgery. The criteria are accentuation of symptoms with cough/sneeze, position of comfort (flexion at hips/knees), spinal tenderness, selective restriction of spinal movements, positive straight leg raising test (was less than 45 degree). All patients were subjected to MRI for confirmation of the prolapsed. All those patients with prolapsed L4-5 or L5-S1 disc on MRI were included.



Fig 1: MRI showing L5-S1 disc prolapse

Routine haematological and urine examination were performed to evaluate the operative risk. Spine was approached through a two to three inch midline incision depending on the levels confirmed under fluoroscopy. All patients were operated in knee –chest position under general anaesthesia. The skin and para spinal muscles were infiltrated with 1 in 100000 diluted adrenaline to decrease bleeding. In twenty three patients, we did a standard interlaminar fenestration by cutting through ligamentum flavum and if necessary only inferior lamina using Kerrison's rongeurs.



Fig 2: Approach for discectomy

The sequestered and extruded loose disc fragments were removed. The disc material was sent for histopathological examination. The exiting nerve roots were cleared of compression in all cases. In all the other cases we did laminectomy.

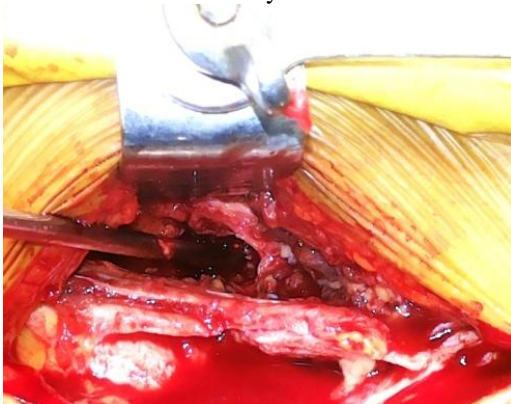


Fig 3: Intra operative view of nerve root

Patients were restricted to bed for 24 – 48 hours under coverage of standard post operative antibiotics & analgesics. Postoperatively patient was allowed to sit up on second postoperative day. Gradual walking was encouraged, prolonged stooping and flexion was avoided. Lifting, bending and stooping prohibited for 6 weeks. Appropriate exercises for back, abdominal & hip musculature and back care were taught to patient. Patients who

were heavy labourers or long distance drivers were off work until 12 weeks and then advised to modify their duties. All patients were advised a regular postoperative back exercise program after 3 weeks. The follow up data was analyzed using modified Macnab criteria. Statistical analysis was performed with statistical software graphpad instat 3. Significance was accepted at p-value <0.05.



Fig 4: Cross sectional view showing prolapsed disc

III. Results:

Out of 47 patients 27 were males and 20 were females. The average age was 43.63 years ranging from 28-55 years. 29 patients were sedentary workers. All patients were followed up for a period ranging from 15 – 30 months average being 24.7 month. The most common level of involvement was L 5 -S 1 followed by L 4 -L 5. Paracentral and posterolateral position of the prolapsed disc was most common followed by central or posterocentral. 19 patients had left sided symptoms while 28 had right sided. Majority of the patients (76%) presented with low backache of which 14 patients also had a radiating pain. But 52 % patients presented with radiating pain. 64% had symptoms of more than 6 months duration. Pain is measured by asking patient to quantify it on Visual analog scale (VAS). On the VAS patient indicates pain intensity on a typical day by marking a line from 0-10 corresponding to pain level. In our study in the group of patients operated by fenestration the preoperative mean \pm SD VAS score was 8.3 ± 0.726 on a scale of 10. On MRI 52% patients showed protrusion of disc and the rest showed extrusion. On clinical evaluation 24% patients showed SLRT less than 30 degrees. 68% patients showed reduced power of EHL, 24% patients had only sensory deficit and the rest had both. No patient had bowel and bladder involvement. Intraoperatively eleven patients had massive disc prolapse. Average postoperative hospital stay was 6.1 days. Average operative time was found to be 61 minutes and mean blood loss is 114.8 ± 14.75 ml. Postoperatively the mean \pm SD score of pain on the VAS came out to be 2.1 ± 1.3 which is found to be statistically significant ($p < 0.005$) when compared with preoperative pain. But for the group of patients operated by laminectomy the preoperative mean \pm SD VAS score was 8.5 ± 0.543 on a scale of 10. On MRI 60% patients showed protrusion of disc and the rest showed extrusion. On clinical evaluation 28% patients showed SLRT less than 30 degrees. 63.3% patients showed reduced power of EHL, 27.6% patients had only sensory deficit and the rest had both. No patient had bowel and bladder involvement. Intraoperatively fourteen patients had massive disc prolapse. Average postoperative hospital stay was 17.8 days. Average operative time was found to be 70.3 minutes and mean blood loss is 132.8 ± 15.25 ml. Postoperatively the mean \pm SD score of pain on the VAS came out to be 2.96 ± 1.02 which is found to be statistically significant ($p < 0.005$) when compared with preoperative pain. Intraoperative inadvertent dural tear occurred in only one case of fenestration. In this case dural rent repair was done under vision. The patient recovered uneventfully. In one case disc material could not be extruded through the fenestration and so laminectomy had to be done. No extra stabilisation was required. Two patients of fenestration group and four cases of laminectomy group had temporary retention of urine after the surgery which relieved by single catheterization. Three fenestration patients and five laminectomy patients complained postoperative headache, relieved by intravenous saline hydration and analgesics. The functional outcome as measured by modified Macnab criteria, the relief of pain and return to occupation of the patients are being tabulated below. Patients who had disc prolapsed between L5-S1 level showed better results than those with L4-5 level. 92% patients showed relief in backache symptoms, whereas radiating pain was relieved in 88% cases. 96% cases showed improvement in motor deficit whereas 92% cases showed improvement in sensory deficit after 1 week.

IV. Discussion:

Prolapsed intervertebral disc occurs in about 5-10% of all backache patients and is a common cause of sciatica. Even a small herniated disc in the presence of a narrow spinal canal can be responsible for the compression of cauda equine and its roots. The standard treatment of lumbar disc prolapsed has been surgical excision of the disc, though the methods of discectomy vary. The traditional view has been that wide laminectomy produces increased morbidity compared to less extensive procedures like inter-laminar fenestration⁹.

Conservative therapy including bed rest, back school programmes and analgesic drugs is generally accepted as adequate treatment in the beginning of an acute attack of sciatica. Traction therapy has been recommended & used for many years and favorable results were reported³. But lumbar discectomy is a common operation in failure to conservative management.

Love devised inter-laminar fenestration. The results of surgery in lumbar disc prolapsed have been reported by many authors earlier like O'Connell in 1951⁹, Sharma and Sankaran¹⁰ in 1980.

On comparing fenestration with laminectomy as described by Nahar et al² and Nagi et al¹¹ fenestration had the added advantages of less surgical time and intraoperative blood loss, rapid convalescence, minimal risk of instability and they seldom landed up to post operative complications like adhesions and arachnoiditis. Due to maintenance of spinal stability early mobilisation was given to the patients. 76% patients returned to their original occupation in less than one month time. The rest had to change their occupation. These patients usually were hard manual labours. During follow up period there was no recurrence of symptoms in any of the patients probably due to less chance of formation of adhesion and false membrane which is quite common in laminectomy. So it can be said that fenestration is a suitable procedure but surgeons must be prepared to perform foraminotomy or undercutting of upper or lower lamina in addition to lumbar discectomy if the nerve root remains tight after disc excision¹².

Results of this study, state that the lumbar discectomy performed with a limited disc excision by fenestration is a safe, effective and reliable method for treating selected patients with herniated lumbar discs. No patients in this study deteriorated after surgery. The length of a patient's recovery period after surgery appeared to be strongly influenced by environmental factors and patient's motivation. The amount of disc herniations were assessed in MRI and on clinical analysis it was found that almost all of them gave good to excellent results according to modified Macnab criteria.

V. Conclusion:

Fenestration is the procedure which requires knowledge and expertise in instrumentation and techniques, and is more cost effective. In the peripheral institutions fenestration with disc excision is quite a reasonable method to surgically treat the indicated cases of prolapsed disc and this procedure can be well performed by surgeon with adequate experience in the field of disc surgery. Fenestration provided early post operative mobilization and early return to job.

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