



Evaluation and Treatment of Lumbar Degenerative Disk Disease

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Abstract

Background: Lumbar disc herniations are most common at L4/5 and L5/S1 levels and this is the most prevalent condition among manual laborers. The aim of the study was to analyze the clinical presentation, age and sex distribution, perioperative duration and immobulization.

Methods: This is a retrospective study, which includes 250 patients operated for lumbar disc herniations at L4/5 and L5/S1 levels. A detailed history of presenting complaints, clinical examination and corresponding findings on imaging were correlated. In all these patients, there was severe symptomatology with failed conservative management, which necessitated classical open lumbar laminectomy and discectomy.

Results: The overall success rate was 96% in our series. Postoperatively, 9.2% of patients experienced localized low back pain, which was mild to moderate and being treated with NSAIDs and exercises.

Conclusions: In addition to removal of herniated disc, other compressing elements like hypertrophied Ligamentum flavum, facet arthropathy and narrowed spinal canal diameter were also addressed with an open procedure. To prevent later complications, these patients are supposed to avoid strenuous work, lifting weights, torsion and jerky movements, faulty posture at work and rest, gait training, crouching, sitting on the floor and haunches.

Introduction

The symptoms of sciatica, pain beginning in the back and radiating into the buttock and leg were mentioned in ancient Greek and Roman texts. The intervertebral disc was first described by Vesalius in 1555.^[1] Luschka observed at autopsy the degenerative process of the disc in 1858.^[2] In 1929, Dandy described two cases of cauda equina syndrome that were thought to be due to material

derived from the intervertebral disc.^[3] In 1934, Mixte and Barr described 34 patients with sciatica due to a degenerative disc that were amicable to surgical treatment.^[4,5] Now Lumbar Laminectomy and Discectomy is a commonly performed surgery. The process of disc degeneration occurs in both at the annulus fibrosus and the nucleus pulposus. In younger ages, the disc has a substantial ability to expand, but the annulus is

strong enough to contain these forces. From the 3rd to the 4th decades of life, the disc still has the ability to expand and the annulus is becoming weaker, whereas, From the 5th to 7th decades of life, despite a weakened immune annulus, the disc loose most of its ability to expand, and thus the disc herniation are less common. so that the disc herniation are common in these age groups. Lumbar disc herniation are most common at L4/5 and L5/S1 levels and the present study of 250 patients deals with disc herniation at these levels. The lumbar intervertebral disc can undergo various stages of degeneration, depending on the person's age, occupation like manual laborers with or without a history of any trivial injury while carrying out their strenuous work. In India, millions of people have jobs that involve a considerable amount of physical labor and sciatica is one of the major symptoms among laborers and compelling them to take rest from work effects their daily earnings.^[6] In vast majority cases, they get relief with conservative management and abstinence from strenuous work for a few days. If symptoms have persisted, proper imaging is advised and when planning invasive therapy, it is of utmost importance that the results of imaging clinical symptoms and signs match logically. Back pain is an extremely common phenomenon, Nachemson estimated that 80% of individuals will experience back pain at some time of their lives.^[6] Horal noted that 35% of individuals with low back pain develop sciatica.^[7] Hakelius reported that 75% of acute lumbar radiculopathy will experience improvement in 10-30 days with conservative management and less than 20% of these individuals will eventually become surgical candidates.^[8] The goal of the treatment is to decrease the pain and restore the patients function with an early return to work. A short period of rest, classical analgesics like NSAIDS and epidural corticosteroid injections play a major role together with active physical exercise as soon as symptoms start to improve.^[9] It is estimated that approximately 70-80% of patients with severe

radiculopathy (posterior leg pain, positive straight leg raising test, muscle weakness) will be improved with conservative treatment. The natural history of herniated nucleus pulposus as observed in MRI has shown that they tend to reduce in terms of size of protrusion into the canal over time. The indication for surgery is severe radiculopathy interrupting daily activities with failed conservative therapy.^[9]

The standard operations include laminectomy either partial or complete and discectomy. Open classical laminectomy and discectomy area widely accepted surgical procedure for lumbar disc prolapse.^[7] The minimally invasive techniques, which have been used to treat contained lumbar disc prolapse, include chemonucleolysis with papain, various modifications of percutaneous discectomy, percutaneous laser discectomy, percutaneous endoscopic discectomy, and intradiscal electrothermy. However, they are mainly intradiscal procedures with a posterolateral approach to intervertebral disc and cannot be used for extruded disc fragments.^[10]

Patients and Methods

This retrospective study includes 250 patients, came to Aljala and Alhawari Hospitals, Benghazi, Libya during the period of Jan 2015 to Dec 2018. All these patients had severe radiculopathy with or without the motor deficit and autonomic dysfunction. In most of these cases, conservative management was tried with variable duration ranging from days to weeks .Persistent severity of the symptomatology was the indication for surgery in cases who failed to show any improvement after conservative management.

Results

Two hundred and fifty Participants who subjected to L4/5 or L5/S1 classical open laminectomy and discectomy were studied. All the patients were operated in prone position under general anesthesia after confirmation of the level that is to be operated with X-ray imaging. The average time

for the surgical procedure was 60 minutes. Postoperative antibiotic were given for 24 hours. The patients were ambulated on the first postoperative day and were discharged with follow-up after 2 weeks.

Demographic data

The age distribution in our this study revealed that maximum patients suffering from L4/5 or L5/S1 level disc herniation were between age groups of 20 to 40 years with 90.4% and it is 9.6% in the age group of 40-50 years. This clearly shows that this problem is most common among people who earn their livelihood by doing strenuous work. The details are shown in table 1

Table 1: Age Distribution

Age group (years)	Number of patients	(%)
20-30	78	31.2
30-40	148	59.2
40-50	24	9.6

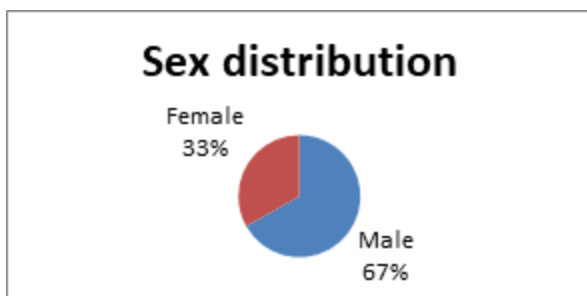


Figure 1: Sex Distribution

The presenting clinical symptoms and findings were severe radiating pain which was unilateral in 174 patients and bilateral in 76 with 69.6% and 30.4% respectively. This shows that lateral or far lateral disc herniation were most common. Motor Deficits of the various degree was seen in 31 patients, the most common being EHL weakness and mild foot drop. Neurogenic claudication was seen in 14 patients i.e., 5.6%. Bladder and bowel involvement was seen in 11 patients with 4.4% and two male patients with sexual dysfunction with 0.8%. Latter three clinical presentations were mostly associated with central and excluded disc herniation.

The average time interval from the onset of significant symptoms to subjecting them to surgery was 9 weeks. In 20% of cases, the decision for surgery was less than 3 weeks of conservative therapy as these were having severe unilateral or bilateral radiculopathy and in patients with the significant motor deficit and with autonomic dysfunction surgery was performed immediately which accounts for 11% of the cases. The details are shown in Table 3.

Table 2: Clinical Presentations

Symptoms	Number of patients	(%)
Radicular Unilateral pain	174	69.6
Bilateral	76	31.2
Motor deficit	31	12.4
Claudication	14	5.6
Bladder and bowel involvement	11	4.0

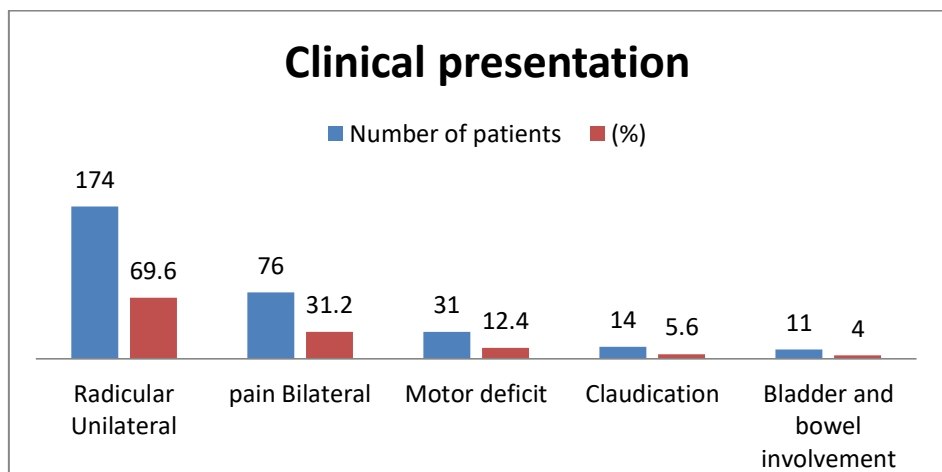


Figure 2: Clinical Presentation

Disc herniation findings preoperatively in correlation with MRI findings were seen in 74% of the cases, the disc herniation was lateral or far lateral and these were presented with ipsilateral radiculopathy in 94% of the lateral or far-lateral cases, bilateral in 3% of the cases and radiculopathy was more severe on the contralateral side as compared to ipsilateral side in 1% of the cases. In these cases where the contralateral side radiculopathy is seen, it is postulated that the disc bulge pushed the thecal sac and exiting root against the other side osseous boundary parts resulting in irritation of another side root. In 10.4% of the cases, the disc herniation was diffused and in 7.6% of the cases, it was most central with bilateral radiculopathy and claudication. Autonomic dysfunction was seen in few. The sequestered disc material was seen in 4.4% of the cases lying on the symptomatic side of the root and thecal sac. Migrated disc was seen in 3.6% of the cases predominantly caudal migration in 90% of the migrated cases. The details are shown in table 4.

Table 3: Disc herniation findings preoperatively.

Finding of herniation	Number of patients	(%)
Lateral / far lateral	185	74
Diffuse	26	10.4
Mostly central	19	7.6
Sequestered	11	4.4
Migrated	9	3.6

In this study, 171 patients (68.4%) had disc herniation at L4-L5 and 79 patients (31.6%) had disc herniation at L5- S1. The details are shown in Table 5.

Table 4: Levels of herniated disc noted in patients

Level of disc involved	No. of patients	(%)
L4-L5	171	68.4
L5-S1	79	31.6

The amount of laminectomy "Fenestration" which is enough to reach the herniated disc was performed in all 250 patients with open approach

after confirmation of the level. The medial facet has to be addressed, which is overlying the herniated disc either at the axilla or shoulder of the exiting root in the form of medial facetectomy in 9.2% of the cases. Ligamentum flavum hypertrophy or buckling are noticed in 11% of the cases. Facet arthropathy noticed in 6% of the cases.

Table 5: The Amount of Laminectomy "Fenestration"

Amount	No. of patients	(%)
med. facetectomy	23	9.2
flavum hypertrophy or buckling	28	11

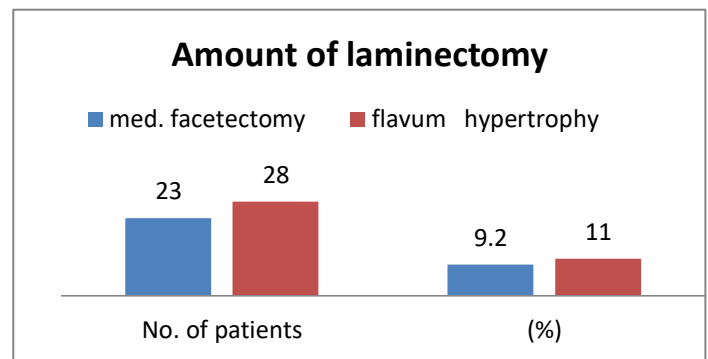


Figure 2: The Amount of Laminectomy "Fenestration"

The overall success rate was 96% in our series. The mean operative time was 60 minutes. thus the overall rate was 96% in our series. Straight leg raising test-64% of patients had straight leg raising positive around 30° and 32% patients had between 30° and 70°, but postoperatively all patients had normal straight leg raising test. Sensations were diminished in L4 dermatome in 71 patients, L5 dermatome in 154 patients and S1 dermatome in 79 patients. More than one dermatome was involved in 59 patients. Overall 62% of patients had shown sensory disturbance preoperatively, but postoperatively 96% of these patients recovered normal sensory function. Most of the patients (201) were discharged 2nd-day post-op (80.4%), where (49) cases were hospitalized for 3 to 5 days.

Table 6: The Hospital Stay

Days	No. of patients	(%)
2nd day	201	80.4
3-5 days postop	49	19.6

Discussion

Relationship between lumbar disc herniation and the syndrome of lumbago/sciatica have been well recognized since the 1930s. Since then it has been a constant endeavor to achieve the decompression of the offending nerve root. In 1934, Mixter and Barr described 34 patients with sciatica due to a degenerative disc that were amicable to surgical treatment.^[4,5] Now Lumbar Laminectomy and Discectomy is a commonly performed surgery. In the present study group, the most common level of PIVD was observed at the L4/5 level with 68.4% and with 31.6% at L5/S1. This finding was similar to the other studies included in the literature review that also confirmed that the most common involved vertebral levels are L4/5, L5/S1, indicating that these levels are affected more frequently. This is attributed to the ability of the disc to expand and weaker annulus due to strenuous work in these age groups. For example, in Savage et al, found that 52% of involved participants were having a disc prolapse at L4/5 level and 36% were at the L5/S1 level. In our this study, Males are were predominantly affected with 66.8% over females with 33.2%. It is near the result of Stromgvist F et al published in 2008 where they got showed that 54.8% males over females with 45.2%. Jo Jordon et al published a study in 2009 and showed that revealed the male to female ratio of 2:1. In contrast, Spengler DM in 1987, they found that women are more commonly affected than men. Most of our patients were in the age group of 20-40 years accounting to 90.4%. Jo Jordon et al 2009 revealed that the highest prevalence is was among people aged 30-50 years. Nevertheless, Dayou Ma 2013 was comparing compared the age group prevalence of having lumbar disc herniation between males and females in a study published done in 2013 which they

found that the peak age group of affection is equal in both sexes (65-70) years and the second peak of affection in males was in (76-80) years and (71-75) years in females.

In the present study, the most common clinical presentation is unilateral radicular pain seen in 69.6% with the finding of lateral disc herniation in 74% of the cases. The survey of the clinical examination of the present sample showed a host of clinical symptoms with a paucity of clinical signs. Unilateral radicular pain is was seen in 174 with 69.6% and bilateral in 76 patients with 30.4%. The motor deficit is was seen 31 patients i.e. 12.4%, EHL weakness is was the most common. Neurogenic claudication is was seen in 14 patients i.e. 5.6%. Bladder and bowel involvement is seen in 11 patients with 4.4%. Similarly, Jeffery A Rihn et al found that the presentation of unilateral radicular pain is 65% and bilateral radicular pain was seen in 15% of their patients. Surprisingly, motor deficits were found to be significantly high in Jonsson B (1993) and Jeffery A Rhin (2011) with a percentage of 43% and 57% respectively.

Having subjected our the patients of this study for open lumbar laminectomy and discectomy, the symptomatic relief in radiculopathy is was seen in more than 96% of the cases and this is almost similar to the results reported by Depalma and Rothman study where they reported >90% improvement in symptoms after surgery in the postop period.^[11] The postoperative discitis was noticed in 4 patients, 3 out of these 4 improved with rest, NSAIDs and antibiotics. one patient needed spinal fusion procedure along with evacuation of peridural collection. Ganz et al. reported an almost similar result showing 86% good outcomes in their series of 33 patients treated by surgery.^[12] Similar findings were observed in the study of Herron et al. with average leg pain improvement of 82% and average back pain improvement of 71%.^[13] None of the patients in our series had a poor result. This could be due to the fact that all patients underwent at least a 6-

12 weeks trial of adequate conservative treatment and were only operated after clinico-radiological correlation of their symptoms with imaging was confirmed. There were no patients involved in compensation or litigation in our study. According to Waddell and Colleagues colleagues who found some individuals who substantially do went worse after surgery with persistent pain and some of them were also subjected to repeated studies throughout their lives^[14] Workmen compensation claims as described by Davis in his study are not seen in our present study.^[15] During the follow up from discharge date to 6 to 12 week's period with a mean of 7.2 weeks, localized low back pain was seen in 23 patients requiring NSAIDS and assurance with no significant finding for this on MRI. In the study published by Davis, long term results are good in more than 90% of the followed up cases.^[15] Herrav in his study noticed recurrent disc herniation in 5% who required surgery. Spondylosis and spondylolesthesis were noticed in 5 patients in our study at the same operated level. Spondylosis and spondylolesthesis at the same level following extensive laminectomy and medial facetectomy as described by Kobrine A, Byey PC.^[16-17]

Case 1

Twenty seven years old male from Al-kofra, presented with a chronic history of low back pain associated with bilateral lower limbs sciatica more in the left side with no motor deficits on examination. MRI lumbosacral spine was done after 4 months from the onset of symptoms which revealed IVDP at the level of L4-5. Post-operatively, the patient improved dramatically and a follow-up MRI done after surgery by 4 weeks. MRI pre and post-operative are shown below.



Figure 19: MRI lumbosacral spine, sagittal view, pre (A) and post-operative (B) images.

Case 2

Thirty four years old male patient, manual worker, presented with severe right lower limb sciatica with L5 dermatomal distribution of pain and paresthesia with no motor deficit or sphincteric affection. His symptoms were not relieved with pain killers and analgesic medications. MRI lumbosacral spine area were done and revealed a huge IVDP with caudal sequestration at L4-5 spine level. Operative discectomy were done and the patient was improved clinically well. A follow-up MRI lumbosacral area was done after 5 weeks from the operative intervention as shown below.



Figure 20: MRI lumbosacral spine, sagittal view, pre (A) and post-operative (B) images

Conclusion

The present study concludes that lumbar intervertebral disc herniations at L4/5 & L5/S1 with severe radiculopathy with or without associated motor or autonomic dysfunction is common among manual laborers. This is predominantly seen in young male earning members who do strenuous work. Short term follow-up reveals 9.2% of them exposed localized low back pain which is mild to moderate and being treated with NSAIDs and exercises.

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