

Laminectomy versus interlaminar approach for Lumbar disc herniation

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Abstract:

Background: Low back pain is the most common health problem in men and women between the ages of 20 and 50 years. The lumbar disc prolapse has a major role in this condition. Treatment is either conservative or surgical. The most common surgical interventions are either laminectomy or interlaminar approach.

Objective: To determine which is the best surgical approach for the patient according to his/her type of disc herniation.

Patients and methods: A comparative clinical study conducted in the Neurosciences Hospital, Baghdad, Iraq from January 2016 to January 2018. In this paper we evaluated the clinical outcome following both approaches

Results: We studied sixty cases; thirty-four patients had interlaminar approach for lumbar discectomy while twenty-six patients had laminectomy with discectomy.

Conclusion: Both methods can manage different types of lumbar disc prolapse, apart from far-lateral disc which favors laminectomy approach.

Keywords: Lumbar Disc herniation, Interlaminar, Laminectomy, surgical management.

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Introduction:

Low back pain (LBP) is the most common health problem in men and women between the ages of 20 and 50 years. The exact origin of most LBP remains unknown. The degenerative damage of the intervertebral disc (IVD) plays a major role in the mechanism of back pain. (1) About 80% of all individuals and 25% of working adults will suffer from back pain in any given year. Of those, more than 50% will have diseases in the lumbar spine including lumbar disc herniation. (2) Lumbar disc herniation is classified according to the site of the prolapse. The posterolateral disc herniation is common, perhaps because of thinning of the posterior longitudinal ligament (PLL) at the periphery, and it usually affects the nerve root exiting under the pedicle of the lower vertebral body. (3) Central lumbar disc herniation may cause clinical features of spinal canal stenosis and rarely may result in cauda equina syndrome. It is characterized by bilateral sciatica, weakness of the lower limbs, saddle hypoesthesia, and bladder and bowel dysfunction. The syndrome has a gradual and progressive onset. (4, 5) The least common is the far lateral (or extraforaminal) disc herniation.

The initial management of such conditions is generally nonsurgical. Surgery is indicated if the patient has cauda equina syndrome, nerve root compression associated with significant motor weakness, or failure to relieve the pain after six weeks of non-operative measures. (6, 7) In general, when the disc herniation produces a clear single root symptom, then interlaminar disc excision is the procedure of choice. In a stenotic lumbar spinal canal associated with sciatica produced by foraminal impingement or secondary to a bony spur, attempting to perform an interlaminar disc excision is technically difficult and is likely to have a disappointing clinical result. The operation of choice for a stenotic lumbar spinal canal is decompressive laminectomy and foraminotomy at the appropriate level. (8, 9). The aim of the current study is to evaluate both approaches (laminectomy and the interlaminar approach) through assessing the clinical outcome and comparing the patient's post-operative condition in these two different modalities of discectomies.

Patients and method:

This clinical descriptive study was conducted in the Neurosciences Hospital in Baghdad between January 2016 and January 2018. All Sixty cases with lumbar disc prolapse were candidates for surgery. They presented with motor deficit and inadequate pain control with medication for at least six weeks. MRI studies showed lumbar disc prolapse. All patients were evaluated according to the standard score of lumbar disc disease pre and postoperatively. Table 1.

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General investigations in form of blood analysis (complete blood picture, bleeding profile), chest x-ray, blood preparation (Typed and cross-matched for possible transfusion), and anesthetic consultation were performed. Thirty-four patients underwent the interlaminar approach for lumbar discectomy, while twenty-six patients had laminectomy and discectomy. All the cases had clear indication for surgery, the type of surgery was chosen randomly. The clinical symptoms and signs were evaluated for all cases pre and post operation (low back pain, leg pain, and gait) signs (straight leg raising test, sensory disturbance, and motor grading). Interlaminar discectomy: Under general anesthesia, endotracheal intubation and prone position, c-arm fluoroscopy is used to identify the appropriate level, lumbar midline skin incision (2.5-3cm) is made, lumbar fascia opened and dissection of right or left interlaminar muscle, until the interlaminar space was reached, ligamentum flavum opened by scalpel no.11, and rongeur dissector is used to push the thecal sac and nerve root medially, the bulging or herniated disc is identified, scalpel used to open the annulus fibrosus and the disc is removed by piecemeal fashion, good hemostasis and fat graft sometimes used above dura, closure of muscle, fascia, and skin in layers. Laminectomy and discectomy: Under general anesthesia, in prone position, incision is made over the lumbar midline skin (5-7 cm). The lumbar fascia is opened and right and left paraspinal muscle dissection is done. Sacral ala and sacral lamina are identified for calculation of appropriate level, the spinous process is removed, lamina leaving 5 mm part of lamina attached to pars interarticularis. The ligamentum flavum is removed, thecal sac pushed medially, and nerve root identified and pushed medially to identify disc bulge or prolapse. The annulus fibrosus is incised and discectomy performed in piecemeal fashion by pituitary rongeur. Good hemostasis, fat graft is sometimes used. Drain under negative pressure is used if excessive ooze is present. Closure in layers is performed.

Statistical analysis: Microsoft excel was used for generating tables and graphs, the Chi Square test was used to test for variable association.

Results:

The number of cases operated according to the site of disc lesion is outlined in table (2). The Majority are with L5-S1 Disc in both groups of patients (53.8% for laminectomy patients and 53% for interlaminar group). The type of surgery in relation to the site of prolapsed disc is shown in table (3). The most frequent type was paracentral in both laminectomy and interlaminar groups (57.7%, 47% respectively). Four cases had central disc operated on with interlaminar discectomy; the postoperative clinical score showed less improvement as compared to the two cases with same type of disc prolapse operated with laminectomy and discectomy, with a P-value of 0.39 & 0.56 respectively, Figure 1. In patients with paracentral disc prolapse, 16 cases

were operated on with interlaminar discectomy and 15 cases with laminectomy. Both groups showed marked improvement, statistically more significant in the laminectomy group with p-value of 0.26 for the interlaminar patients and 0.97 for the laminectomy group, Figures 2. Eight cases had lateral disc prolapse operated with interlaminar discectomy showed a variety of outcome, statistically not significant with p-value of 0.0006, Figure 3. Four cases with lateral disc prolapse were operated on with laminectomy and discectomy and had a marked improvement, P value 0.44, Figure 3. Five cases had a far lateral disc prolapse and were operated on with interlaminar discectomy, but almost showed no or slight clinical improvement post-surgery. This was statistically significant with a p-value 0.74, Figure 4. Six cases with a far lateral disc prolapse were operated on with laminectomy and discectomy. All showed very good results and marked improvement. This was also statistically significant (p-value 0.56), Figure 4. Revision surgery was required in 7(20.5%) cases of interlaminar approach and only in one (3.8%) case with previous laminectomy. Postoperative analgesia was required in 10 (29.4%) cases of interlaminar approach and 25 (96.1%) cases with laminectomy. Dural violation was reported in 2 (5.9%) cases of interlaminar approach and 5 (19.3%) cases with laminectomy.

Table 1: Clinical evaluation score for patient with lumbar disc disease

Subjective symptoms (maximum 9 points)		Clinical signs (maximum 6 points)	
<i>Low back pain</i>		<i>Straight leg raising test</i>	
3	none	2	normal
2	occasional mild pain	1	30° – 70°
1	frequent mild or occasional severe pain	0	< 30°
0	frequent or continuous severe pain		
<i>Leg pain and/or tingling</i>		<i>Sensory disturbance</i>	
3	none	2	none
2	occasional slight symptoms	1	slight disturbance
1	frequent mild or occasional severe symptoms	0	marked disturbance
0	frequent or continuous severe symptoms		
<i>Gait</i>		<i>Motor</i>	
3	normal	2	normal
2	able to walk farther than 500 m although resulting in pain, tingling and/or muscle weakness	1	slight weakness
1	unable to walk farther 500 m due to pain, tingling and/or muscle weakness	0	marked weakness
0	unable to walk farther than 100 m due to pain, tingling and/or muscle weakness		

Table 2: Distribution of cases according to the affected levels and type of operation

Affected level	Laminectomy	Interlaminar	Total
Multiple levels	3 (11.6%)	3 (8.8%)	6
L5 – S1	14 (53.8%)	18 (53%)	32
L4 – L5	8 (30.8%)	13 (38.2%)	21
L3 – L4	1 (3.8%)	0	1
Total	26	34	60

Table 3: Distribution of cases according to the type of disc prolapse and type of operation

Type of disc prolapse	Laminectomy	interlaminar	Total
Central	2 (7.7%)	4 (11.7%)	6
Para-central	15 (57.7%)	16 (47%)	31
Lateral	4 (15.3%)	8 (23.5%)	12
Far lateral	5 (19.3%)	6 (17.8%)	11
Total	26	34	60

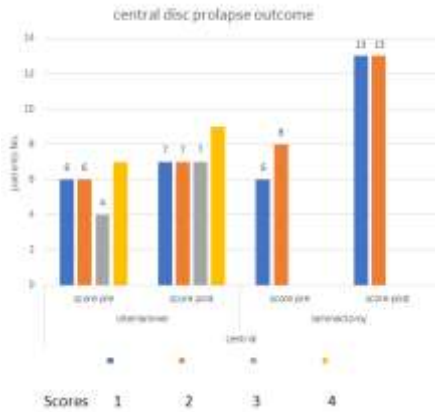


Figure 1: Central disc prolapse outcome (interlaminar and laminectomy)

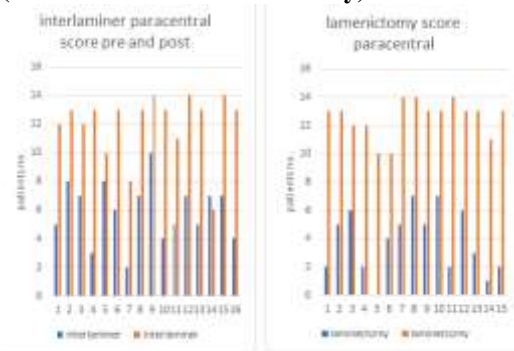


Figure 2: Paracentral disc prolapse outcome (interlaminar and laminectomy)

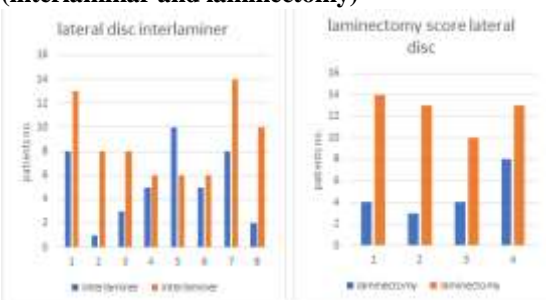


Figure 3: Lateral disc prolapse outcome (interlaminar and laminectomy)

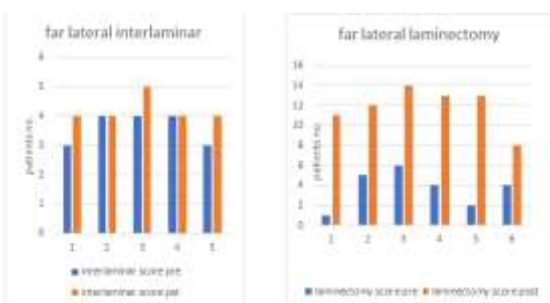


Figure 4: Far lateral disc prolapse outcome (interlaminar and laminectomy)

Discussion:

Lumbar disc prolapse is one of the commonest diseases of the lumbar spine, affecting all age groups especially the middle age. (10, 11) Lumbar disc prolapse can sometimes be treated surgically especially if it causes motor deficit or if conservative measures fail. The far-lateral or extreme lateral disc usually refers to “an extraforaminal displacement in the peridiscal zone peripheral to the sagittal plane of the most lateral part of the pedicle at the same level.” (12) Similar results for the far-lateral disc were found in a study by Kevin Phan, et al. they attributed that result for the location of the far-lateral disc which requires a good exposure and visualization, and noticed that result especially in the L5-S1 level because of the obstruction by the iliac crests. (13) Comparison of pre-operative and post-operative scores of symptoms and signs showed that patients with central, lateral and paracentral disc prolapse improved postoperatively with a slight favor of laminectomy approach. A study by Kulkarni, et al, showed that both approaches are adequate for single level central, paracentral or lateral disc herniation. There was a favor for laminectomy in cases with multi-levels discs and if there was a stenotic lumbar canal, because of inadequate discectomy with interlaminar approach in this situation. The study showed that these cases needed revision for complete discectomy.(14) In our study 7 out of 34 patients with interlaminar approach required revision surgery due to inadequate discectomy, while only one out of 26 required revision of surgery post laminectomy and discectomy. Post-operative analgesia was needed in 25 (96.1%) patients operated with laminectomy while 10 patients (29.4%) with interlaminar approach required medication postoperatively. This is due to the extensive dissection of subcutaneous tissues, bones, and ligaments in the laminectomy group resulting in a considerable degree of postoperative pain. A study by Bajwa and Haldar, and another study by Filippi et al, showed that minimally invasive and microsurgical techniques helped in reducing the pain following lumbar discectomy and other spinal surgeries. (15, 16) There was a higher incidence of accidental dura violation with laminectomy, 5 (19.3%) compared with 2 (5.9%) with interlaminar approach. In a study by Kalevski and Peev, it was concluded that the incidence of dural tear depends on the surgical complexity, the degree of spine degenerative changes and the ossification of the ligamentum flavum , rather than the type of surgical approach.(17)

Conclusion:

Lumbar disc herniation is a common disease that can lead to a serious morbidity if not treated adequately The choice of the surgical procedure must depend on the patient clinical condition and the radiological findings. Both approaches (interlaminar and laminectomy), are effective in the treatment of lumbar disc disease, but some consideration must be taken in some cases regarding the chosen procedure according

to the type of disc prolapse. Accidental tear of the dura is not necessarily related to the type of surgery rather than the complexity of the case

Authors' contribution:

All the authors shared the design of the study performing surgeries, collecting data, drafting and final approval of the documentations.

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عمليات فتح الظهر بطريقة فتح الصفائح العظمية مقابل عمليات الفتحة الصغيرة بدون فتح الصفائح العظمية لحالات انزلاق الفقرات القطنية

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د. أحمد أمان

الخلاصة

الخلفية: ألم الظهر من أكثر الاعراض شيوعا بين المرضى بالأعمار ما بين ٢٠-٥٠ سنة ومن اهم اسبابه الانزلاق الغضروفي للفقرات القطنية. تكون المعالجة عادة تحفظيا وفي حالة عدم الاستفاد يكون التداخل الجراحي هو البديل. يوجد نوعين من التداخل، اما بفتح الصفائح العظمية او بدونه

الهدف: ارتأينا في هذه الدراسة مقارنة مخرجات المرضى الذين اجري لهم أحد هذين النوعين من التداخل الجراحي وايهما أفضل حسب نوع الانزلاق الغضروفي لكل مريض

المرضى والطريقة: اجريت الدراسة في مستشفى العلوم العصبية ببغداد للفترة من كانون الثاني ٢٠١٦ ولغاية كانون الثاني ٢٠٠٨. وشملت ستين مريضا اجري لكل منهم نوع من التداخل الجراحي

النتائج: كلتا الطريقتين حققتا النتائج المرجوة للمرضى ماعدا في حالة الانزلاق الوحشي البعيد حيث كانت النتائج أفضل لمن اجري العملية بفتح الصفائح العظمية

الاستنتاج: العملية الجراحية تبقى الخيار الاخير في علاج الانزلاق الغضروفي للفقرات القطنية وتعتمد على مهارة الجراح في اي نوع من العمليات يفضل ان يجريها والنتائج متقاربة ويفضل في حالات الانزلاق الوحشي البعيد ان تجرى بفتح الصفائح العظمية

مفاتيح الكلمات: الانزلاق الغضروفي للفقرات القطنية، فتح الصفائح العظمية، فتح الفقرات ما بين الصفائح العظمية، العلاج الجراحي.