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Double Consecutive Lumbar Discectomy: Is Fixation a Rule?

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Abstract

Background: Lumbar Disc Prolapse (LDP) represents less than 5% of all low back problems. Most of cases treated with conservative management. Surgery is needed in only 10% of cases.

We will evaluate the need for hardware fixation after double consecutive lumbar discectomies.

Aim of Study: Our study aims to answer the question of whether decompression-only surgery is sufficient for patients with double consecutive lumbar disc prolapse or they necessarily require spinal fixation and fusion.

Patients and Methods: Our work was conducted on 30 patients with double consecutive LDP from January, 2016 to December, 2017 at Fayoum University Hospital. Double consecutive lumbar discectomy was done in all patients. Regular follow-up was done up to 6 months.

Results: All cases had no instability 6 months after surgery. Four patients experienced mechanical low back pain 3 months postoperatively. MR images revealed facet joint arthropathy in two cases improved by medical treatment and the others required facet joint injection.

Conclusion: Double consecutive lumbar discectomy is not considered a risk of instability but larger studies might be needed.

Key Words: *Consecutive – Prolapse – Discectomy.*

Introduction

LUMBAR Disc Prolapse (LDP) is a common cause of low back pain and radicular pain. Approximately 2% of general population and 4.9% of young adults have LDP **[1-3]**. Multilevel disc herniations is commonly associated with degenerative lumbar spinal disorders and become a common spinal disease which is difficult to treat **[4]**.

With the development of many surgical techniques, stands the open lumbar discectomy as the most common and most popular surgical technique for treatment of LDP **[5]**.

Too much debate is rising concerning the role of additional stabilization or fusion in the absence of gross instability. It has been long believed that back pain symptoms associated with LDP will not improve by surgical decompression alone and is mandatory for hardware fixation and fusion **[6-8]**.

Patients and Methods

Study design:

This study was retrospectively conducted on 30 patients with double level lumbar discectomy during the period from January, 2016 to December, 2017 in the Neurosurgery Department of Fayoum University.

Inclusion criteria:

All patients suffering from double level lumbar disc prolapse not responding to medical treatment ranging from 18 to 52 years old with body mass index <35%. Patients with recurrent lumbar disc prolapse, patients with evident instability, patients with signs of osteoporosis (confirmed by DEXA scan) or bleeding disorders were excluded.

All patients were subjected to comprehensive history taking and clinical examination. X-Ray lumbosacral spine with dynamic views (to exclude instability) and also MRI of the lumbosacral spine were performed for all patients to evaluate disc level of herniation, disc height, disc degree of herniation, disc direction of herniation, and disc contour. All the patients were operated upon with conventional open lumbar discectomy through either; full laminectomy, hemilaminectomy or laminotomy approaches.

Full neurological examination was performed to all patients to detect improvement or deterioration of the neurological condition. Improvement

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of back pain and radicular lower limb pain were assessed with Visual analoge score (VAS score). Patients were discharged 3 to 5 days hours with follow-up after 2 weeks, 1, 3 and 6 months in outpatient clinic.

Surgical techniques:

All patients of both groups undergone general anesthesia. Prone position; the abdomen was secured free of pressure and cotton pads placed on pressure points. We started by shaving the back of the patient, using alcohol swab for cleaning the incision site, betadine for sterlization and draping by sterile towels.

A midline skin incision is performed. Subperiosteal muscle dissection with a periosteal elevator and a fine electro cautery needle, exposing the wanted lamina. Lateral fluoroscopic imaging is done to confirm the targeted disc space. We operated all patients through either full laminectomy, hemilaminectomy or laminotomy approaches. For patients with laminotomy approache, we started to remove bone at lower laminal margin overlying the targeted disc space with a small Kerriosn. A small fenestration is done in superior lamina till the superior border of ligamentum flavum starts to appear. After safe dissection from dura by dissector, the ligamentum flavum is opened by a dissector and scalpel, and then removal with a Kerrison.

After exposure of the nerve root, it was medially displaced at the disc space and the annulus was incised to remove the disc material. Afterwards, the root and Dural sac are finally explored to check for any residual compression and/or retained subligamentous disc fragments, controlling epidural bleeding with gel foam. Closure in layers was performed.

Outcome measures:

All patients were followed-up at outpatient clinical after two weeks, one month, three months and six months postoperatively. We evaluated the patients clinically using Visual Analogue Score (VAS) for both low back pain and radicular pain. Radiographic evaluation by plain X-ray (dynamic views) were performed in all patients and MRI lumbosacral spine were requested in selected cases.

Sampling:

The sample size was carefully calculated according to Epi Info 2000. The sample size was chosen using a particular formula based on the prevalence of disease at a confidence interval of 95% and precision of (2%). The sample increased by 10% to avoid problems related to non-responses and missing data. The power of study was 80%.

Ethical approval:

The study was approved by the scientific Research Ethical Committee at our University Hospital after ensuring the ethical standards and scientific merit of research involving our patients and was matched with the 1964 Helsinki Declaration and its later amendments.

Consenting:

Written Consents were obtained from the patients and/or their family relatives after discussing with them; the details of surgery, the probable outcome, the complications, and the possibility of recurrence and re-operation.

Statistical analysis:

Data were gathered and coded to make manipulation of data easier and were double entered into Microsoft Access and data analysis was performed using Statistical Package of Social Science (SPSS) software version 18 in windows 7. Qualitative data were analysed in a simple descriptive way in the form of numbers and percentages, and quantitative parametric data were analysed by arithmetic means as central tendency measurement, standard deviations as measure of dispersion.

Results

Among the 30 patients; 21 males and 9 females. Average age was 35 (range from 18 to 52). Average duration of complaint was 42 months, range from 1 to 6 years. 18 were working in heavy duty jobs, 2 shop supervisors, 2 office clerks and 8 housewives (Table 1).

Table (1): Patient demographic data.

Variables	Number (n=30)
Age (mean, range) in years	35 (18-52)
Gender:	
Male	21 (70%)
Female	9 (30%)

We had 18 patients (60%) with minimal back pain and bilateral claudication pain, 8 patients (26.7%) with unilateral sciatic pain and 4 patients (13.3%) with bilateral sciatic pain (3 cases with mainly left sided and one with mainly right sided sciatica). Non of our patients experienced associated motor deficits or sphenicteric troubles.

Plain X-ray of the lumbosacral spine was suggestive of a disc lesion in all patients but the possibility of multilevel disc diseases was only

raised in 3 patients (10%). With MRI scan, the combination were as follows; (L4,5 with L5, S1) in 21 patients (70%), (L3,4 with L4,5) was 9 patients (30%). So (L4,5) was involved in 29 patients (100%), (L5,S1) was involved in 21 patients (70%). There were no associated spondylolisthesis in any patient (Table 2).

Table (2): Patient clinical and radiological data.

Variables	Value
Duration of complaint (Mean, range)	42 months (1-6 years)
Preoperative clinical presentation (No., %):	
Bilateral claudication pain	18 (60%)
Unilateral sciatic pain	8 (26.7%)
Bilateral sciatic pain	4 patients (13.3%)
Level of disc (No., %):	
L4,5 With L5, S1	21 (70%)
L3,4 with L4, 5: 9	9 (30%)

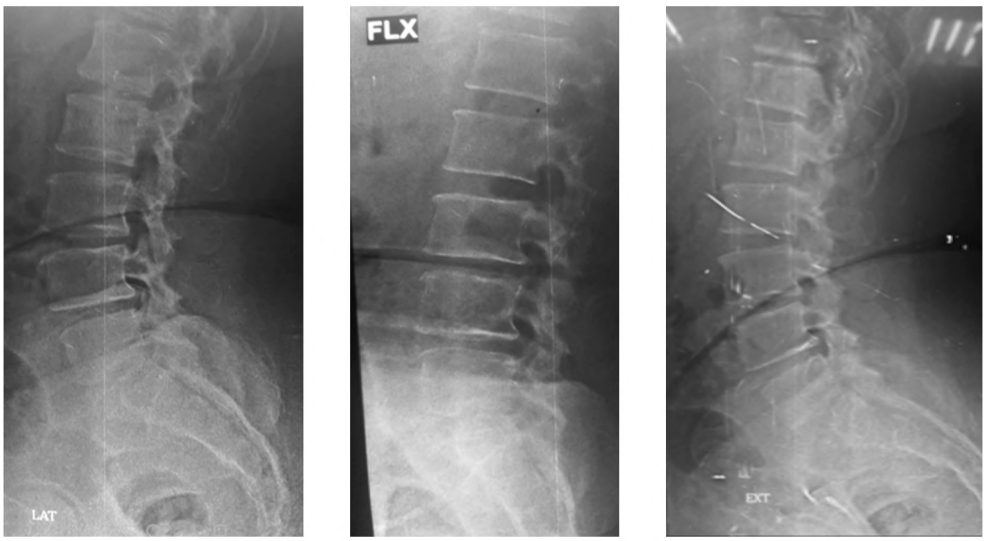
Complete laminectomy was carried out for 26 patients (86.7%) with dicogenic canal stenosis. Four patients (13.3%) were approached from one side; Hemilaminectomy in 2 patients (6.7%) and laminotomy in 2 patients (6.7%). The mean operative time was 85 minutes and ranged from 55 to 115 minutes. Intraoperative blood loss was from 150 to 250cc (mean 200cc) (Table 3), Figs. (1-4).

Intraoperative dural tears were reported in 2 patients (6.7%); one was repaired by direct suturing and 2 were repaired using muscle graft. None of them developed post-operative CSF leak or pseudomeningocele. Mechanical low back pain was reported in 4 patients (13.3%) 3 months post-operatively. Patients were admitted and carefully investigated; two of which managed conservatively and 2 had facet joint arthropathy and required facet joint injection (Table 3).

Two patients (6.7%) were reported to have superficial wound infection in the follow-up period which were managed by repeated dressings and parenteral antibiotics. No other intra or post-operative complications were recorded during a period of 6 months follow-up. Patients were discharged from 2 to 3 days post-operatively.

Table (3): Patient operative and post-operative data.

Variables	Value
Surgical approach (No., %):	
Complete laminectomy	26 (86.7%)
Hemilaminectomy	2 (6.7%)
Laminotomy	2 (6.7%)
Operative time (mean, range)	85 minutes (55 to 115 minutes)
Intraoperative blood loss (mean, range)	200 cc (150 to 250cc)
Intraoperative complication (No., %):	
Dural tears	2 (6.7%)
Post-operative compilation (No., %):	
Back pain	4 (13.3%)
Superficial wound infection	2 (6.7%).



(A) (B) (C)

Fig. (1): Pre-operative dynamic views showing no instability pre-operatively (A- Lateral view, B- Flexion view and C- Extension view).

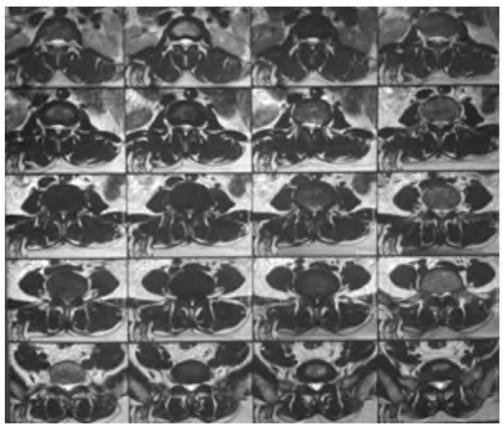
(A)  (B) 

Fig. (2): Pre-operative MRI showing cosecutive double disc prolapse with lumbar canal stenosis L3,4 with L4,5, (A- Axial and B- Sagittal views).

Fig. (3): Lateral view 2 weeks post-operatively (complete laminectomy).

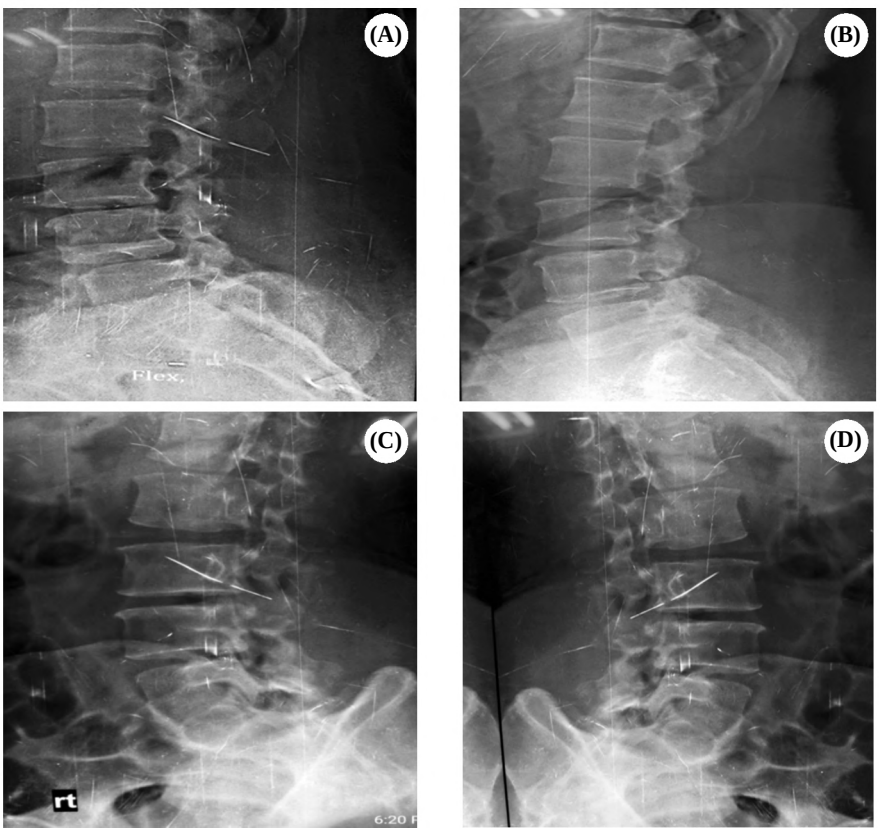


Fig. (4): Dynamic views 6 months post-operatively showing no signs of instability (A- Flexion, B-Extension, C & D- Right and left oblique views respectively).

Discussion

LDP is characterised by radicular pain and other symptoms depending on the site and degree of herniation. This was reported to be the most common cause for loss of working hours in young and middle aged individuals. Discectomy is a well known procedure commonly performed for LDP. The first lumbar discectomy by laminectomy and transdural approach was reported by Mixter and Barr, 1934 **[9]**.

Post-operative instability after lumbar discectomy is a major cause of failed back surgery syndrome **[10-13]**. It is the abnormal motion between two or more vertebrae and is considered as the loss of the ability of the spine under physiologic loads to maintain its normal pattern of displacement **[14-16]**.

There is too much debate in the literature regarding occurrence of post-operative instability after decompression only approaches of lumbar spine. In our study we anticipated that lumbar discectomy alone in the absence of major back pain and in the prevalence of radicular pain will not endanger spinal stability.

In our study the mean age was 35 years for both genders. This was in agreement with Huang et al., 2005 and Schick et al., 2002, where the mean age was 39.7 and 39.5 years in there study groups **[17,18]**.

We noticed that the range of age is similar in relevant studies and it was around 40 years old. Increasing disc degeneration through the activity years from 20 to 40 gives an explanation to this range.

Male predominance was found in our study, which was nearly like what was stated by Samini et al. **[19]**, Postacchini et al. **[20]** representing: 75%, 66.5% and 62.8% respectively. Also, Hermantin et al., **[21]** had similar results with 39 male (65%) and 21 female (35%), which is near to the sex distribution percentage of our study. This may be explained by exposure of men to muscular work and heavy lifting.

Little is written in the literature about double consecutive lumbar discectomy and its implications on spinal stability. The results of the our study suggest that consecutive double level lumbar discectomy in the presence of mainly radicular pain and a minimal pre-operative back pain should not be a contraindication to decompression-only surgery in patients who otherwise are candidates for surgical decompression of consectutive double level LDP.

Good preservation of articular processes offers a good preservation of spinal stability **[22,23]**. This theoretical evidence provides a substantial support to the technique of lumbar decompression surgery without fusion.

Charles et al., discussed decompression without fusion or stabilization in patients with lumbar spinal stenosis with a clinically significant preoperative back pain. Their study was then classified into 3 groups: Back pain-predominant (BP-Dominant) group, leg pain-predominant (LP-Dominant) group, and back pain equal to leg pain (BP=LP) group. They found that the LP-Dominant patients ultimately had better 1-year post-operative scores, even the BP-Dominant patients improved clinically in all outcome measures, including back pain **[24]**.

In 2015, Röder et al. **[25]** reported 50 matched pairs of patients from the SWISS spine registry (decompression plus interspinous process device) versus the Spine Tango registry (decompression-only controls) with pre-operative back pain ›_5 of 10. At of follow-up period of 7 to 9 months, the interspinous process device group improved dramatically in back pain (3.8 vs. 2.5) and leg pain (4.3 vs. 2.5). In the decompression-only group, 60% of patients reported significant improvement in back pain **[26]**. The principal limitation of the study was both comparing groups from 2 different registries.

Amrithlal et al., studied 83 patients who underwent fenestration discectomy for lumbar disc herniation with special reference to post-operative instability of the lumbar spine was analyzed. Standard fenestration discectomy does not cause instability of the spine more than microdiscectomy. The Oswestry scoring showed an average score of 19.8%. 59 (71.08%) patients had mild disability and 24 (28.91%) patients had moderate disability. None of the patients had severe disability **[27]**.

In contradiction to our study, Fox et al., studied a series of patients with decompression-only surgery for spinal stenosis with and without fusion and claimed a progression in spondylolisthesis after decompression-only surgery in 73% of patients with LDS compared with 31% without, again reporting the continuing process of instability that might be increased by decompressiononly surgery **[28]**.

Sansur et al., stated that the additional fusion may turn out to be associated with a greater rate of late surgical complications (e.g., non-union, implant failure, adjacent segment degeneration) **[29]**.

In this series we did not include patients who required total facet resection and/or spinal realignment to decompress canal stenosis which may have been indicated for fusion.

Limitation of study:

We faced a smaller sample size and short duration of follow-up for our study group.

Conclusion:

In the current study we reached to conclusion that double consecutive lumbar discectomy does not endanger instability especially in the presence of mainly radicular pain and a minimal preoperative back pain but larger studies might be needed.

Conflicts of interest:

The authors declare no conflicts of interest regarding the publication of this paper.

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استئصال الغضروف القطنى الثنائى المتتالى
هل تثبيت الفقرات له دور؟

أن الانزلاق الغضروفى القطنى لهو من أهم أسباب الآم الظهر والأطراف السفلى. ٢٪ من الناس يعانون من الانزلاق الغضروفى و٤.٩٪ من الشباب يعانون منه. الانزلاق الغضروفى المتعدد يحدث غالباً مع تآكل الفقرات وأصبح منتشراً جداً مع صعوبة فى طرق العلاج. مع تطور الأساليب الجراحية الحديثة يظل استئصال الانزلاق الغضروفى واحداً من أشهر وأكثر طرق العلاج تفضيلاً لكثير من الجراحين. يوجد كثير من اللغط حول تثبيت الفقرات بعد استئصال الغضروف المنزلق خصوصاً فى حالة عدم وجود تخلخل بالفقرات.

لقد خلصت هذه الدراسة إلى أن استئصال الانزلاق الغضروفى القطنى الثنائى المتتالى لا تمثل خطورة على ثبات الفقرات خاصة فى حالات وجود الالم أساساً بالاطراف السفلى مع وجود الام طفيفة بأسفل الظهر.