

EVALUATION OF POSTERIOR LUMBER INTERBODY FUSION WITHOUT INSTRUMENTATION IN LUMBER DEGENERATIVE DISC DISEASES

By

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ABSTRACT

Background: Degenerative disc disease represents a common cause of chronic low back pain that makes some disabling and requires surgical intervention. Posterior lumbar interbody fusion (PLIF) represents one of the techniques used to deal with this disabling.

Objective: To assess the results of the posterior lumbar interbody fusion (PLIF) without instrumentation in cases of degenerative disc diseases without instability.

Patient and method: This was a prospective study of twenty patients who underwent surgical lumbar laminectomy and discectomy with interbody fusion and graft for degenerative lumbar diseases that not responsive to medical treatment for 6 months at Sayed Galal Hospital, Al-Azhar Faculty of Medicine.

Result: There was a highly statistically significant decrease in the level of pain (VAS score) one week postoperatively compared to preoperative level with p-value < 0.001, and a statistically significant difference was found between preoperative pain (VAS score) level ,and post 6 months level with p-value < 0.001.

Conclusion: Posterior lumbar interbody fusion technique without instrumentation showed several potential benefits in the treatment of degenerative disc disease (DDD).

Keywords: PLIF, degenerative disc diseases, without instrumentation.

INTRODUCTION

Posterior lumbar interbody fusion (PLIF) is a type of spine surgery that involves approaching the spine from the back (posterior) of the body to place bone graft material between two adjacent vertebrae (interbody) to promote bone growth that joins together or “fuses” the two structures (fusion) (Mobbs et al., 2017).

A spinal fusion procedure such as a PLIF may be recommended as a surgical treatment option for patients with a condition causing spinal instability in their lower back, such as degenerative disc disease (Lykissas and Aichmair., 2013).

The primary purpose of posterior lumbar interbody fusion is to stabilize the spine (stop the motion) by restoring the

disc height and alignment with the bone graft (*Tropiano et al., 2017*).

This study aimed to assess the results of the posterior lumbar Interbody fusion (PLIF) without instrumentation in cases of degenerative disc diseases without instability.

PATIENTS AND METHODS

This study was a prospective study of twenty patients who underwent surgical lumbar laminectomy and discectomy with interbody fusion for DDD that not responsive to medical treatment for 6 months in Sayed Galal Hospital from February 2019 to January 2020.

This study included adult patients aged from 30 to 55 years who suffered from back pain and radicular pain unresponsive to conservative treatment with significant degenerative disc disease without significant instability, and we excluded any associated comorbidity, e.g. severe renal disease, hepatic disease, and cardiomyopathy, associated instability as spondylolisthesis, non-degenerative lumbar diseases and other associations as the presence of infection, tumor, and trauma.

The preoperative data were noticed for all patients including clinical assessment, thorough medical history, complete general examination, VAS score, and investigated by X-ray and MRI.

Anesthesia: General anesthesia in all cases, intravenous antibiotics were given 30 minutes before incision.

Position: The patient position was prone to spinal frame, with the abdomen free and the spine flexed to open the inter-laminar spaces.

Procedures: Posterior lumbar interbody fusion without instrumentation. The PLIF technique consisted of three surgical steps.

Decompression via interspinous approach partial laminectomy, flavectomy, and removal of the disc and curettage of both adjacent endplate and Interbody graft.

When decompression and stabilization were indicated, an allo-PLIF at one or two levels was performed using an autogenic graft. Prophylactic antibiotics were given preoperatively. For a successful PLIF without complications, four extremely important operative goals were obligatory: (1) Disc was removed to the anterior longitudinal ligament, which was visualized and protected from transgression, (2) To promote revascularization and remodeling of autografts, the surgeon decorticated endplates of adjacent vertebrae to expose subcortically, bleeding cancellous bone, rich with osteoprogenitor cells, to the interface with contiguous autograft; (3) Autografts filled at least 80% of disc space to provide adequate mechanical support and (4) Nerve roots was protected from traction injuries when impacting intervertebral autografts by saw cut reduction in the size of iliac optimal instrumentation.

Follow up: We followed our patients immediately after operation, one week after surgery, and six months postoperatively where we evaluated clinical and radiological finding including the clinical examination (by assessing subjective symptoms such as (low back pain and radicular pain), clinical signs, outcome scores including the visual analog score and length of postoperative

hospital stay. Also, postoperative X-ray imaging after surgery for both groups of patients was evaluated.

Statistical analysis: All data were revised and then were presented on IBM-compatible PC by using SPSS (Statistical Package for the Social Sciences) program version 22.0.0, Microsoft Office Excel 2007, and GraphPad Prism 6 to be analyzed.

Parameters in the three studied groups and were presented in the form of mean, median, standard deviation (SD), minimum, maximum, range, and percentages. Analytical comparison between different groups was done by

using student t test and analysis of variance (ANOVA) for comparing parametric data when normally distributed. For comparing non parametric data, Fisher’s exact test was used instead of chi-square test as Fisher’s test calculates an exact P value, while chi-square only calculated an approximation.

P values: $P \leq 0.05$ were considered significant.

Ethical considerations:

Written and oral information were obtained from all patients’ prior operation.

RESULTS

According to the demographic data, the mean age of the patients was 51.05 ± 5.29 with a range from (30 – 55) years. As

regard to sex distribution, 14 were males that represented 70% and 6 were females that represented 30% (**Table 1**).

Table (1): Demographic data of the studied Patient (n = 20)

Demographic data		No.= 20
Age (Years)	Mean \pm SD	51.05 \pm 5.29
	Range	41 – 59
Sex	Females	6 (30.0%)
	Males	14 (70.0%)

As regards the diagnosis, 12 patients that represented (60.0%) were diagnosed as L4- L5 Disc prolapsed and 8 patients that represented (40.0%) were diagnosed

as L5-S1 Disc prolapsed. Also, showed that 55% of the patients had LBP with left sciatica as a most apparent clinical picture (**Table 2**).

Table (2): Clinical picture and Diagnosis of the studied patients (n = 20)

Values		No.	%
Clinical Picture	LBP + left sciatica	11	55.0%
	LBP + right sciatica	7	35.0%
	LBP + right sciatica + right foot drop	1	5.0%
	weakness of hip flexior of left hip + parathesia along L4	1	5.0%
Diagnosis	L4- L5 Disc prolapsed	12	60.0%
	L5-S1 Disc prolapsed	8	40.0%

As regards blood loss level, the mean blood loss level with this technique was 442.50 ± 131.06 with a range from (250 – 700) ml. For the operation time, the mean of the operative time was 1.43 ± 0.40 with

a range from (1-2) hours. For the type of fusion, 20 patients that represented (100%) went through Bony fusion with bone graft (**Table 3**).

Table (3): Blood loss(ml),operative time(hours) and Type of fusion of the studied patients (n = 20)

Values		No.= 20
Blood loss(ml)	Mean \pm SD	442.50 ± 131.06
	Range	250 – 700
Operative time (Hours)	Mean \pm SD	1.43 ± 0.40
	Range	1 – 2
Type of fusion	Bony fusion with bone graft	20 (100.0%)

As regard to Pain (VAS Score) preoperative, 1 week postoperative and 6months postoperative, also showed that there was a highly statistically significant decrease in the level of Pain (VAS score) 1week postoperative compared to

preoperative level with p-value < 0.001 and highly statistically significant difference found between Pre-operative Pain (VAS score) level and 6 months postoperative level with p-value < 0.001 (**Table 4**).

Table (4): Comparison between pain (VAS Score)pre, post 1 week, and post 6 months

Pain (VAS score)	Pre-op	Post-op (1 week)	Post-op (6 months)	P1	P2	P3
Mean \pm SD	8.05 ± 0.76	3.25 ± 0.72	1.60 ± 0.68	0.01 •	0.01 •	0.01 •
Range	7 – 9	2 – 4	1 – 3			
Test value	1870.882*			–	–	–
P-value	< 0.001					
Sig.	HS					

P1: preoperative VS P2: VS 1week, P3: VS Post 6 months

The muscle weakness pre and Postoperative and showed that there was no statistically significant decrease in the

muscle weakness preoperative and post preoperative with p-value = 0.071 (**Table 5**).

Table (5): Comparison between muscle weakness pre, and post operative

Muscle weakness	Pre-op		Post-op		P-Value
	No.	%	No.	%	
No	17	85.0%	20	100.0%	0.071
Yes	3	15.0%	0	0.00%	

DISCUSSION

Degenerative spine disease is a common process of aging in humans.

Different techniques are used to overcome this problem and minimizing operative complications. Approaches to the less

invasive technique are gaining popularity in spinal surgery (*Lee et al., 2017*).

The posterior lumbar interbody fusion (PLIF) procedure has gained popularity, with indications including spinal stenosis, instability, degenerative disc disease (DDD). Interbody fusion techniques have been developed to provide solid fixation of spinal segments while maintaining load-bearing capacity and proper disc height (*El-Fiky and Allam., 2016*).

This study followed a prospective study of twenty patients who underwent surgical lumbar laminectomy and discectomy with interbody fusion for DDD that did not respond to medical treatment for 6 months. It included adult patients aged from 30 to 52 years and suffered from back pain and radicular pain that not respond to conservative treatment with significant degenerative disc disease without significant instability and excluded patients with associated comorbidity, associated instability as spondylolisthesis, non-degenerative lumbar diseases and any other association as the presence of infection, tumor or trauma.

The mean age of the patients was 51.05 ± 5.29 with a range from 41 – 59 years. As regard to sex distribution, 14 were males that represented 70% and 6 were females that represented 30%. (60.0%) of patients were diagnosed as L4- L5 Disc prolapsed and (40.0%) were diagnosed as L5-S1 Disc prolapsed. 55% of the patients had LBP with left sciatica as a most apparent clinical picture.

The mean blood loss level with this technique was 442.50 ± 131.06 with a range from 250 – 700 ml. This result

matched the results found by *Galgiani et al. (2016)* and *Elghait et al. (2019)*.

For the operation time, the mean of the operative time was 1.43 ± 0.40 with the range from 1-2hours. All the patient went through bony fusion with bone graft.

As regard to Pain (VAS Score) preoperatively, 1 week, and 6months postoperatively, showed that there was a statistically significant decrease in the level of pain (VAS score) 1 week postoperative compared to preoperative level statistically significant difference between Preoperative Pain (VAS score) and 6 months postoperative levels.

No specific complications from the PLIF technique.

Some studies have reported that PLIF provides more reduction in VAS (*Aygiin et al., 2014* and *Alijani et al., 2015*).

Alijani et al. (2015) evaluated the pain of patients with spondylolisthesis who had undergone PLIF and reported that PLIF was related to a better outcome for pain control at 6 months after the surgery.

Aygun et al. (2014) showed those 48 months after the surgery, the PLIF group developed better results as regards the VAS.

Muscle weakness pre and postoperatively showed that there was no statistically significant decrease in the muscle weakness preoperatively and postoperatively.

CONCLUSION

Posterior lumbar inter body fusion technique without instrumentation showed several potential benefits in the treatment of degenerative disc diseases.

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تقييم تثبيت ما بين الفقرات القطنية بدون إستخدام مسامير فقارية في أمراض الغضروف القطني التنكسي

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خلفية البحث: يمثل مرض القرص التناكسي سببا شائعا لآلام الظهر المزمنة التي تسبب بعض الاعاقات وتتطلب تدخلا جراحيا، ويمثل الانصهار الخلفي أحد الأساليب المستخدمة لتعامل مع هذه الإعاقة.

الهدف من البحث: تقييم نتائج الانصهار بين الفقرات القطنية الخلفية دون أجهزة في حالات أمراض القرص التنكسية دون اضطراب.

المرضي وطرق البحث: تناولت الدراسة الحالية لعشرين مريضا خضعوا لاستئصال الصفيحة القطنية الجراحية واستئصال الغضروف مع اندماج داخلي للفقرات القطنية التنكسية التي لا تستجيب للعلاج الطبي لمدة 6 أشهر بمستشفى سيد جلال الجامعي.

نتائج البحث: حدث انخفاض كبير من الناحية الإحصائية في مستوى الألم بعد أسبوع واحد من الجراحة مقارنة بمستوى ما قبل الجراحة، بينما وجد فرق كبير إحصائياً بين الألم المنطوق ومستوى 6 أشهر بعد العملية الجراحية.

الاستنتاج: أظهرت تقنية اندماج الجسم الخلفي بدون أدوات عددا من الفوائد المحتملة في علاج الغضروف القطني التنكسي.

الكلمات الدالة: مرض القرص التناكسي للفقرات القطنية، الانصهار الخلفي بين الفقرات بدون إستخدام مسامير فقاريه.