

Study to Analyse the Functional Outcome of Transforaminal Lumbar Interbody Fusion in Prolapsed Intervertebral Disc Patients

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Abstract

Background: Lumbar degenerative diseases, such as lumbar spinal stenosis, lumbar disc herniation, lumbar degenerative instability, degenerative spondylolisthesis, etc. are common aetiologies of lower back pain and can have a significant influence on quality of life. Over 90 % of spine surgeries are performed because of degenerative disc diseases (DDD).

Aims and objectives: To analyze the functional outcome of transforaminal lumbar interbody fusion (TLIF) performed in terms pain relief using visual analogue scale (VAS) for pain for back and leg and quality of life using Oswestry disability index (ODI) pre-operatively and post-operatively and during follow-ups.

Material and Method: A prospective interventional study with a sample of 20 patients with prolapsed intervertebral disc having chronic lower back pain undergoing transforaminal lumbar inter body fusion were studied at tertiary care centre from January 2020 to June 2021 in the Department of Orthopaedics Gandhi Medical College and associated Hamidia Hospital, Bhopal, Madhya Pradesh. Pain relief was measured using VAS for pain for back and leg and quality of life using ODI pre-operatively and post-operatively and during follow-ups.

Results: The preoperative mean VAS score was 7.9 ± 0.85 which improved to 2.8 ± 1.24 in postoperative group. Mean VAS score at final follow-up was 2.2 ± 0.79 having statistically significant ($p < 0.0001$). The preoperative mean ODI score was 64 ± 8.1 which improved to 37.2 ± 6.0 in postoperative group. Mean ODI score at final follow-up was 27.5 ± 5.9 . The improvement in mean ODI score was statistically significant with p value of < 0.001

Conclusion: The present study demonstrates that TLIF is safe and effective procedures for management of degenerative spine diseases with clinical improvement in pain and disability.

Keywords: prolapsed intervertebral disc, Oswestry disability index, transforaminal lumbar interbody fusion, spinal fusion

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Introduction

Spinal fusion procedures were introduced as a treatment option for chronic back pain in degenerative disc diseases more than seventy years ago. [1] Transforaminal

lumbar interbody fusion (TLIF) was popularised by Harms and Jerszensky as an alternative to prolapsed intervertebral disc patients (PLIF). [2] TLIF offers several

advantages including a decreased retraction of dural sac that lessens the risk of post-operative radiculopathy. The major difference in the TLIF from conventional approach is the operation is performed unilaterally and the bone graft is inserted into disc space through one side. [3] A major inconvenience with TLIF is surgical approach which required large midline incision, that has to be made with extensive muscle and aponeurosis detachment, resulting in significant iatrogenic soft tissue damage. They are typically lengthy procedures and require long exposure which may results in atrophy and ischemic necrosis of paraspinal musculature and resultant prolonged back pain. [4]

Further to overcome these problems and with developments in instrumentation and imaging have increased the trend toward minimally invasive spine surgeries. Minimally invasive transforaminal lumbar interbody fusion (MITLIF) was first described by Foley et al. [5] in 2002 who used sequential dilation, tubular retraction and a percutaneous screw rod system.

Present study is to analyze the functional outcome of TLIF performed at our centre in terms of pain relief using visual analogue scale (VAS) for pain for back and leg and quality of life using Oswestry disability index (ODI) pre-operatively and post-operatively and during follow-ups

Material and methods: This study was a prospective interventional study with a sample of 20 patients with prolapsed intervertebral disc having chronic lower back pain undergoing TLIF who met inclusion and exclusion criteria from January 2020 to June 2021 at department of orthopaedics, Gandhi Medical College and associated Hamidia Hospital, Bhopal, Madhya Pradesh.

Patients with disabling lower back pain with or without radiculopathy for more than six months, pain not relieved by the conservative line of management (muscle

relaxants, pain medication, steroids), patients ≥ 18 years of age, consenting for study and surgery and those who completed regular follow up of six months were included.

Patients with extensive epidural scarring, arachnoiditis, active infections, osteoporotic patients, and comorbidities and those who cannot be studied because of any reason were excluded.

Clinical outcomes assessment criteria

The primary clinical outcomes was measured by change in VAS score and ODI scores preoperative, postoperative and during follow ups at 6 months.

Oswestry Disability Index (ODI)[6]

The ODI is an index derived from the Oswestry Low Back Pain Questionnaire used by clinicians and researchers to quantify disability for low back pain. The self-completed questionnaire contains ten topics concerning intensity of pain, lifting, ability to care for oneself, ability to walk, ability to sit, sexual function, ability to stand, social life, sleep quality, and ability to travel. Each topic category is followed by 6 statements describing different potential scenarios in the patient's life relating to the topic. The patient then checks the statement which most closely resembles their situation. Each question is scored on a scale of 0–5 with the first statement being zero and indicating the least amount of disability and the last statement is scored 5 indicating most severe disability. The scores for all questions answered are summed, then multiplied by two to obtain the index (range 0 to 100). Zero is equated with no disability and 100 is the maximum disability possible.

Follow up

Patients were called for follow up at completion of 1 month and 6 months from Surgery. During follow up visits clinical outcomes measured using VAS score and ODI score and check X-rays were done to

assess the pedicel screws placement and fusion of lumbar vertebrae.

Statistical analysis

All statistical analysis was done using Statistical Package of Social Science (SPSS Version 25; Chicago Inc., USA). Data comparison was done by applying specific statistical tests to find out the statistical significance of the comparisons. Quantitative variables were compared using mean values and qualitative variables using proportions. Paired t test

was used to measure the statistical difference between preoperative and postoperative values of patients. Significance level was fixed at $P < 0.05$.

Results

Twenty patients of prolapsed intervertebral disc patients with mean age of 46.9 years with the youngest patient being 23 years old and oldest being 63 years old. Out of 20 patients, 12 cases (60%) were males and 8 cases (40%) were females.

Table 1: Distribution according to change in VAS score

	Pre-operative	Post-operative	Follow up at 6 month
Mean VAS score with standard deviation	7.9±0.85	2.8±1.24	2.2±0.79

The preoperative mean VAS score was 7.9±0.85 which improved to 2.8±1.24 in postoperative group. Mean VAS score at final follow-up was 2.2±0.79. In our study the improvement in mean VAS score was statistically significant ($p < 0.0001$).

Table 2: Distribution according to change in Oswestry disability index score

	Pre-operative	Post-operative	Follow up at 6 month
Mean ODI score with standard deviation	64±8.1	37.2±6.0	27.5±5.9

The preoperative mean ODI Score was 64±8.1 which improved to 37.2±6.0 in postoperative group. Mean ODI score at final follow-up was 27.5±5.9. In our study the improvement in mean ODI score is statistically significant ($p < 0.0001$).

In this series 70% of patient had age less than 50 years, the age in which people are the most active. Their vigorous activities predispose them to spinal pathologies. The mean age was 46.9 years depicting that there were more number of young patients. The age range was 23-63 yrs.

Discussion

Table 3: Mean age of DDD patients in various studies

Name of study	Mean age in years
Wang et al (2010) [7]	47.9
Zhang et al (2014) [3]	51.55
Yee et al (2015) [8]	47.9
Kulkarni et al (2016) [9]	54.2
Present study	46.9

The mean age of patients with degenerative spinal diseases in different studies has been between 45 to 64 years. The mean age obtained in this study is similar to that of the study of Yee et al

(2015) [8] in which the mean age was 47.9 years. Thus the mean age obtained in this study are in accordance with most of the studies published earlier.

The preoperative mean VAS Score was 7.9 with standard deviation of 0.85 which improved to 2.8 in postoperative group with standard deviation of 1.24 .Mean VAS score at final follow-up was 2.2 with

standard deviation of 0.79. In our study the improvement in mean VAS score is statistically significant (p value less than 0.0001).

Table 4: Improvement in mean VAS score in different studies

Name of study	Pre-operative (mean±SD)	Last follow-up (mean±SD)
Wang et al (2010) [7]	5.8±0.9	1±0.9
Zhang et al (2014) [3]	6.97±2.49	4.55±3.81
Yee et al (2015) [8]	6.3±2.5	1.3±0.6
Kulkarni et al (2016) [9]	6.3±2.9	2.3±3.0
Adogwa et al (2017) [10]	8.4±1.7	5.5±2.6
Present study	7.9±0.85	2.25±0.79

Table 4 showed that improvement in mean VAS score in different studies have been highly consistent with most of them shows improvement in mean VAS score. [6] The best results were obtained by studies of Wang et al (2010) [7] and Yee et al (2015)

[8]. We should also aim for better results as our experience, techniques and skill in surgery improves with time and better results are obtained with following strict protocols for rehabilitation with trained staff and proper equipment.

Table 4: Distribution according to change in oswestry disability index

Name of study	Pre-operative (mean±SD)	Last follow-up (mean±SD)
Wang et al (2010) [7]	49±15.21	34.27±22.7
Zhang et al (2014) [3]	57.8±23.54	26.4±25.45
Yee et al (2015) [8]	44.4±18	20.7±16.5
Kulkarni et al (2016) [9]	36.9±6.3	15.7±8.9
Adogwa et al (2017) [10]	41.2±6.6	10.8±3.3
Present study	64.3±8.1	27.5±5.94

Table 5 showed that improvement in mean ODI score in different studies have been highly consistent with most of them shows improvement in mean ODI score. The best results were obtained by studies of Kulkarni et al (2016) [9] and Adogwa et al (2017) [10]. The preoperative mean ODI Score was 64 with standard deviation of 8.1 which improved to 37.2 in postoperative group with standard deviation of 6.0 .Mean ODI score at final follow-up was 27.5 with standard deviation of 5.9. [11] In our study the improvement in mean VAS score is statistically significant (p value < 0.0001)

Conclusion

Interbody fusion remains an effective treatment option for a range of spinal

disorders including degenerative disc disease, trauma, infection and neoplasia. There are various approaches available for interbody fusion including PLIF, TLIF, MI-TLIF, ALIF and LLIF. There is evidence demonstrating that one approach is superior to other in terms of fusion or other clinical outcome. The present study demonstrates that TLIF is safe and effective procedures for management of degenerative spine diseases with clinical improvement in pain and disability.

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