



FREQUENCY OF COMPLICATIONS OF TRANSFORAMINAL LUMBAR INTERBODY FUSION (TLIF): A MULTI-CENTER EXPERIENCE

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ABSTRACT

Background: The transforaminal lumbar interbody fusion (TLIF) technique has become increasingly popular since its introduction by Harms in 1982. Its forerunner, posterior lumbar interbody fusion (PLIF) is limited to levels L3 to S1 since excessive retraction on the thecal sac at higher levels risks damage to the neurological structures.

Objective: To determine the frequency of Complications of Transforaminal Lumbar Interbody Fusion (TLIF).

Methodology: This study was multi-centre retrospective study carried out at the Department of Orthopedics and Spine Surgery, Qazi Hussain Ahmed Medical Complex, Nowshera and other private medical centers in Peshawar Pakistan. The study duration was one year from August 2021 to August 2022. A thorough evaluation of hospital records of these patients was done in terms of both intraoperative and postoperative complications. All the data was compiled and entered into SPSS version 23 for analysis.

Results: In this a total of 180 patients were included. The male patients in our study were 54(30%) whereas the female patients were 126 (70%). The mean age (\pm SD) was 457 (\pm 7) years with minimum age of 20 years and maximum age of 75 years. The overall rate of complications in our study was 54 (30%). Post operative ileus in our study was observed in 13 (7.22%) patients. Post operative infection in our study was noted in 12 (6.67%) patients while per operative dural tear observed in our study was 8(4.44%) patients. Implants related complications were noted in 11(6.11%) patients. Pseudoarthrosis was documented in 4(2.22%) patients. There were no cases of pulmonary embolism or DVT formation in our series.

Conclusion: Transforaminal lumbar interbody fusion (TLIF) is a safe and effective option to achieve fusion in various conditions. It is technically challenging and the surgeon needs to be proficient in the technique to avoid catastrophic complications. Clinical scoring proved that our patients did benefit significantly when looking at pain and overall state of health.

Key words: Frequency; Complications; Transforaminal Lumbar Interbody Fusion.

INTRODUCTION

The transforaminal lumbar interbody fusion (TLIF) technique has become increasingly popular since its introduction by Harms in 1982. Its forerunner, posterior lumbar interbody fusion (PLIF) is limited to levels L3 to S1 since excessive retraction on the thecal sac at higher levels risks damage to the neurological structures. Additionally, TLIF only requires a unilateral approach and thus the contralateral facet joint and lamina can be preserved. This provides an additional surface for fusion.¹ There are only a few studies that specifically assess TLIF in terms of patient's clinical and radiological outcome²⁻⁵ and this is the first to provide local South African data. Posterior interbody fusion techniques have been criticized due to the additional risks of neural structure mobilization to facilitate cage insertion. The arguments for include increased fusion rates and the ability to maintain or improve sagittal alignment. Spinal fusion is indicated for a wide range of spinal disorders like degenerative pathologies, trauma, infection and neoplasia.⁶ The history of lumbar spinal fusion is about 70 years old.^{7, 8} Transforaminal lumbar interbody fusion (TLIF) is indicated to achieve spinal fusion in degenerative spinal disorders.⁹ The aim of this technique is to achieve fusion of adjacent vertebrae through the disc space to immobilize the intervertebral joint and thus eliminating painful movements.¹⁰ Since the ipsilateral foramen are exposed with minimal traction on thecal sac the approach can be particularly advantageous in cases of scarring and adhesions after previous surgery.¹¹ In literature successful fusion rate of above 90% and satisfactory clinical outcome has been reported with TLIF.¹² Fusion techniques traditionally utilize iliac crest autograft.¹³ Though the clinical success of auto graft has been well documented but this is not without complications. The advances in surgical technology have improved our ability to correct spinal pathologies with less invasive techniques but the technical complexities of these procedures have also increased.¹⁴ Variable complications of TLIF have been reported in literature ranging from surgical site infection, dural tear, neurological injuries to pseudoarthrosis.¹⁵ Although reported to be relatively safer, TLIF is not without complications. We present a retrospectively data of perioperative complications associated with TLIF. The objective of our study was to determine the frequency of complications of Transforaminal Lumbar Interbody Fusion (TLIF) in our center.

METHODOLOGY

This study was multi-centre retrospective study carried out at the Department of orthopedics and spine surgery Qazi Hussain Ahmed Medical complex nowshera and other private medical centers of Peshawar Pakistan. The study duration was one year from August 2021 to August 2022. Medical record of all adult patients of either gender who were operated for TLIF in the time interval from August 2021 to August 2022 was included. Those patients who underwent TLIF for infection or as a second stage adjunct to another procedure were excluded. Patients with incomplete medical record or follow up were also excluded. The study protocols were approved by the Ethical Committee of our hospital. A thorough evaluation of hospital records of these patients were done in terms of both intraoperative and postoperative complications. All the data was compiled and entered into SPSS version 23 for analysis. Frequencies and percentages were calculated for qualitative data while mean and standard deviation for quantitative data. The data was presented in table and Graphs.

Results

In this a total of 180 patients were included. The male patients in our study were 54(30%) whereas the female patients were 126 (70%). (Figure 1) The mean age (\pm SD) was 457 (\pm 7) years with minimum age of 20 years and maximum age of 75 years. TLIF Indications surgery includes spondylolisthesis in 99 (55%) cases, degenerative disc disease in 54(30%) cases and recurrent disc herniation in 27 (15%) cases. (Figure 2) Based on level of surgery, the most common one was L4-L5 observed in 86 (47.78%) followed by L5-S1 in 81(45%). (Figure 3) The overall rate of

complications in our study was 54 (30%). (Figure 4) Post-operative ileus in our study was observed in 13 (7.22%) patients. Post operative infection in our study was noted in 12 (6.67%) patients while per operative dural tear observed in our study was 8(4.44%) patients. Implants related complications were noted in 11(6.11%) patients. Screw malpositioning was observed in 8(4.44%). Cage subsidence was observed in 3 (1.67%). Implant breakage or pullout was not documented in our study. In our series 12 (6.67%) patients had new onset neurology. Neurology was defined as radiculopathy in dermatomal pattern and motor weakness of grade 1 or more. Contralateral side radiculopathy was noted in 10(5.55%) while motor weakness was observed in 2 (1.11%) patients. Pseudoarthrosis was documented in 4(2.22%) patients. There were no cases of pulmonary embolism or DVT formation in our series. (Table 1)

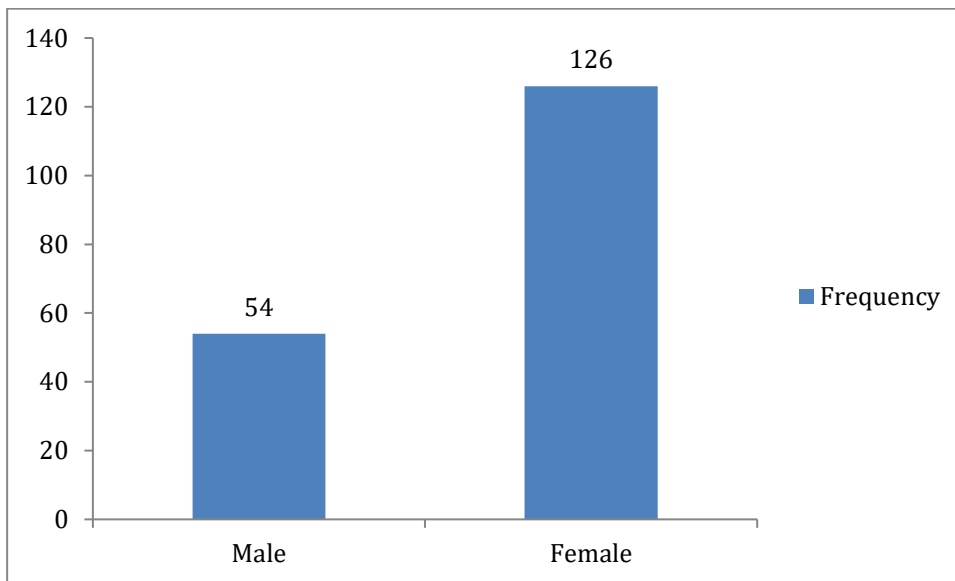


Figure 1: Distribution of patients based on gender

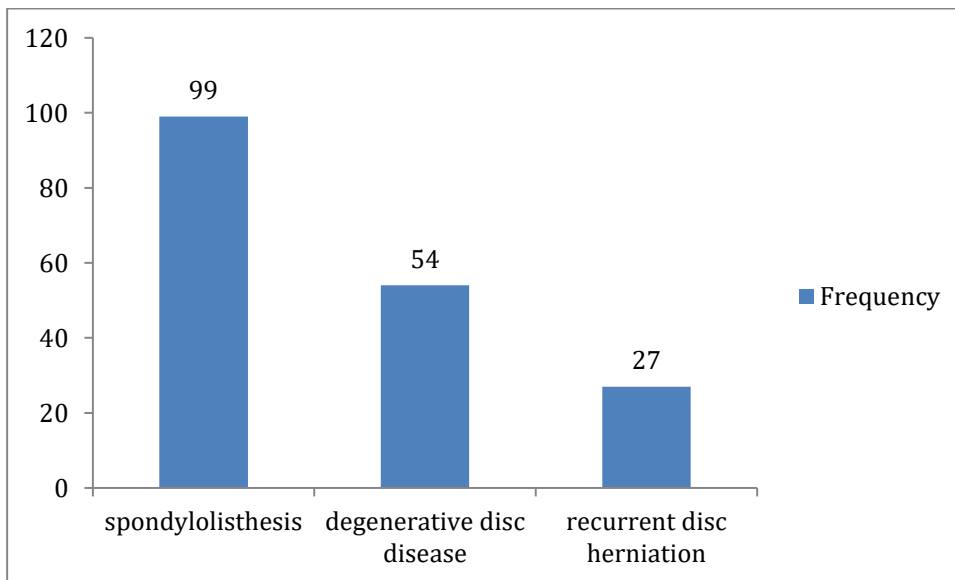


Figure 2: Distribution of patients based on TLIF Indications surgery

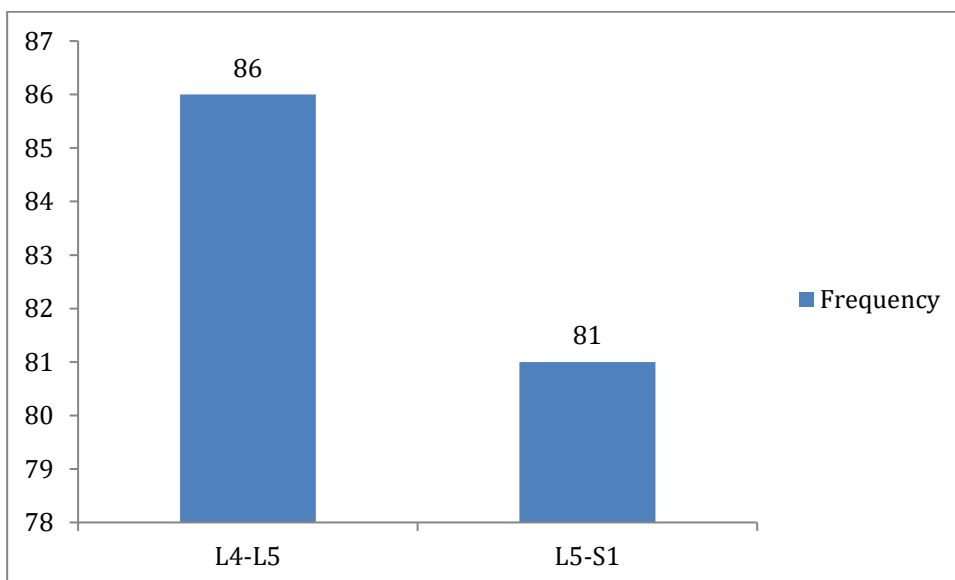


Figure 3: Distribution of patients based on level of surgery

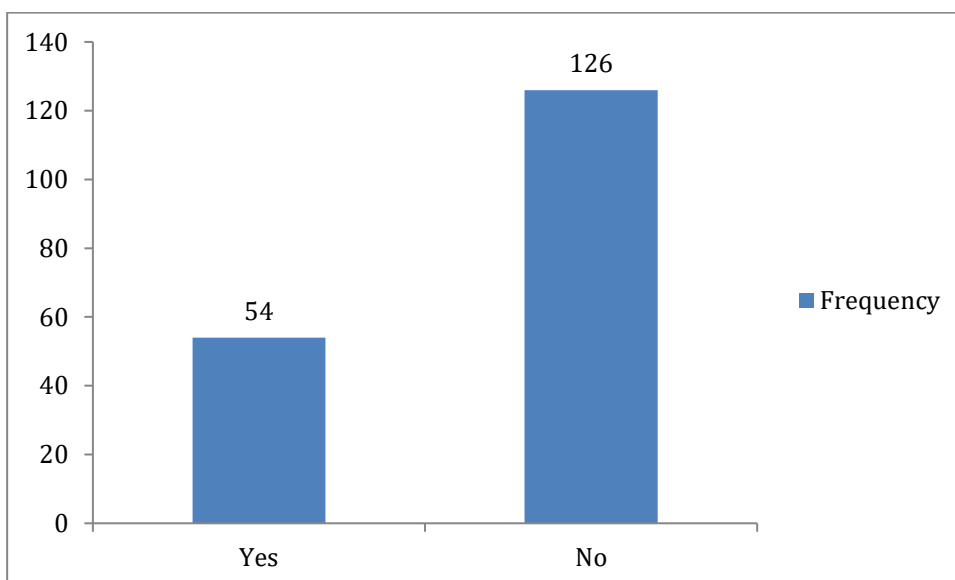


Figure 4: The overall rate of complications in our study

Table 1: Complications observed in our enrolled patients

Complication	Frequency (%)
Post operative ileus	13 (7.22%)
Post operative infection	12 (6.67%)
dural tear	8(4.44%)
Screw malpositioning	8(4.44%).
Cage subsidence	3 (1.67%).
Implant breakage or pullout	00 (00)
radiculopathy	10(5.55%)
motor weakness	2 (1.11%)
Pseudoarthrosis	4(2.22%)
pulmonary embolism	00 (00)
DVT	00 (00)

DISCUSSION

An ongoing debate on the clinical and biomechanical advantages of an instrumented fusion continues in the wake of rising costs and an ageing population. In the UK, it is estimated that 8 000 spinal fusions were performed annually between 1997 and 2002. Similarly, in the US there was a 350% increase in spinal fusions from 9 000 p.a. in 1996 to 36 000 in 2002.¹⁶ Opponents to instrumented fusion advocate financial incentives for the rise in use of instrumentation. Zdeblick¹⁷ showed in a prospective study that patients who underwent instrumented fusion did significantly better than in un-instrumented cases in terms of fusion and clinical outcomes. France et al.¹⁸ looked at instrumented vs un-instrumented fusion in a prospective study and found that instrumentation improved the fusion rate but it did not correlate with clinical outcome. Other studies assessed instrumented and un-instrumented lumbar fusion and found that instrumentation resulted in higher fusion rates at 8 weeks compared to the un-instrumented group but at 16 weeks the fusion rates were the same in both groups.^{19, 20}

In this a total of 180 patients were included. The male patients in our study were 54(30%) whereas the female patients were 126 (70%). The mean age (\pm SD) was 457 (\pm 7) years with minimum age of 20 years and maximum age of 75 years. TLIF Indications surgery includes spondylolisthesis in 99 (55%) cases, degenerative disc disease in 54(30%) cases and recurrent disc herniation in 27 (15%) cases. Based on level of surgery, the most common one was L4-L5 observed in 86 (47.78%) followed by L5-S1 in 81(45%).

In our study Post operative infection was noted in 12 (6.67%) patients. Tormenti et al reported 3.8% infection rate in their series of 531 patients.²⁰ Rihn et al reported 4.2% infection rate in their series of 119 patients.¹² The relatively higher rate of infection in our series could be because of our low threshold for slight oozing or discolored wound edges as infection. However outcome of our cases with post op infection were satisfactory as all were successfully treated. Per operative dural tear was observed in our study in 8(4.44%) patients. Potter²¹ in their series of 100 TLIF procedures reported 6 (6%) cases of dural tears. In another series by Hee HT²² 5(4.5%) cases of dural tears during TLIF surgery were reported. Hence our reported dural rate is comparable with other studies in literature.^{12, 23-25}. We repaired all our dural tears intraoperatively followed by putting fibrin glue. None of these patients had dural leak post operatively in the follow up. Screw malpositioning was observed in 8(4.44%) patients in our study. Tormenti MJ et al²¹ reported 11(2.1%) cases with symptomatic screw malpositioning and all were revised. We did revision in only 3(1.4%) cases. Intervertebral cage migration is a serious complication of TLIF procedure. Cage subsidence was observed in 3 (1.67%) in our study. Re-do surgery was done in one symptomatic patient and displaced cage was successfully retrieved. Aoki²⁶ reported 3 cases of posterior migration of cage. Two of our patients developed motor weakness on the contralateral side after TLIF in revision PID case. To our understanding it was due to traction on the root because of large cage. Large cages in access of 10 mm height should be carefully used especially in revision cases. The rate of successful fusion in our series was 97.5% and pseudoarthrosis in 2.22% cases. Brantigan and colleagues²⁷ reported fusion rate of 90% in their 221 patients with TLIF. Kuslich²⁸ reported 85.3% fusion at 1 year and 90.6 % fusion at 2 years follow up. Other studies²⁹⁻³¹ have also reported fusion rates above 90%. Our study had few limitations. This study was retrospective in design and the possibility of missing complications existed. Post operative CT scan was not used routinely unless patient was symptomatic. The effects of comorbidities on post operative complications could not be analyzed. We recommend further studies to verify our results.

CONCLUSION

Transforaminal lumbar interbody fusion (TLIF) is a safe and effective option to achieve fusion in various conditions. It is technically challenging and the surgeon needs to be proficient in the technique to avoid catastrophic complications. Clinical scoring proved that our patients did benefit significantly when looking at pain and overall state of health.

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