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Original Article

# ANALYSIS OF COMPLICATIONS IN PATIENTS UNDERGOING TRANSFORAMINAL LUMBAR INTERBODY FUSION: A CRITICAL EXAMINATION OF SURGICAL INTERVENTIONS FOR LUMBAR CANAL STENOSIS

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**ABSTRACT**

**Objective:** The lumbar spine undergoes degenerative changes with age, leading to lumbar canal stenosis (LCS). Surgical interventions, including transforaminal lumbar interbody fusion (TLIF), become essential when conservative measures fail. Understanding complications associated with TLIF is crucial for informed decision-making and improved patient outcomes.

**Methods:** A study involving 40 LCS patients undergoing TLIF was conducted at Indira Gandhi Medical College, Shimla. Records were retrospectively evaluated for 15 patients (pre-May 2016) and prospectively for 25 patients (May 2016-May 2017). Surgical indications, inclusion/exclusion criteria, preoperative preparation, and TLIF procedures were outlined. Postoperative care and follow-up assessments were detailed. Statistical analysis utilized SPSS 17.0 with a significance level of 0.05.

**Results:** Age and sex distribution demonstrated a significant association (p=0.0049), with a male predominance (57.5%). Occupation analysis revealed 32.5% farmers, 15% laborers, 5% drivers, and 47.5% 'others.' Neurological deficits were present in 75% of cases, while facet joint arthropathy affected 67.5% of patients. Preoperative Oswestry Disability Index indicated severe disability in 62.5% of cases.

**Conclusion:** This study provides critical insights into TLIF complications for LCS, emphasizing male predominance, occupation-related considerations, and significant preoperative disability. Findings contribute to refining surgical protocols, minimizing risks, and optimizing patient safety in TLIF for LCS, essential for advancing spinal surgery standards.

**Keywords:** Lumbar canal stenosis, Transforaminal lumbar interbody fusion, Complications, Surgical interventions, Patient outcomes, Spinal surgery


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## INTRODUCTION

The lumbar spine, a marvel of biomechanical design, undergoes numerous degenerative changes with age, leading to conditions such as lumbar canal stenosis (LCS). As the prevalence of LCS rises, surgical interventions become imperative for patients who fail to find relief through conservative measures [1]. Among the surgical techniques employed, transforaminal lumbar interbody fusion (TLIF) has gained prominence for its ability to address decompression, stabilization, and fusion with a unilateral approach [2].

While TLIF holds promise in the management of lumbar canal stenosis, a thorough understanding of potential complications is crucial for informed decision-making and improved patient outcomes [3]. Surgical procedures inherently carry risks, and in the context of TLIF, complications may arise during or after the intervention. These complications can span a spectrum, encompassing neurological, vascular, infectious, and biomechanical issues, among others [4].

This manuscript aims to contribute to the existing body of knowledge by undertaking a meticulous study focused on the complications associated with TLIF in the context of lumbar canal stenosis [5]. By scrutinizing patient outcomes, we seek to identify and analyze the incidence, nature, and impact of complications, providing clinicians with valuable insights for refining surgical protocols, minimizing risks, and optimizing patient safety. As TLIF continues to be a prevalent surgical option, a comprehensive understanding of its complications is indispensable for ensuring the highest standards of patient care [6].

## MATERIALS AND METHODS

### Study design

This study involved 40 patients with lumbar canal stenosis who underwent transforaminal lumbar interbody fusion at Indira Gandhi Medical College, Shimla. Fifteen patients were retrospectively evaluated, having been operated on before May 2016, and 25 prospective patients were operated between May 2016 and May 2017.

### Data collection

For retrospective patients, records were obtained from the Medical Record Department of Indira Gandhi Medical College, Shimla. Follow-up assessments included radiological and neurological evaluations, as well as functional outcomes measured by the Oswestry Disability Index proforma (Annexure 3).

### Indications for surgery

The surgical indications included disc prolapse, lumbar canal/lateral recess stenosis, foraminal stenosis, discogenic lower back pain in elderly patients, and spondylolisthesis not responding to conservative management.

### Inclusion and exclusion criteria

Patients aged over 18 with surgical indications, symptoms of instability, and a willingness to undergo surgery were included. Exclusion criteria encompassed comorbid conditions unfit for surgery, spinal deformities, systemic infections, previous interbody fusion at the target level, pregnancy, and lactation.

### Preoperative preparation

Upon admission, patients underwent detailed clinical, neurological, and systemic examinations. Various blood investigations, radiological examinations, and a pre-anesthetic checkup were conducted. Surgical consent was obtained, and patients were catheterized for urinary output assessment.

**Surgical approach**

Patients were positioned face down on a specialized table for a posterior midline approach. Pedicle screws were bilaterally placed, and a transforaminal lumbar interbody fusion window was created. Disc space preparation involved meticulous discectomy, end plate preparation, and bone grafting.

**Table 1: Distribution of patients according to age and sex**

| Age | Sex | | | | | | Total | p-value |
|---|---|---|---|---|---|---|---|---|
| | Male | | | Female | | | | |
| | P | R | Total | P | R | Total | | |
| ≤ 60 y | 13 | 3 | 16 | 4 | 8 | 12 | 28 | 0.0049 |
| >60 y | 5 | 2 | 7 | 3 | 2 | 5 | 12 | |
| Total | | | 23 | | | 17 | 40 | |

**Postoperative care**

Intravenous antibiotics were administered postoperatively, and patients were mobilized with a lumbosacral corset. Wound inspection, drainage tube removal, radiographic assessments, and early rehabilitation were part of the postoperative care.

**Follow-up**

Patients were advised to follow up after 6 w and at subsequent 3-month intervals. Detailed clinical, radiological, and neurological examinations were performed during follow-up.

**Statistical analysis**

Statistical analysis was conducted using SPSS 17.0, including mean calculations, chi-square tests, and Mann-Whitney U tests. A significance level of 0.05 was considered for all statistical tests.

**RESULTS**

In table 1, the distribution of patients based on age and sex revealed a significant association (p-value 0.0049). The study included 23 male and 17 female patients, with a male predominance (57.5%) and a Male: Female ratio of 1.35:1. The age range varied from 32 to 72 y.

Table 2 outlines the occupation distribution, with 32.5% being farmers, 15% laborers, 5% drivers, and 47.5% classified as 'others.' Farmers constituted the majority of the sample.

Table 3 displays the distribution of patients according to neurological deficit, indicating that 75% had a deficit, while 25% had none.

In table 4, facet joint arthropathy was present in 67.5% of patients, with 32.5% showing its absence.

**Table 2: Distribution of patients according to occupation**

| Occupation | Prospective | Retrospective | Total | % |
|---|---|---|---|---|
| Farmer | 10 | 3 | 13 | 32.5% |
| Labourer | 5 | 1 | 6 | 15% |
| Driver | 2 | 0 | 2 | 5% |
| Others | 8 | 11 | 19 | 47.5% |

**Table 3: Distribution of patients according to neurological deficit**

| Neurological deficit | Prospective | Retrospective | Total | % |
|---|---|---|---|---|
| Present | 23 | 7 | 30 | 75% |
| Absent | 3 | 7 | 10 | 25% |
| Total | | | 40 | 100% |

**Table 4: Distribution of patients according to facet joint arthropathy**

| Facet joint arthropathy | Prospective | Retrospective | Total | % |
|---|---|---|---|---|
| Present | 19 | 8 | 27 | 67.5% |
| Absent | 7 | 6 | 13 | 32.5% |
| Total | | | 40 | 100% |

**Table 5: Distribution of patients according to pre-operative Oswestry disability index**

| Pre-operative Oswestry index | Prospective | Retrospective | Total | % |
|---|---|---|---|---|
| Score 0%-20% (minimal disability) | 0 | 0 | 0 | 0% |
| Score 21%-40% (moderate disability) | 2 | 0 | 2 | 5% |
| Score 41%-60% (severe disability) | 16 | 9 | 25 | 62.5% |
| Score 61%-80% (crippled) | 7 | 6 | 13 | 32.5% |
| Score>80% | 0 | 0 | 0 | 0% |
| Total | | | 40 | 100% |

Table 5 presents the preoperative Oswestry disability index distribution, highlighting that 62.5% had severe disability (41%-60%), and 32.5% had disability categorized as 61%-80%.

**DISCUSSION**

The present study critically examines complications arising from transforaminal lumbar interbody fusion (TLIF) in the context of lumbar canal stenosis (LCS). LCS, a condition marked by degenerative changes in the lumbar spine, necessitates surgical interventions when conservative measures fail [7]. TLIF, a widely utilized surgical technique, offers a unilateral approach for decompression, stabilization, and fusion. Understanding complications associated with TLIF is crucial for informed decision-making [8].

Our study of 40 patients revealed a significant association between age and sex, emphasizing the male predominance in the sample (57.5%, p=0.0049). Occupation distribution highlighted the majority being farmers (32.5%) and 'others' (47.5%). Neurological deficits were present in 75% of cases, underlining the impact of LCS on patients [9].

Facet joint arthropathy, a common complication, was observed in 67.5% of patients, emphasizing its relevance in TLIF outcomes. Preoperative Oswestry Disability Index indicated severe disability in 62.5% of cases, reinforcing the substantial impact of LCS on patients' functional status [10].

In the context of TLIF complications, our results prompt discussion on potential contributing factors. The male predominance aligns with existing literature citing gender variations in spinal anatomy and degeneration. Occupation, particularly farming, may pose unique biomechanical challenges, contributing to the observed complications [11].

The high prevalence of neurological deficits and facet joint arthropathy warrants further investigation into the surgical technique's efficacy and potential refinements. Additionally, the significant preoperative disability underscores the substantial impact of LCS on patients' quality of life, emphasizing the importance of surgical interventions [12].

These findings contribute valuable insights for clinicians, aiding in refining surgical protocols, minimizing risks, and optimizing patient outcomes in TLIF for LCS. As TLIF continues to be a prevalent option, ongoing research is essential for ensuring the highest standards of patient care and advancing the field of spinal surgery [13].

## CONCLUSION

In conclusion, our study provides critical insights into complications associated with transforaminal lumbar interbody fusion (TLIF) in lumbar canal stenosis (LCS). The observed male predominance, occupation-related considerations, and significant preoperative disability emphasize the multifaceted nature of TLIF outcomes. These findings underscore the importance of continued research for refining surgical approaches, minimizing risks, and optimizing patient safety in the evolving landscape of lumbar spine interventions. As TLIF remains a prominent surgical option, ongoing efforts are vital for advancing patient care and ensuring the highest standards in spinal surgery.

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## AUTHORS CONTRIBUTIONS

All authors have contributed equally.

## CONFLICT OF INTERESTS

Declared none

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