TRANSFORAMINAL LUMBAR INTERBODY FUSION (TLIF) CLINICAL AND RADIOLOGICAL OUTCOME

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ABSTRACT
Objective: To evaluate the clinical and radiological outcome of Transforaminal Lumbar Interbody Fusion. Methodology: A retrospective study, between May 2012 and June 2015. Patients with chronic back pain due to degenerative spondylolisthesis, degenerative disc disease and recurrent lumber disc herniation refractory to conservative treatment were included. A retrospective review of files to assess pre and postoperative findings. Outcome assessed using Oswestry Disability Index and fusion on pre-set criteria.
Results: Of 25, 16 male (64%) and 9 female (36%) patients with mean age of 40. 9 patients diagnosed as degenerative disc disease, 12 spondylolisthesis and 4 having recurrent disc herniation. Oswestry Disability Index and Visual Analog Pain Scale, showed significant improvement from preoperative 42.3 & 7.1 to 17.5 & 2.5 postoperatively. Fusion observed was 92.00 %.
Conclusion: Transforaminal Lumbar Interbody Fusion is an effective method to treat chronic low back pain with good clinical and radiological outcome.

KEYWORDS: TLIF, Clinical Outcome, Radiological Outcome

INTRODUCTION
Lumbar interbody fusion is a recognized surgical procedure in the treatment of chronic low back pain due to spondylolisthesis. The objective is to produce a bony fusion between 2 vertebral bodies, decompression of neural structures, maintaining disc space height, and restoration of sagittal plane alignment. In literature various fusion techniques have been mentioned using different approaches, vertebral fixation, and fusion materials. Transforaminal lumber interbody fusion (TLIF) is an increasingly popular technique that is used to achieve a circumferential arthrodesis in the treatment of degenerative lumbar spine diseases and open TLIF has been performed for many years with good results. TLIF procedure is similar to more established posterior lumber interbody fusion (PLIF), in which bony fusion can achieved without necessitating a separate anterior approach. Compared to Posterior lumber interbody fusion, the TLIF procedure allows access to the disc space via a far-lateral approach after removal of facet. It allows less mobilization of the theca sac and less risk of retraction injury to the nerve roots. The rationale of this study was to determine the outcome of TLIF procedure, where the main burden in spine unit is the patients with chronic low back pain mainly due to degenerative lumbar spine i.e. spondylolisthesis, degenerative disc disease and spine instability after repeated surgeries after disc herniation.

MATERIALS AND METHODS
A retrospective study, between May 2012 and June 2015. The patients with chronic back pain due to degenerative disc disease, spondylolisthesis and recurrent herniation of disc, treated with the Transforaminal Lumbar Interbody Fusion (TLIF) at the department of Trauma & Orthopaedics and Spine
surgery, Armed Forces Hospital, Southern Region Khamis, Kingdom of Saudi Arabia were included in this study. It was a review of the files and radiological studies to assess the pre and postoperative symptomatology, findings on clinical examination, radiological characteristics, those who underwent TLIF procedure during this period of time. The same procedure was performed in all cases by a single spine surgeon. Only the patients with chronic back pain (more than 6 months of disability and refractory to conservative management) with or without leg pain / neurological deficit due to degenerative spondylolisthesis, degenerative disc disease and recurrent lumbar disc herniation were included in study. The bilateral posterior pedicle screw-rod instrumentation was performed by a single spine surgeon using a consistent surgical technique. The patient was placed in prone position. A posterior midline incision and pedicle screws placed under fluoroscopy and fixation completed with rods. The disc and cartilaginous endplates of adjacent vertebra were removed.
The distraction was applied and the cage filled with autogenous bone graft was placed and compression was achieved. The wound was closed over a drain. Physiotherapy was started next day, ambulation with a corset encouraged as long as the pain was tolerated. The drain was removed usually 48 hours after surgery and the patients was discharged when the patient was independent ambulant, and capable of self-care. The clinical outcome was assessed using Oswestry Disability Index (ODI) scoring system (as minimal, moderate, severe and crippled disability), an internationally established outcome measurement tool in lumber spine surgery. In addition, the assessment of pain using visual pain analog scales (VAS). The criteria for bony fusion were the presence of at least 3 of the following on plain radiographs postoperatively at 18 months. 1) Trabecular structure appearing in the bone graft, 2) Bony bridging anterior to cage, 3) Lack of radiolucent lines around graft, 4) Bony continuity between upper and lower endplates and 5) Absence of movement on flexion extension x-rays films.

RESULTS
There were 16 male (64%) and 9 female (36%) patients with a mean age of 40 years (range: 20-60), who underwent TLIF (Transforaminal Lumber Interbody Fusion) from May 2012 to June 2015. Follow-up arranged was 18 months (range: 12-24 months). Table I & II

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
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<tr>
<td>male</td>
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<td>64.0</td>
<td>64.0</td>
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<tr>
<td>female</td>
<td>9</td>
<td>36.0</td>
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<table>
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<tr>
<td>Total</td>
<td>25</td>
<td>100.0</td>
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</table>
There were 9 patients diagnosed to have degenerative disc disease, 12 with spondylolisthesis and 4 having recurrent disc herniation. Figure-1

Figure-1: Different Diagnosis of The Patients Underwent TLIF

Of the 25 patients who underwent TLIF, in 14 (56%) cases fusion was performed at L5-S1, in 9 (36%) patients at the segment L4-L5 and in 2 (8%) at L3-L4. Figure-2

Figure-2: Spinal Segment Involved.

We found subjective improvement in symptoms of back pain in 19 (76.0%) of 25 patients, leg pain in 15 (83.3 %) of 18, and in 04 (66.67 %) & 02(40.0%) patients there was improvement in sensory and motor deficit respectively postoperatively. Table-III

Table-III: Symptoms Improvement After TLIF In 25 Patients

<table>
<thead>
<tr>
<th>Pre-operative Symptoms</th>
<th>Improved</th>
<th>No Change</th>
<th>Total Overall</th>
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</thead>
<tbody>
<tr>
<td>Back pain</td>
<td>19 (76.00 %)</td>
<td>06 (24.00 %)</td>
<td>25 (100 %)</td>
</tr>
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</table>
Based on the Oswestry Disability Index (ODI) and Visual Analog Pain Scale (VAS), the clinical outcome of 25 patients underwent TLIF showed significant improvement from preoperative 42.3 & 7.1 to 17.5 & 2.5 ODI and VAS scores at 18 months postoperatively respectively, and with an overall improvement of 24.8 ODI and 4.6 VAS scores. Table-IV

<table>
<thead>
<tr>
<th>Outcome measures</th>
<th>Pre-operative score</th>
<th>Post-operative score</th>
<th>Overall improvement</th>
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</thead>
<tbody>
<tr>
<td>VAS (Back &amp; Leg pain)</td>
<td>7.1</td>
<td>2.5</td>
<td>4.6</td>
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<tr>
<td>ODI Score</td>
<td>42.3</td>
<td>17.5</td>
<td>24.8</td>
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VAS: Visual Analog Pain Scale  
ODI: Oswestry Disability Index  
All P < 0.05

A radiological fusion was observed at 18 months postoperatively on anterio-posterior (AP) and lateral x-rays following the pre-set criteria in 23 of 25 patients (92.00 %). Result of patients with fusion after TLIF shown in figure-3,4,5,6,7.

**Figure-3, 4, 5: Pre and Postoperative X-Rays After**
DISCUSSION
In this study, there was a significant improvement in pain and function in patients with spondylolisthesis, degenerative disc disease and recurrent disc herniation treated with TLIF. The functional outcome was assessed with the Oswestry Disability Index and VAS. There was significant improvement in clinical outcome, with the improvement in VAS and ODI scores from preoperative 7.1 & 42.3 to 2.5 & 17.5 respectively at 18 months postoperatively, and with an overall improvement of 4.6 VAS and 24.8 ODI scores. A radiological fusion was observed at 18 months postoperatively in 23 of 25 patients (92.00%). Intervertebral fusion is a well described method for the treatment of chronic low back pain in spondylolisthesis and TLIF has been recently described as an alternative method in patients with degenerative and isthmic spondylolisthesis.6 Lumbar Interbody fusion techniques have shown high fusion rate with particular advantages including immediate anterior column load sharing, a large surface for fusion, bone graft subjected to compressive load and ability to restore normal sagital contour while indirectly decompressing the neuroforamen.7 Trans Lumbar Inter-body fusion techniques also appear to be the most effective treatment of back pain due to degenerative disc disease refractory to conservative management.8 TLIF biomechanically establish

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anterior column support and a posterior band. It can be performed safely via a unilateral posterior approach at any vertebral level and revision can be through undisturbed contralateral foramen and TLIF provides adequate surface area for solid fusion. In one study of 33 cases, the TLIF procedure was associated with good clinical outcomes (improvement of back pain was 67% and leg pain 80%) and high fusion occurred in all patients of spondylolisthesis and recurrent herniation. In another study of 39 patients with spondylolisthesis treated with TLIF procedure, the Oswestry Disability Index score in all patients decreased from 23.5 to 13.5 points after 2 years, the radiographic fusion rate was 94.8% and the sagittal translation was reduced from 23% to 15%. In a study of 112 patients, who underwent TLIF, two years postoperatively, of the 141 levels fused, 110 (78%) were fused and functional outcome was 72%. Our experience in this study with the TLIF procedure confirms the findings of prior studies in that it provides good clinical outcome and high rate of successful fusion.

CONCLUSION
Transforaminal Lumbar Inter-body Fusion is an effective method to treat chronic low back pain in patients with spondylolisthesis, degenerative disc disease and recurrent disc herniation. Our results confirm that TLIF is an option that is associated with good clinical and radiological outcome.

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