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# ORIGINAL ARTICLE

## A comparative evaluation of minimal invasive-transforaminal lumbar interbody fusion (MI-TLIF) and open-TLIF

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***ABSTRACT*:**
**Background:** Transforaminal lumbar interbody fusion (TLIF) has stood the test of time in accomplishing the goal of reducing approach-related morbidity in comparison to its predecessors such as posterior lumbar interbody fusion. The present study compared minimal invasive-transforaminal lumbar interbody fusion (MI-TLIF) and open-TLIF. **Materials & Methods:** among 86 cases of back and leg pain secondary to degenerative conditions were divided into 2 groups. Group I patients were treated with MI- TLIF and group II with O- TLIF. **Results:** Group I had 30 males and 13 females and group II had 25 males and 18 females. Diagnosis was listhesis in 28 in group I and 27 in group II, lumber canal stenosis in 5 and 7 and disc herniation in 10 and 9 in group I and II respectively. The mean operative time was 3.2 hours and 2.5 hours, hospital stay was 4.5 days and 5.7 days, CRP level was 2.5 and 5.4 and VAS score was 50.6 and 45.2 and blood loss was 125.9 and 340.2 ml in group I and II respectively. The difference was significant (P< 0.05). **Conclusion:** MI-TLIF led to lesser blood loss, shorter hospital stay, lesser tissue trauma, and early mobilization.
**Key words:** Posterior lumbar interbody fusion, transforaminal, Herniation.

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### INTRODUCTION

Lumbar pain has tormented man for thousands of years. There are descriptions of lumbar and ciatic pain in Bible and writings of Hipocrates. About 70 to 80% of the people have significant lumbar pain at some time in their lives.[1] Its pathophysiology is probably due to degeneration, thus causing alteration of properties of the discs. These alterations result in biochemical and structural irrtation of the adjacent nerve endings, as well as of new nerve in growth into the interior portion of the disc, thus provoking lumbar and referred leg pain.[2]

The majority of patients with lumbar pain caused by IDD or DDD obtain significant relief of their symptons only with adequate clinical treatment which consists of moderate rest, physical therapy and medicine such as antiinflamatories, analgesics, muscular relaxants and antidepressants. There are several types of lumbar arthrodesis and among the most used are the following: posterior lumbar fusion (PLF), posterior lumbar interbody fusion (PLIF), anterior lumbar interbody fusion (ALIF), circumferencial 360 fusion (front and back) and more recently, the transforaminal lumbar interbody fusion (TLIF).[3]

Transforaminal lumbar interbody fusion (TLIF) has stood the test of time in accomplishing the goal of reducing approach-related morbidity in comparison to its predecessors such as posterior lumbar interbody fusion. With a unilateral transforaminal approach, sufficient disc space exposure can be achieved through the resection of a single facet joint. This approach reduces the retraction of the thecal sac and nerve roots, and at the same time preserves the contralateral structures.[4] However, the drawback of open-TLIF (O-TLIF) is in its inherent technique, which involves far lateral dissection, with the stripping of paravertebral muscles to expose the entry point for pedicle screw and disc preparation.[5] The present study compared minimal invasive-transforaminal lumbar interbody fusion (MI-TLIF) and open-TLIF.

### MATERIALS & METHODS

The present study was conducted among 86 cases of back and leg pain secondary to degenerative conditions (degenerative and spondylolytic spondylolisthesis, central disc herniations) of both genders. All were informed regarding the study and their consent was obtained.

Demographic profile such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Group I patients were treated with MI- TLIF and group II with O- TLIF. Back pain and leg pain were quantified by visual analog scores (VASs) collected from patients

preoperatively, postoperatively, and at the last follow up. The Oswestry Disability Index (ODI) (version 2.0) was similarly recorded. Results were tabulated and subjected to statistical analysis using Mann Whitney U test. P value less than 0.05 was considered significant.

## Results

**Table I Distribution of patients**

| Groups | Group I | Group II |
|---|---|---|
| Method | MI- TLIF | O- TLIF |
| M:F | 30:13 | 25:18 |

Table I shows that group I had 30 males and 13 females and group II had 25 males and 18 females.

**Table II Clinical parameters**

| Variables | Parameters | Group I | Group II | P value |
|---|---|---|---|---|
| Diagnosis | Listhesis | 28 | 27 | 0.05 |
| | Lumber canal stenosis | 5 | 7 | |
| | Disc herniation | 10 | 9 | |
| Level involved | L2-L3 | 24 | 30 | 0.01 |
| | L3-L4 | 18 | 11 | |
| | L4-L5 | 0 | 1 | |
| | L5-S1 | 1 | 1 | |

Table II, graph I shows that diagnosis was listhesis in 28 in group I and 27 in group II, lumber canal stenosis in 5 and 7 and disc herniation in 10 and 9 in group I and II respectively. The difference was significant (P< 0.05).

**Graph I Clinical parameters**

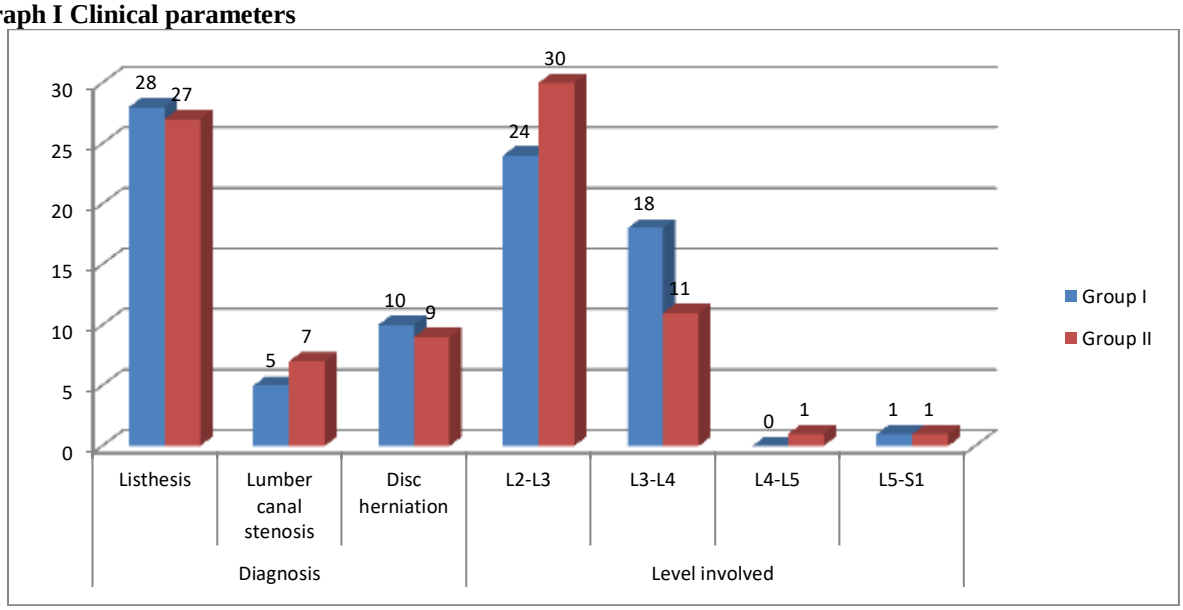


**Table III Treatment outcome**

| Parameters | Group I | Group II | P value |
|---|---|---|---|
| Operative time (Hours) | 3.2 | 2.5 | 0.04 |
| Hospital stay (Days) | 4.5 | 5.7 | 0.05 |
| CRP level | 2.5 | 5.4 | 0.01 |
| VAS | 50.6 | 45.2 | 0.02 |
| Blood loss (ml) | 125.9 | 340.2 | 0.001 |

Table III shows that mean operative time was 3.2 hours and 2.5 hours, hospital stay was 4.5 days and 5.7 days, CRP level was 2.5 and 5.4 and VAS score was 50.6 and 45.2 and blood loss was 125.9 and 340.2 ml in group I and II respectively. The difference was significant (P< 0.05).

## DISCUSSION

The disc lesion and the biomechanics of the spine, the best way to surgically treat disc degeneration must deal with two fundamental aspects to eliminate the focus of the pain of the damaged disc and reduce movement of the affected segment.[6] This can be accomplished by total removal of the disc and interbody fusion, which is the most efficient way to perform an immobilization between two vertebra. The PLF with pedicle screws is relatively simple, safe and permits good posterior decompression.[7] However, it does not remove the disc nor immobilize the segment very efficiently. The ALIF permits excellent removal of the disc and segmental immobilization, does not jeopardize the posterior paravertebral muscles or spinal nerves, and it does not cause posterior instability.[8] However, there is the risk of lesion of the pre-sacral plexus (causing retrograde ejaculation in man), large blood vessels and principally it does not achieve good posterior decompression (canal and vertebral foramen) which is frequently needed in these cases of degenerative disease.[9] The present study compared minimal invasive-transforaminal lumbar interbody fusion (MI-TLIF) and open-TLIF.

In present study, group I had 30 males and 13 females and group II had 25 males and 18 females. Kulkarni et al[10] in their study consecutive cases of open and MI-TLIF were prospectively followed up. Single-level TLIF procedures for spondylolytic and degenerative conditions (degenerative spondylolisthesis, central disc herniations) operated between January 2011 and January 2013 were included. The pre and postoperative Oswestry Disability Index (ODI) and visual analog scale (VAS) for back pain and leg pain, length of hospital stay, operative time, radiation exposure, quantitative C-reactive protein (QCRP), and blood loss were compared between the two groups. 129 patients underwent TLIF procedure during the study period of which, 71 patients (46 MI-TLIF and 25 O-TLIF) fulfilled the inclusion criteria. Of these, a further 10 patients were excluded on account of insufficient data and/or no follow up. The mean follow up was 36.5 months (range 18-54 months). The duration of hospital stay (O-TLIF 5.84 days + 2.249, MI-TLIF 4.11 days + 1.8, $P < 0.05$) was shorter in MI-TLIF cases. There was less blood loss (open 358.8 ml, MI 111.81 ml, $P < 0.05$) in MI-TLIF cases. The operative time (O-TLIF 2.96 h + 0.57, MI-TLIF 3.40 h + 0.54, $P < 0.05$) was longer in MI group. On an average, 57.77 fluoroscopic exposures were required in MI-TLIF which was significantly higher than in O-TLIF (8.2). There was no statistically significant difference in the improvement in ODI and VAS scores in MI-TLIF and O-TLIF groups. The change in QCRP values preoperative and postoperative was significantly lower ($P < 0.000$) in MI-TLIF group than in O-TLIF group, indicating lesser tissue trauma.

We observed that diagnosis was listhesis in 28 in group I and 27 in group II, lumber canal stenosis in 5 and 7 and disc herniation in 10 and 9 in group I and II respectively. Schizas et al[11] in their study of 36 patients reported no difference in operative time between the two groups. MI-TLIF group had less blood loss and shorter hospital stay. No difference was noted in postoperative pain, initial analgesia consumption, VAS, or ODI between the two groups.

We found that mean operative time was 3.2 hours and 2.5 hours, hospital stay was 4.5 days and 5.7 days, CRP level was 2.5 and 5.4 and VAS score was 50.6 and 45.2 and blood loss was 125.9 and 340.2 ml in group I and II respectively. Villavicencio et al[12] in their prospective study of 139 patients reported less blood loss and shorter hospital stay in MI-TLIF group. Mean change in VAS scores postoperatively, MacNab's criteria score, and overall patient satisfaction and total operative time were comparable in both the groups. They concluded that MI-TLIF technique may provide equivalent long term clinical outcomes compared to O-TLIF.

## CONCLUSION

Authors found that MI-TLIF led to lesser blood loss, shorter hospital stay, lesser tissue trauma, and early mobilization.

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