

A Single Segment Minimally Invasive Transforaminal Fusion of Lumbar Spine with Unilateral Pedicle Screw Fixation – A Short Term Analysis and Comparison between Successful and Failed Group

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Keywords

Unilateral MINI TLIF, Coronal imbalance, Revision rate

Background

Since the beginning of minimally invasive transforaminal lumbar interbody fusion, this technique has been used to treat various lumbar spinal disease requiring fusion. Although it has typically been combined with bilateral fixation, some studies have been done using unilateral fixation.

Despite promising results in several studies, it has been suggested that unilateral fixation provides less rotational stability, as well as allows off-axis movements.

Objectives

We wanted to clinically and radiologically compare results between two groups of patients with unilateral fixation of minimally invasive transforaminal lumbar interbody fusion (unilateral fixation of MINI TLIF); those with a successful outcome and those that required a revision procedure with bilateral fixation.

Design and Methods

Thirty-two adults (nineteen males, thirteen females) aged 57.4 ± 10.9 years and with BMI 27.4 ± 3.4 kg/m² were included in the study. Patients had failed conservative treatment for persistent lower back pain, unilateral radicular pain or neurological symptoms and were surgically treated for a single-level degenerative lumbar spine disease between 2013 and 2017. Indications for surgery were symptomatic herniated disc, foraminal stenosis, degenerative disc disease, and spinal stenosis. Prior to the unilaterally fixated MINI TLIF with a single cage insertion, they were clinically and radiologically evaluated. Pain in lower extremities and lower back, as well as disability score, were assessed with Visual Analogue Scale (VAS) and Oswestry Disability Index (ODI). Standing anteroposterior (AP) and lateral x-rays of lumbar spine were performed to measure segmental lordotic angle (SLA), segmental coronal imbalance (SCI), and intervertebral disc height (IDH). The SLA was measured between a proximal endplate of the cranial vertebral body and distal endplate of the caudal vertebral body, IDH between centres of two adjacent vertebral body endplates, and SCI between a proximal endplate of the cranial vertebral body and a distal endplate of the caudal vertebral body. Same measurements were taken immediately after the surgery and at follow-up examination after 6 – 12 months. Paired samples T-test was used to compare preoperative and postoperative results. Independent samples T-

test was used to compare data between a successful (group A) and a revised group (group B). Significance was set at $p < 0.05$.

Results

The level of pathology was L2-L3 in 6.3 %, L3-L4 in 28.1 %, L4-L5 in 46.9 %, and L5-S1 in 18.8 %. In 46.9 % we used PEEK, while in 53.1 % we used Trabecular Metal (TM) cages. Twenty-seven patients achieved a full recovery with minimal or no remaining pain on follow-up (group A), while 5 required revision surgery with bilateral fixation (group B). In all cases in group B, the pathologic level was L4-L5 and TM cages were inserted. An incidental dural tear, a bacterial infection, or a posterior cage migration occurred in four cases.

Immediately after the procedure, an increase in SLA (13.2° to 15.3°) and IDH (9.3 mm to 12.0 mm) were observed. However, an important decrease in SLA and IDH ensued on follow-up (to 13.1° and 10.6 mm; respectively). Nevertheless, a decrease in ODI (0.66 to 0.35) and VAS_{back} (7.0 to 3.7) was evident after surgery even at follow-up in all patients. Higher ODI and VAS_{back} were noted in group B on follow-up compared to group A (namely, 0.56 and 5.6 compared to 0.31 and 3.3, respectively).

Although lower SCI was detected immediately after the primary procedure in the later revised group compared to group A (1.5° compared to 3.1°), a significant increase in SCI was observed in group B on follow-up prior to revision surgery (1.5° to 4.0°) with no such increment in group A.

Conclusion

Our results suggest that it is possible to achieve a limited improvement of segmental lordosis and intervertebral disc height with unilateral fixation of MINI TLIF. Subsidence of the intervertebral cage with loss of segmental lordosis seems to occur at time goes by. A simultaneous coronal disbalance could be a predictive factor for failure and revision surgery in some patients. Identifying those patients at risk might prove beneficial in determining a need for primary bilateral fixation.