Comparative Long Term Radiographic and Clinical Outcomes Following Isolated Anterior Versus Transforaminal Lumbar Interbody Fusion at the L5-S1 Level

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INTRODUCTION:

Anterior and transforaminal lumbar interbody fusions (ALIF/TLIF) are two common techniques for addressing degenerative lumbosacral pathology. The purpose of this study was to evaluate the differences in long-term radiographic and clinical outcomes between the two techniques.

METHODS:

A retrospective analysis was performed between 2019-2024 identifying patients who underwent isolated elective L5/S1 ALIF or TLIF. Data collected included demographics, perioperative data, longitudinal radiographic data [anterior disc height(ADH), posterior disc height(PDH), and segmental lordosis(SL)], complications, revisions, and longitudinal Patient Reported Outcomes Measurement Information System(PROMIS) and Oswestry Disability Index(ODI) scores. The maximal medical improvement(MMI), the time at which 90% of the patients achieved the minimal clinically important difference for PROMIS/ODI, was also studied.

RESULTS:

Sixty-seven patients(TLIF:n=38; ALIF:n=29) were included. The ALIF group had a lower BMI than the TLIF group(27.6±4.9 vs 31.4±6.8, p=0.026). Both groups demonstrated similar preoperative ADH(p=0.593), PDH(p=0.067), and SL(p=0.311). The ALIF cohort had a significant change in ADH(+10.3mm vs +4.0mm, p<0.01) and SL(+8.3deg vs +2.5deg, p<0.01) compared to the TLIF cohort intraoperatively and was maintained at long term follow up(ADH:+8.2mm vs +5.1mm, p<0.01; SL:+4.9deg vs +2.3deg, p<0.01). Conversely, the ALIF cohort had a similar change in PDH compared to the TLIF cohort intraoperatively(+4.4mm vs +3.4mm, p>0.05), but developed significant settling at long term follow up(+2.5mm vs +3.7mm, p<0.01). There were no differences in PROMIS/ODI scores or MMI from preoperative to 1-year follow up.

DISCUSSION AND CONCLUSION:

The ALIF technique achieves greater correction of ADH and SL compared to TLIF at the lumbosacral junction. The TLIF technique provides better long-term correction and maintenance of PDH. Similar long term clinical improvement was observed between groups. Our results suggest tailoring interbody techniques to address patient specific pathology at the L5/S1 level, whether the goals of surgery are to maximize segmental lordosis or for sustained neuroforaminal decompression.