Prone Transpsoas Approach to Lateral Lumbar Interbody Fusion: A Longitudinal Analysis of Radiographic Outcomes

Kurt Lautenshlager BSA[1], Hari Surnedi[1,2], Allyson N Pfeil BS[1], Davin Fertitta BS[1], Corey Hryc PhD[1], Ryan M Stuckey MD[1]
[1]Fondren Orthopedic Research Institute, Houston, TX, [2]William Marsh Rice University, Houston TX
Allyson.pfeil@fondren.com

Disclosures: Kurt Lautenshlager (N), Hari Surnedi (N), Allyson N Pfeil (N), Davin Fertitta (N), Corey Hryc (N), Ryan M Stuckey (3B-Atec; 4-Atec)

INTRODUCTION: The Prone Transpsoas (PTP) approach is an emerging technique for lateral lumbar interbody fusion (LLIF) allowing for simultaneous anterior and posterior spinal column access through a single incision. Previous literature demonstrates the feasibility and advantages of this technique, such as decreased operative time in addition to enhanced lumbar and segmental lordosis compared to traditional LLIF. Despite positive early outcomes, longitudinal outcome information is limited. This study addresses the literature gap by analyzing the three and six-month radiographic and clinical outcomes of PTP LLIF patients.

METHODS: A retrospective medical record review was conducted for 48 patients who underwent PTP at a single surgery center. Preoperative comorbidities were collected from an internal database, and intraoperative data was collected from the operative report. Radiographic outcomes were assessed by comparing preoperative x-rays to three and six-month time postoperative x-rays. Features of interest included several spinopelvic parameters including lumbar lordosis (LL), segmental lordosis (SL), pelvic tilt (PT), as well as anterior (ADH) and posterior (PDH) disc heights. Measurements for SL, ADH and PDH were evaluated at each operated level.

RESULTS: Significant improvements in radiographic parameters were observed for 3-month and 6-month postoperative comparisons of LL (6.0° ± 7.0°, $P < .001$; 5.5° ± 6.7°, $P < .001$), SL (4.3° ± 3.4°, $P < .001$; 4.2° ± 3.2°, $P < .001$) and PT (-1.7° ± 4.2°, $P < .01$; -1.5° ± 3.8°, $P < .01$). Similar improvements were seen in disc heights, with average increases in ADH (4.7mm ± 2.5mm, $P < .001$; 4.7mm ± 2.5mm, $P < .001$) and PDH (3.0mm ± 1.6mm, $P < .001$; 2.9mm ± 1.5mm, $P < .001$) for the same intervals. The most common complications were sensory and motor deficits, with 11 patients (24%) and 6 patients (13%) experiencing some degree of these, respectively. Additionally, two patients experienced a fractured screw within six months postoperatively.

DISCUSSION: Despite the established efficacy of LLIF since its initial introduction in 2006, the necessity for intraoperative repositioning to perform direct decompression or posterior instrumentation demonstrates a significant limitation. PTP LLIF, by comparison, circumvents this need, while also providing greater improvement in lumbar and segmental lordosis largely credited to the prone positioning. The radiographic improvements observed in this study were favorable and consistent between 3- and 6-month comparisons, indicating successful surgical intervention.

SIGNIFICANCE/CLINICAL RELEVANCE: Obviation of the need for intraoperative patient repositioning demonstrates a significant advantage over traditional LLIF. Additionally, the significant improvement in spinopelvic alignment and disc heights at both time points shows promising results for the PTP approach.

ACKNOWLEDGMENTS: The group acknowledges the surgical efforts of the physician who managed the cases analyzed in this study at Fondren Orthopedic Group, a division of Ortho Lone Star, which shares a location with Texas Orthopedic Hospital, an HCA hospital.

IMAGES AND TABLES:

Table 1: Summary of Three- and Six-Month Radiographic Outcomes

Measurement	3 months				6 months			
	n	avg	SD	p	n	avg	SD	p
ΔLL	47	6.0	7.0	<0.001	46	5.5	6.7	<0.001
ΔPT		-1.7	4.2	0.009		-1.5	3.8	0.011
ΔSL	78	4.3	3.4	<0.001	76	4.2	3.2	0.024
ΔADH		3.0	1.6	<0.001		2.9	1.6	<0.001
ΔPDH		4.7	2.5	<0.001		4.7	2.5	<0.001