

Lateral Lumbar Interbody Fusion with Percutaneous Pedicle Screw (LLIF-PPS) Fixation: Are We Getting the Sagittal Alignment Right?

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DISCLOSURE

- Funding Statement

- This study was funded by a SOLAS research grant

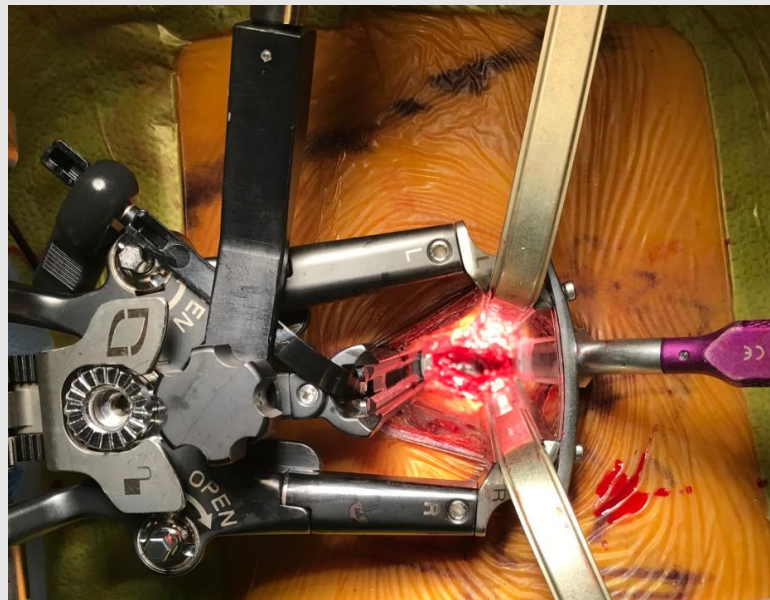
- Disclosures

- Breana R. Siljander, M.D.
 - No conflicts to disclose
- Nicholas R. Dick, B.S.
 - No conflicts to disclose
- J. Alex Thomas, M.D.
 - Paid consultant for Nuvasive, Royalties from Nuvasive
- Jonathan N. Sembrano, M.D.
 - Research support from Nuvasive, AO Spine and OrthoFix



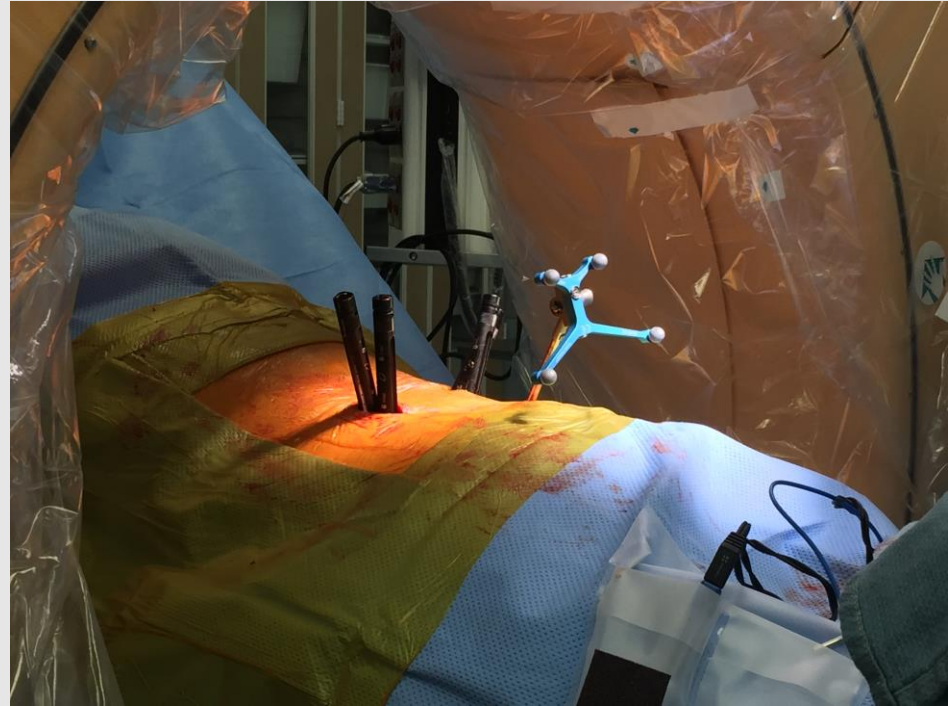
BACKGROUND

- Lateral Lumbar Interbody Fusion with Percutaneous Pedicle Screw (LLIF-PPS)
Fixation definition:
Circumferential minimally-invasive surgery (MIS) that achieves indirect decompression, stabilization and interbody fusion for treatment of lumbar pathologies
- Advantages of MIS
 - Lower blood loss
 - Less postoperative pain
 - Quicker recovery
- **Sagittal alignment after spinal fusion strongly correlates with surgical outcomes**



OBJECTIVE

- We evaluated the efficacy of LLIF-PPS in achieving optimal sagittal alignment



METHODS

- Retrospective radiographic analysis
- Pre-op and 6-12 week post-op x-rays were analyzed for number of alignment goals met using the following criteria:
 1. **PI-LL < 10**
 2. **PT < 20**
 3. **L4-S1 >= 60% of PI**
- Frequency that each of 3 sagittal alignment criteria was met in pre-op and post-op x-rays was recorded



METHODS

- Study Cohort

- Patients who underwent LLIF-PPS in 2009-2018 by 2 surgeons at 2 institutions
- N = 84 patients (114 levels)

- Exclusion criteria

1. Concomitant ALIF/TLIF
2. Corrective osteotomies
3. Pre-psoas approach
4. Planned anterior longitudinal ligament release
5. Extension of fixation to the thoracic spine or pelvis
6. Fusion for diskitis, osteomyelitis or acute trauma



RESULTS

- Demographics

- 33 Men, 51 Women
- Mean age 63.5 years (range 25-82)
- Mean BMI 30.8 (range 16.1-52.9)

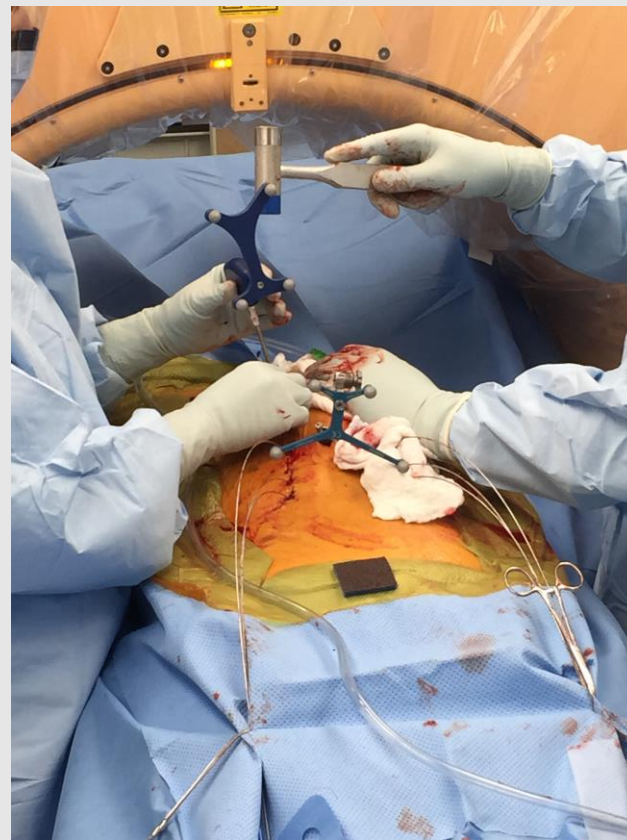
- Fusion Levels

- L1-2, L2-3, L3-4, and/or L4-5 levels
- L4-5 level most common level (71)
- Average 1.4 levels fused (range 1-4)



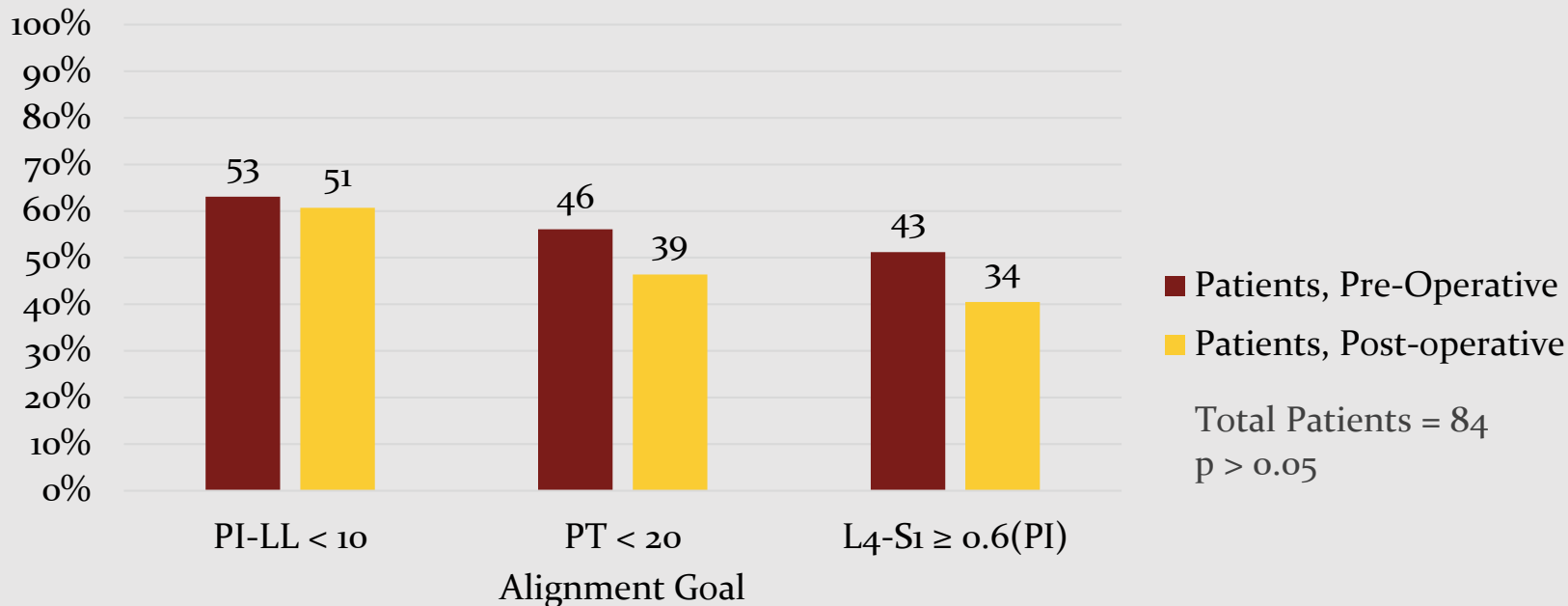
RESULTS

Measure	Pre-operatively		
	Mean	S.D.	Range
PI	54.5	10.28	38-83
LL	50.87	12.25	22-87
PI-LL Mismatch	3.54	10.19	-20-27
PT	18.12	8.46	3-47
L4-S1 Lordosis	32.88	9.79	6-62
Measure	Post-operatively		
	Mean	S.D.	Range
PI	56.46	10.94	38-83
LL	50.61	12.14	21-76
PI-LL Mismatch	5.86	10.63	-21-32
PT	20.45	8.69	4-51
L4-S1 Lordosis	31.69	9.16	12-57



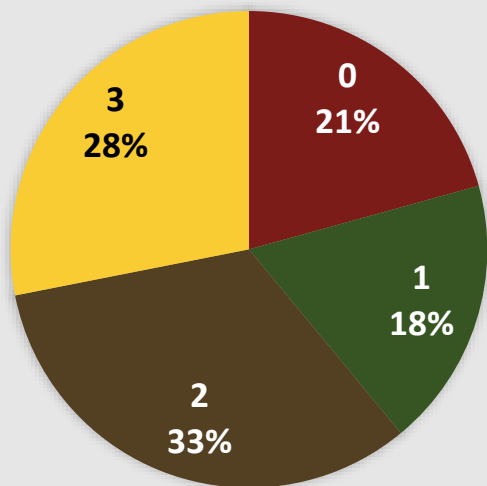
RESULTS

% Patients Meeting Alignment Goal

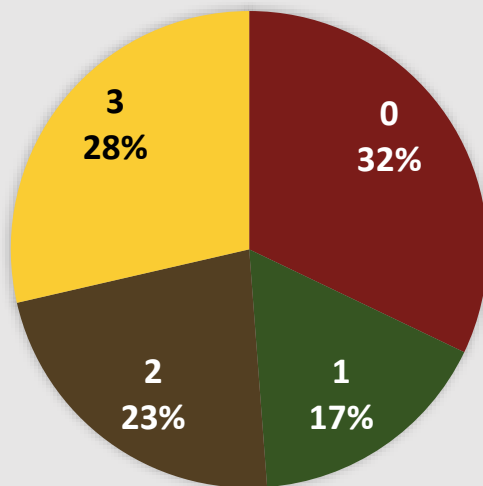


RESULTS – % Patients Meeting *n* Alignment Goals

PATIENTS, PREOPERATIVE



PATIENTS, POSTOPERATIVE



	Mean # Goals Met (SD)
Preop	1.68 (1.1)
Postop	1.48 (1.2)
P-value	0.03

Total Patients = 84

Preop to Postop, # Goals Met	Percentage of Patients
Same # Goals	51%
Met More	17%
Met Fewer	31%



LIMITATIONS

- Does not include Patient Reported Outcomes (PROMs)
 - Cannot discern clinical implications of sagittal malalignment in our patient cohort
 - This is our next study
- Patients did not have full-spine pre- and post-operative x-rays; unable to analyze other radiographic measurements that may affect outcomes:
 - Sagittal Vertical Axis (SVA)
 - T₁ Pelvic Angle (TPA)
 - Global Tilt (GT)



CONCLUSIONS

- No difference in frequency of meeting alignment goals before and after LLIF-PPS
- Fewer cumulative alignments goals were met after LLIF-PPS
- LLIF-PPS unlikely to correct preoperative sagittal malalignment
- **Patients with pre-op sagittal malalignment should be considered for other procedures (e.g. osteotomies) that provide more significant correction of lordosis**



Thank you!

