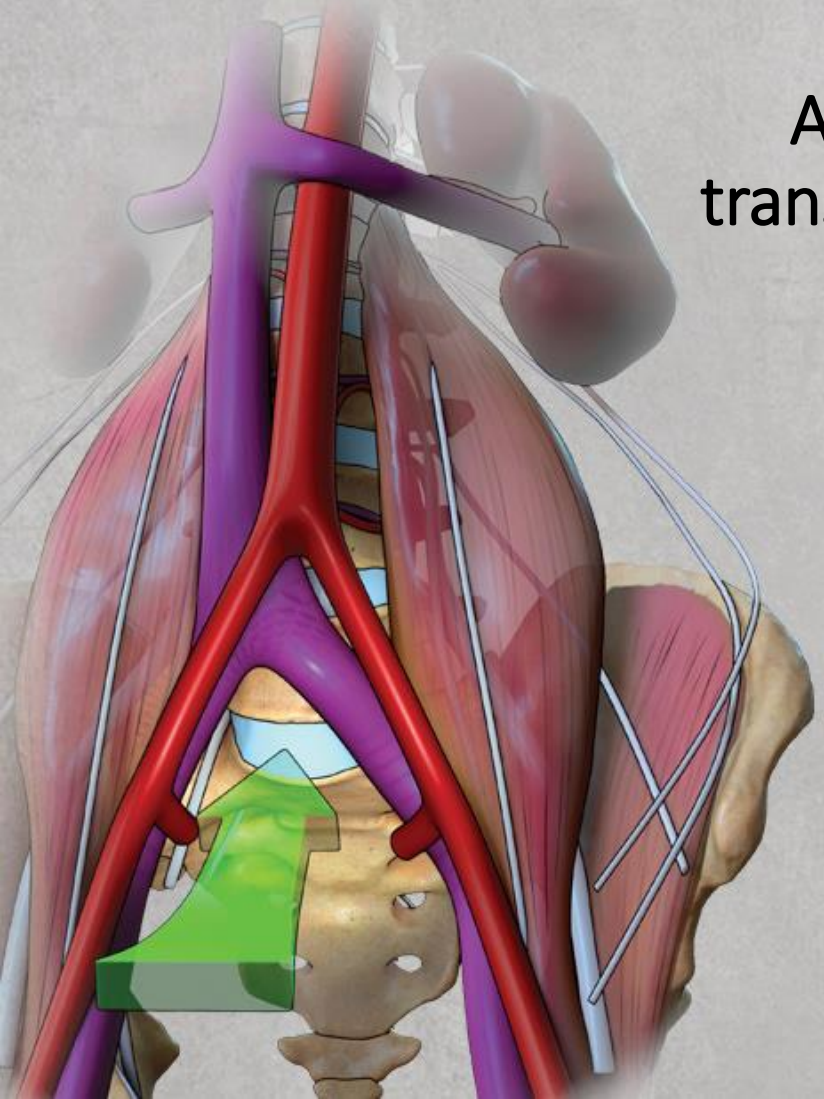

A comparison of anterior lumbar interbody fusion to transforaminal lumbar interbody fusion at the lumbosacral junction in the modern era

E-Presentation # 47

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Introduction

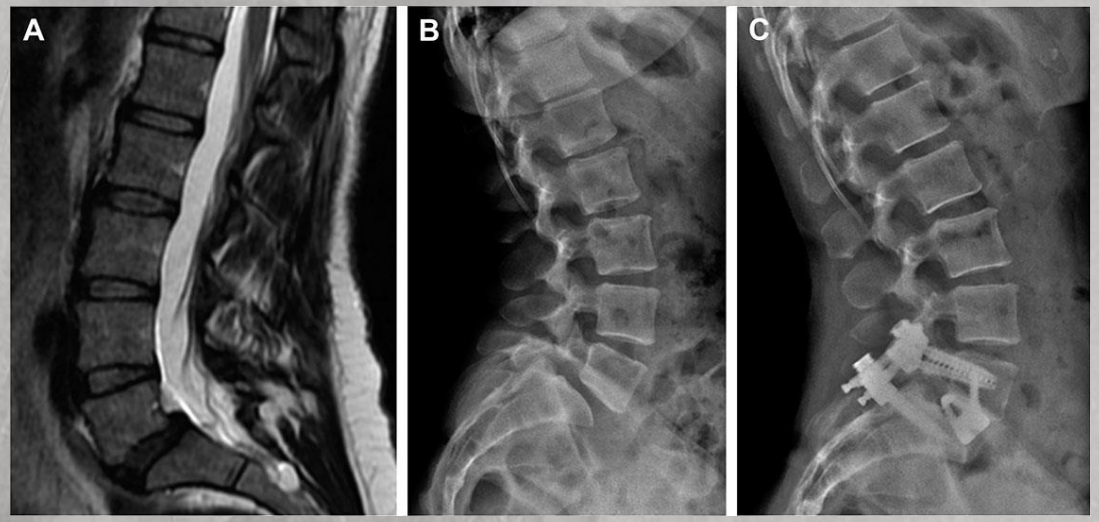
- Interbody fusion is the primary method for achieving arthrodesis across the lumbosacral junction in the setting of degenerative pathologies, such as spondylosis and spondylolisthesis.
- Two common techniques include anterior lumbar interbody fusion (ALIF) and posterior transforaminal lumbar interbody fusion (TLIF).
- While previous authors have compared these techniques, there have been recent advancements in interbody design and technology, and most prior studies have not specifically assessed the lumbosacral junction.
- The **objective** of the current study is to compare changes in radiographic and clinical parameters between patients undergoing single-level ALIF and minimally invasive (MIS) TLIF at L5-S1.

Methods

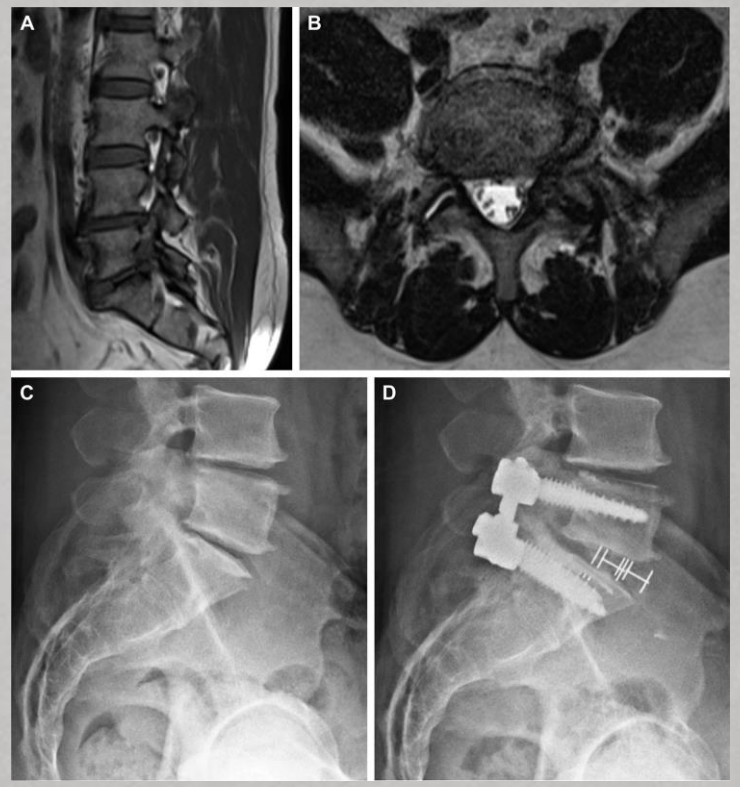
- This study was a retrospective review of consecutive patients who underwent single segment ALIF or MIS TLIF by the senior authors of the study over a five-year interval.
- Upright radiographs were used to determine pre- and post-operative lumbar lordosis, segmental lordosis, disc angle, and neuroforaminal height.
- Improvements in patient-reported outcome scores (ODI and SF-36) were also compared.

Representative Case Examples

ALIF + MIS PSF



MIS TLIF



Results

Table 1. Demographics for all patients undergoing single segment L5-S1 ALIF and MIS TLIF

Characteristic	All Patients (n = 108)	ALIF (n = 49)	TLIF (n = 59)	p value
Age, y, mean (SD)	57.6 (13.5)	55.3 (14.6)	59.6 (12.3)	0.105
Male gender	58 (53.7)	27 (55.1)	31 (52.5)	0.791
BMI, mean (SD)	27.7 (4.7)	28.1 (5.1)	27.5 (4.5)	0.503
Smoking status				0.613
Nonsmoker	68 (63)	32 (65.3)	36 (61.0)	
Smoker	6 (5.6)	3 (6.1)	3 (5.1)	
Former smoker	33 (30.6)	13 (26.5)	20 (33.9)	
Unknown	1 (0.9)	1 (2)	0 (0)	
Surgical Indication				0.218
Spondylolisthesis	54 (50)	28 (57.1)	26 (44.1)	
Degenerative	50 (46.3)	18 (36.7)	32 (54.2)	
ASD	3 (2.8)	2 (4.1)	1 (1.7)	
Pseudoarthrosis	1 (0.9)	1 (2)	0 (0)	

Values are n, % unless otherwise noted.
Abbreviation: ASD = Adjacent Segment disease

108 total patients.
No difference in baseline characteristics.

Table 2. Implant characteristics and complications for all patients undergoing single segment L5-S1 ALIF and MIS TLIF

Characteristic	All Patients (n = 108)	ALIF (n = 49)	TLIF (n = 59)	p value
Implant Type				**<0.001**
PEEK	84 (77.8)	25 (51)	59 (100)	
Titanium	24 (22.2)	24 (49)	0 (0)	
Cage Lordosis				**<0.001**
6°	59 (54.6)	-	59 (100)	
10°	1 (0.9)	1 (2)	-	
12°	1 (0.9)	1 (2)	-	
Hyper-Lordotic	47 (43.5)	47 (96)	-	
Hospital LOS	1.62 (1.07)	2.0 (1.35)	1.3 (0.58)	**<0.001**
Complications				
Intra-operative	1 (0.9)	0 (0)	1 (1.7)	1.00*
Post-Operative	9 (8.3)	5 (10.2)	4 (6.8)	0.729*

Hyper-lordotic = 15-30°
*Fisher's Exact test

Table 3. Complications related to ALIF and MIS TLIF at L5-S1

	ALIF	TLIF
Intra-operative	None	Durotomy (1)
Post-operative	Ileus (3)	UTI (2)
	Urinary retention (1)	Pneumonia (1)
	Supraventricular tachycardia (1)	Radiculopathy requiring readmission (1)

PEEK cages more common in TLIF.
Hyper-lordotic cages more common in ALIF.
No differences in complication rates.

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Results

ALIF

Table 4. Pre- and post-operative radiographic and clinical parameters for patients undergoing single segment L5-S1 ALIF

	Pre-op	Post-op	Change	p value
Radiographic parameters				
Lumbar Lordosis (°)	52.2 (13.3)	56.8 (13.3)	4.6 (7.7)	< **0.001**
Segmental lordosis (°)	18.3 (6.6)	30.8 (5.3)	12.5 (7.3)	< **0.001**
Disc Angle (°)	7.1 (5.0)	21.9 (4.3)	14.8 (5.5)	< **0.001**
Neural foramen height (mm)	11.1 (3.1)	15.6 (4.2)	4.5 (4.6)	< **0.001**
Clinical parameters				
ODI (n = 41)	45.8 (19.4)	31.8 (24.7)	-14.1 (22.7)	< **0.001**
SF-36 (n = 31)	51.0 (17.3)	57.5 (17.7)	6.5 (21.0)	0.094

Paired samples T test

Significant increases in all radiographic parameters.

MIS TLIF

Table 5. Pre- and post-operative radiographic and clinical parameters for patients undergoing single segment MIS L5-S1 TLIF

	Pre-op	Post-op	Change	p value
Radiographic parameters				
Lumbar Lordosis (°)	48.6 (12.3)	50.4 (11.2)	1.8 (7.8)	0.078
Segmental lordosis (°)	19.1 (6.3)	21.1 (5.5)	2.0 (5.7)	**0.008**
Disc Angle (°)	8.8 (5.5)	11.7 (4.1)	3.0 (6.1)	< **0.001**
Neural foramen height (mm)	10.5 (3.2)	12.9 (3.2)	2.4 (3.0)	< **0.001**
Clinical parameters				
ODI (n = 48)	40.0 (26.6)	34.5 (30.7)	-5.4 (26.3)	0.160
SF-36 (n = 53)	58.1 (15.6)	59.9 (14.9)	1.8 (7.3)	0.081

Paired samples T test

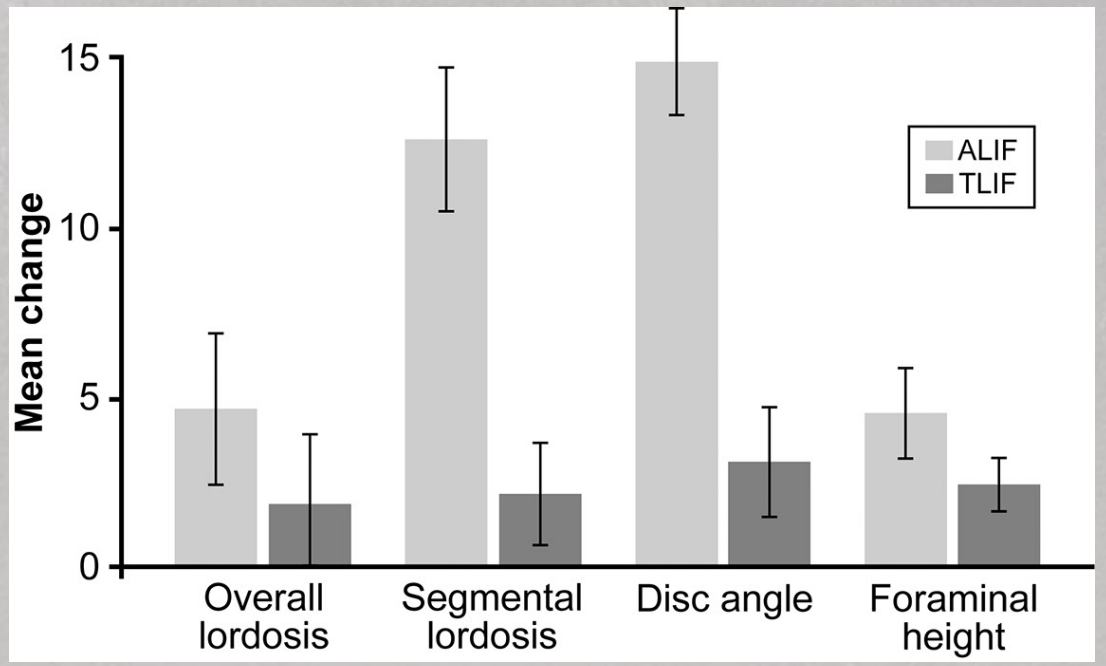
Significant increases in segmental lordosis, disc angle, and foraminal height.
No difference in overall lumbar lordosis.

Results

Table 6. Comparison of changes in radiographic and clinical parameters between patients who underwent single segment ALIF and MIS TLIF at L5-S1

	ALIF (n = 49)	TLIF (n = 59)	P value
Radiographic parameters			
Lumbar Lordosis (°)	4.6 (7.7)	1.8 (7.8)	0.067
Segmental lordosis (°)	12.5 (7.3)	2.1 (5.7)	< **0.001**
Disc Angle (°)	14.8 (5.5)	3.1 (6.2)	< **0.001**
Neural foramen height (mm)	4.5 (4.6)	2.4 (3.0)	**0.008**
Clinical parameters			
ODI	-14.1 (22.7)	-5.4 (26.3)	0.104
SF-36	6.5 (21.0)	1.8 (7.3)	0.234

Independent samples T test.



ALIF results in significantly greater increase in segmental lordosis (6x), disc angle (5x), and foraminal height (2x). Similar change in overall lumbar lordosis and clinical parameters.

Conclusions

- For patients treated for single level degenerative disease at the lumbosacral junction, both ALIF and MIS TLIF lead to significant increases in segmental lordosis and neural foramen height.
- ALIF results in significantly greater increases in segmental lordosis (6x) and L5-S1 disc angle (5x) compared to MIS TLIF.
- There is also a greater increase in neuroforaminal height with ALIF.
- Improvement in clinical parameters is similar between the two techniques.
- Specific surgical goals and patient risk factors should also be weighed when determining appropriate treatment options for these patients.