Motion Preserving XLIF for Idiopathic Scoliosis

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Disclosures:

Glenn R. Buttermann, MD: Consultant (Dio Medical) Licensing Agreement (FG Solco)



Background

- Options for TL scoliosis (Lenke type V) include PSF, ASF, combined A/P.
- ASF requires less levels fused and is thus *motion preserving*.
- Traditional ASF approach is via convexity which requires extensile incision and takedown of abdominal musculature or thoracotomy with takedown of diaphragm.
- XLIF is well established for degenerative scoliosis and is *minimally invasive*.



Posterior Spinal Fusion

- <u>Advantages</u>: routine approach does not require specialized deformity training.
- Disadvantages: more segments require fusion, risk of PJK if construct extends above T11 (or fuse to prox thoracic), high risk of adjacent DDD below construct, extensive injury to extensor muscles, ↑implant costs.



Traditional ASF via Convex Approach

- <u>Advantages</u>: fewer segments require fusion and therefore is *motion sparing*.
- <u>Disadvantages</u>: requires specialized deformity training, extensile approach, potential morbidity of diaphragm takedown, poor cosmesis, risk of post-thoracotomy syndrome.





Minimally Invasive ASF via Concave Lateral Approach

- <u>Advantages</u>: fewer segments require fusion and therefore is *motion sparing,* small incision, ↓LOS,
- <u>Disadvantages</u>: requires specialized deformity training, access surgeon.





Methods

- Comparative cohort study, min > 2 yr FU.
- AIS and adults with IS of adolescent onset.
- Concave minimally invasive XLIF approach vs traditional convex approach.
- Prospective Outcomes (LBP & leg VAS, Pain Drawing, ODI, Appearance VAS, pain meds).
- Stenosis, DDD, HNP tracked but not specifically treated.



Technique, Concave Approach





- Confirm levels, place retractors,
- Approach is anterior to psoas (note that vertebral body rotated away, thus safer than traditional approach for subsequent transvertebral screw placement)

Technique





- Perform discectomies while protecting vessels
- Trial implant sizes (coronally tapered)

Technique





- Implant staples and screws (bicortical), end vertebra first, apical vertebra last.
- Staples prevent screw toggle in primarily cancellous vertebral body.

Technique





- Place coronally tapered (± lordotic) cages & bone graft (this achieves about 2/3 of correction)
- Place rod
- Distract and secure rod for additional 1/3 of correction

16 y/o female AIS



2 yr FU: 45 \rightarrow 16 degrees, decompensation 4.2 cm \rightarrow 0.6 cm, VAS 8 \rightarrow 0

38 y/o female AIS & DDD/HNP



2 yr FU: 52 ${\rightarrow}26$ degrees, decompensation 3.1 ${\rightarrow}$ <0, VAS 8 ${\rightarrow}$ 0.5

38 y/o female AIS & DDD/HNP



L2-3 DDD/HNP, *L45 DDD/left symptomatic HNP*, L5S1 HNP. After correction of primary curve, L45 fractional curve improved spontaneously with reduction of HNP.

61 y/o female AIS & DDD/HNP/Stenosis



2 yr FU: 52 \rightarrow 24 degrees, VAS 8.5 \rightarrow 1



61 y/o female AIS & DDD/HNP/Stenosis



Results - radiographic

	XLIF Concave	Traditional
	(n=10)	Convex (n=8)
Median Age (years)	22	17
# Motion Segments Fused	3.5	3.8
Radiographic Results		
Preop Curve (degrees)	53	53
Preop bending (degrees)	14	19
Post-op Curve (degrees)	20	19
Preop Decomp (cm)	2.6	2.5
Post-op Decomp (cm)	0.5	1.1

Results - Clinical

	XLIF Concave	Traditional
	(n=10)	Convex (n=8)
Median Age (years)	22	17
# Motion Segments Fused	3.5	3.8
Clinical Results		
Preop Pain VAS	6.1	4.2
1 yr post-op Pain VAS	1.8	2.3
2 yr post-op Pain VAS	1.2	3.3
Preop ODI	31	19
1 yr post-op ODI	13	16
2 yr post-op ODI	13	13
Preop Deformity VAS	7.2	5.7
1 yr post-op Deformity VAS	1.2	1.5
2 yr post-op Deformity VAS	1	2.1
Additional surgery	0	0



Summary XLIF for AIS, same or better than traditional approach

- N = 10
 - 4 AIS
 - 6 adult IS with adolescent onset
- Mean Curve improvement: 53° → 20°.
 Comparable correction to historical convex ASF
- Coronal decompensation: 2.6 cm \rightarrow 0.5 cm
- Lumbar lordosis maintained.
- Mean Pain improvement, VAS: $6.1 \rightarrow 1.2$
 - avoids post-thoracotomy pain syndrome.
- Minimal # motion segments fused → preserves mobility.

Discussion-Motion Preserving AIS Surgery

- Maximize lumbar mobility with minimal residual deformity.
- Produces similar radiographic improvements and reliable spinal balance to the traditional convex ASF technique.
- Early outcomes favorable.
- This new technique also avoids the disadvantages of PSF

OR



