

# The Marriage of dualPortal Spinal Endoscopy and dualX TLIF: Amplify dualLIF

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# Disclosures

- Consultant: Amplify Surgical, Seaspine, Alphatec, Nuvasive
- Royalties: Seaspine, Alphatec

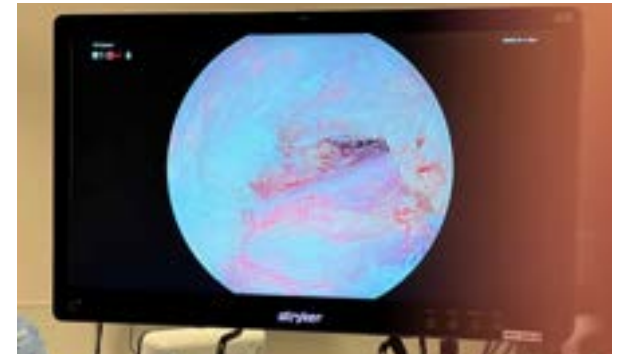
# dualPortal Spinal Endoscopy

- dualPortal: endoscopic viewing portal + working portal
  - Decouples of the endoscopic camera with the surgical instruments
  - Greater flexibility, enhanced visualization, increased versatility
  - Familiar approach and territory



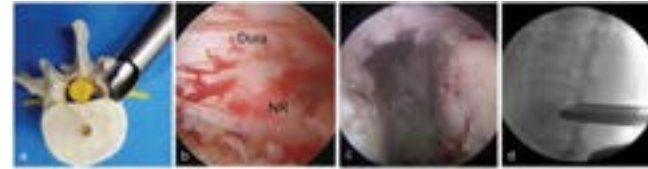
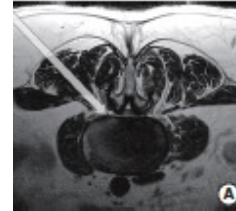
# dualPortal Spinal Endoscopy

- dualPortal: endoscopic viewing portal + working portal
  - Same surgery with same instruments
  - Different tool to visualize



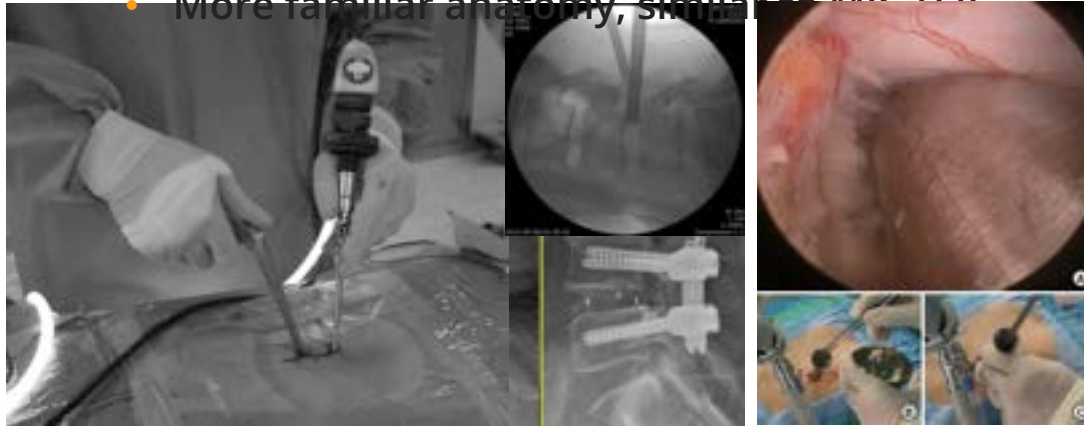
# Challenges of EndoTLIF

- Unportal limitations with trans-Kambin technique
  - Quad palsy, exiting nerve root injury, radiculitis, fusion?...
- Limitations in cage options for endoscopic TLIF
  - Narrow cage to fit through the trans-Kambin approach
  - Endplate resorption
- Biggest limitation: unfamiliar territory
  - Steep learning curve



# dualPortal™ Endoscopic TLIF

- Developed and advanced in South Korea
- Large PEEK cages placed posterolaterally after laminotomy, facetectomy
- More familiar anatomy, similar to MIS TLIF



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Fully endoscopic lumbar interbody fusion using a percutaneous unilateral biportal endoscopic technique: technical note and preliminary clinical results

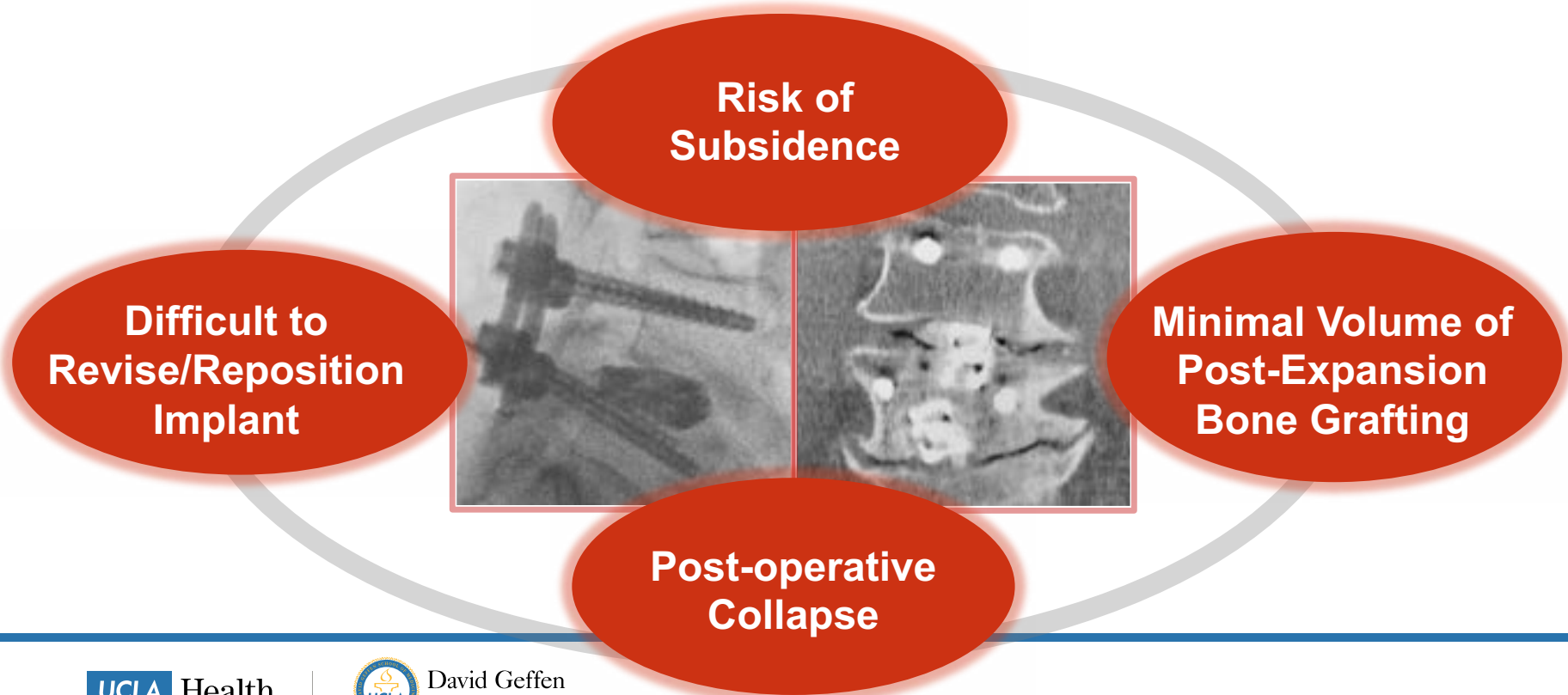
Dong Hwa Heo MD, PhD<sup>1</sup>, Sang Kyu Son MD<sup>2</sup>, Jin Hwa Eum MD<sup>1</sup>, ... [View More +](#)

Technique of Biportal Endoscopic Transforaminal Lumbar Interbody Fusion

Dong Hwa Heo<sup>1,\*</sup>, Young Ho Hong<sup>2,\*</sup>, Dong Chan Lee<sup>1</sup>, Han Jae Chung<sup>1</sup>, Choon Keun Park<sup>3</sup>

Neurosurgery 2020;17(Suppl 1):S129-137.  
<https://doi.org/10.14245/ns.2040178.089>

# Challenges of Expandable Interbody Devices



# High Subsidence / Collapse Risk with Uni-directional Expandable Cages

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Journal of Neurosurgical Spine, 2020  
Nov 13: 1-10

The incidence of cage subsidence was higher in the expandable group (19.7% vs 5.4%,  $p = 0.0017$ ). Within the expandable group, the unilateral facetectomy-only subgroup had a 5.6 times higher subsidence rate than the PCO subgroup (26.8% vs 4.8%,  $p = 0.04$ ). Four expandable cages collapsed over time.

**dualX Broad Footprint Mitigates the Risk of Subsidence**

## Long-term radiographic outcomes of expandable versus static cages in transforaminal lumbar interbody fusion

Chih-Chang Chang<sup>1,2,3,4</sup>, Dean Chou<sup>1</sup>, Brenton Pennicooke<sup>1</sup>, Joshua Rivers<sup>5</sup>, Lee A Tan<sup>1</sup>, Sigurd Berven<sup>6</sup>, Praveen V Mummaneni<sup>1</sup>

Affiliations + expand

PMID: 33186602 DOI: 10.3171/2020.6.SPINE191578

### Abstract

**Objective:** Potential advantages of using expandable versus static cages during transforaminal lumbar interbody fusion (TLIF) are not fully established. The authors aimed to compare the long-term radiographic outcomes of expandable versus static TLIF cages.

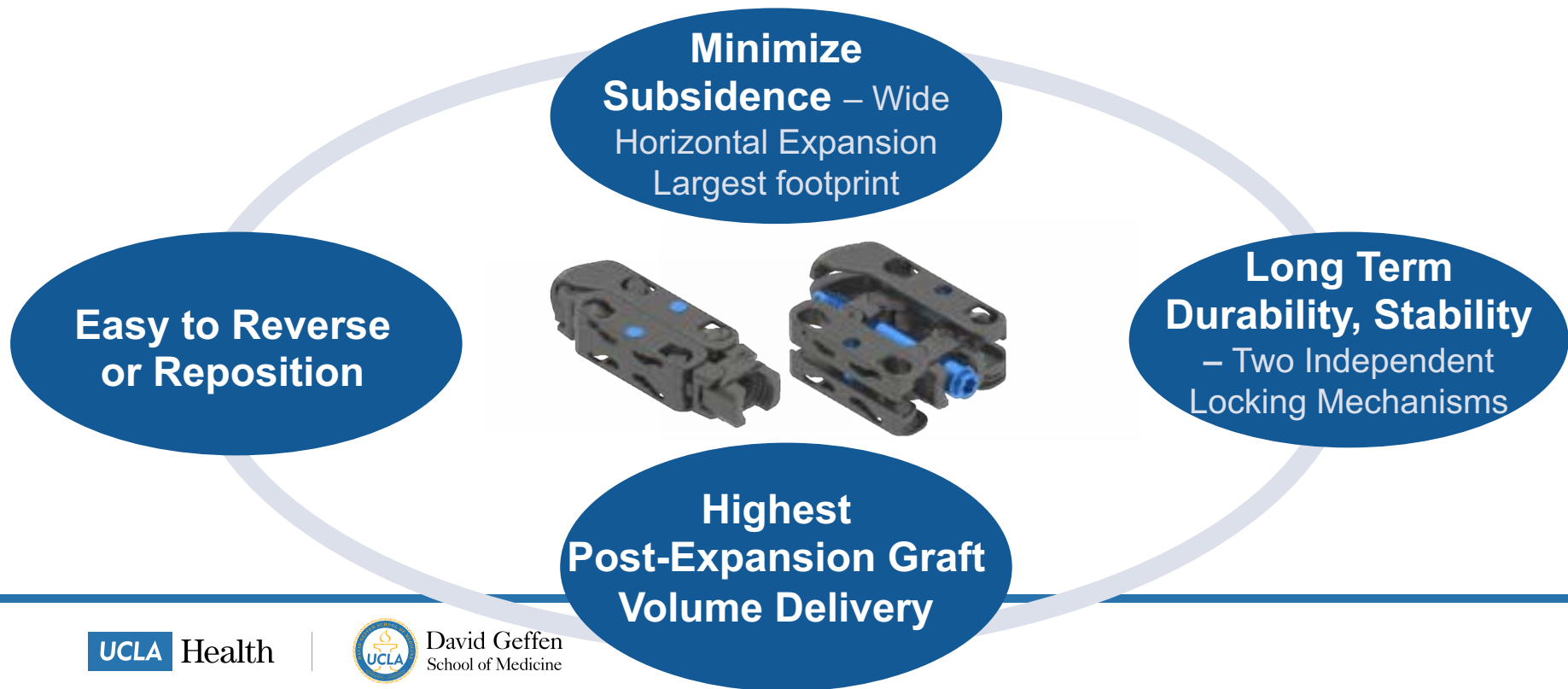
**Methods:** A retrospective review of 1- and 2-level TLIFs over a 10-year period with expandable and static cages was performed at the University of California, San Francisco. Patients with posterior column osteotomy (PCO) were subdivided. Fusion assessment, cage subsidence, anterior and posterior disc height, foraminal dimensions, pelvic incidence (PI), segmental lordosis (SLL), lumbar lordosis (LL), pelvic incidence-lumbar lordosis mismatch (PI-LL), pelvic tilt (PT), sagittal slope (SS), and sagittal vertical axis (SVA) were assessed.

**Results:** A consecutive series of 178 patients with a total of 210 levels who underwent TLIF using either static (148 levels) or expandable cages (62 levels) was reviewed. The mean patient age was  $60.3 \pm 11.5$  years and  $62.8 \pm 14.1$  years for the static and expandable cage groups, respectively. The mean follow-up was  $42.6 \pm 29.6$  months for the static cage group and  $27.6 \pm 14.1$  months for the expandable cage group. Within the 1-level TLIF group, the SL and PI-LL improved with statistical significance regardless of whether PCO was performed; however, the static group with PCOs also had statistically significant improvement in LL and SVA. The expandable cage with PCO subgroup had significant improvement in SL only. All of the foraminal parameters improved with statistical significance, regardless of the type of cages used; however, the expandable cage group had greater improvement in disc height restoration. The incidence of cage subsidence was higher in the expandable group (19.7% vs 5.4%,  $p = 0.0017$ ). Within the expandable group, the unilateral facetectomy-only subgroup had a 5.6 times higher subsidence rate than the PCO subgroup (26.8% vs 4.8%,  $p = 0.04$ ). Four expandable cages collapsed over time.

**Conclusions:** Expandable TLIF cages may initially restore disc height better than static cages, but they also have higher rates of subsidence. Unilateral facetectomy alone may result in more subsidence with expandable cages than using bilateral PCO, potentially because of insufficient facet release. Although expandable cages may have more power to induce lordosis and restore disc height than static cages, subsidence and endplate violation may negate any significant gains compared to static cages.



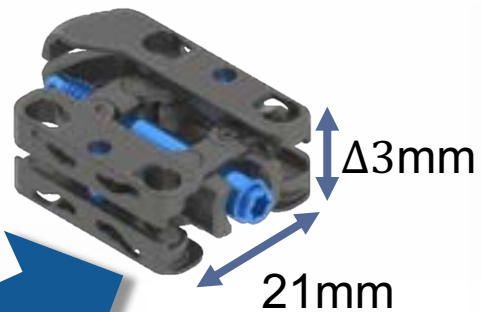
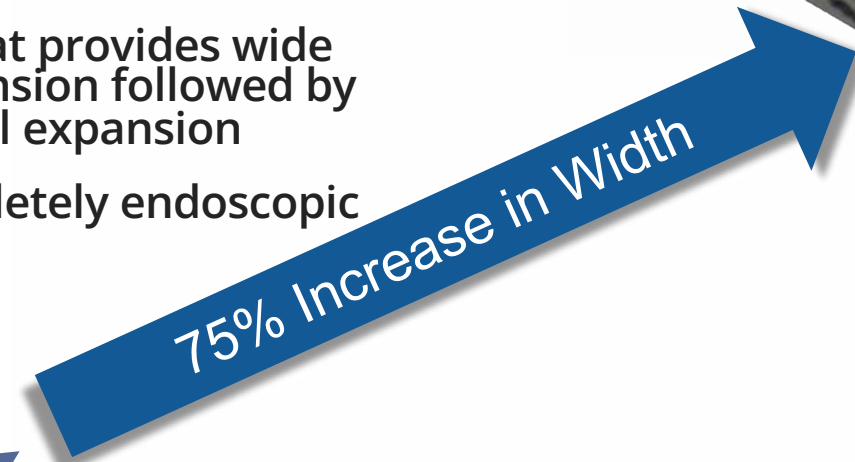
# dualX TLIF cage: A Revolution in Expandable Interbody Devices



# dualX – The Largest Footprint Expandable Cage

## Safe and Secure

- Minimize subsidence due to wide footprint
- Only implant that provides wide horizontal expansion followed by powerful vertical expansion
- Allows for completely endoscopic placement



# dualX – Long Term Durability and Inherent Stability

Ensures Durability and Stability with Two Independent Locking Mechanisms

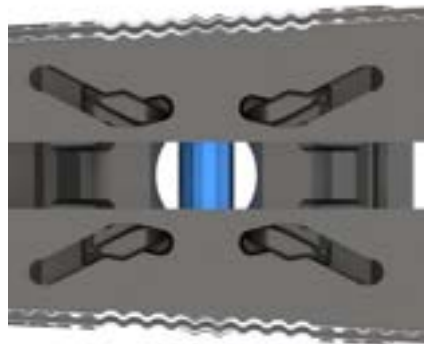
## dual Locking

Expansion Locking Mechanism



Secondary Screw Lockout

- Innovative dual locking design
  - Maintains the integrity of the implant until the patient is fused
- Final locking screw
  - Ensures implant stays expanded in width and height
- The only one of two “non-screw based” Expansion Mechanism


































# Post-expansion, Surgeon Preferred Bone Grafting

## Maximize Bone Graft Delivery

- Integrated Post Packing Through Delivery Handle
- Large Internal Atrium Retains Extensive Bone Graft Volume
- Unique “Open Structure” Enables Bone Graft to Flow Beyond Cage and Fill Entire Disc Space

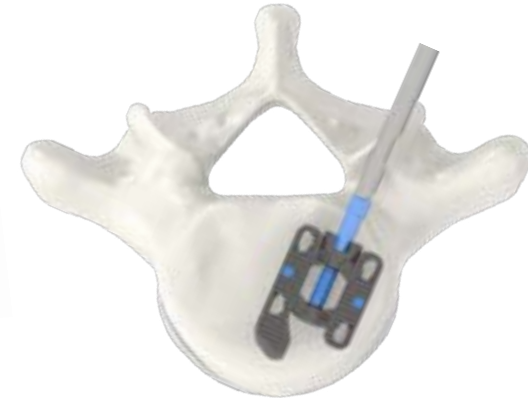


# Market Leading, Differentiated Benefits

		Integrity Implants	Globus	Medtronic	Nuvasive
Bi-Directional Expansion					
Large Footprint					
Largest Footprint Size (WxL) (vs. height expanding devices)	21x30mm (TLIF)	14x29	12x30	10x32	11x36
Significant Volume for Internal Bone Graft Filling					
Dual Locking Safety					
Solution to Minimize Psoas Retraction (LLIFs)					
All Titanium Solution and Adaptable for 3D Printing					

# Instrument Simplicity & Safety

- All steps performed safely through a single inserter
  - Insertion
  - Lateral expansion
  - Vertical expansion
  - Graft filling
  - Screw lock out

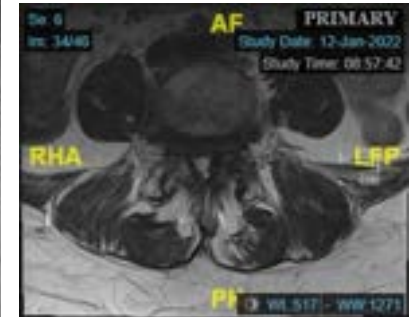
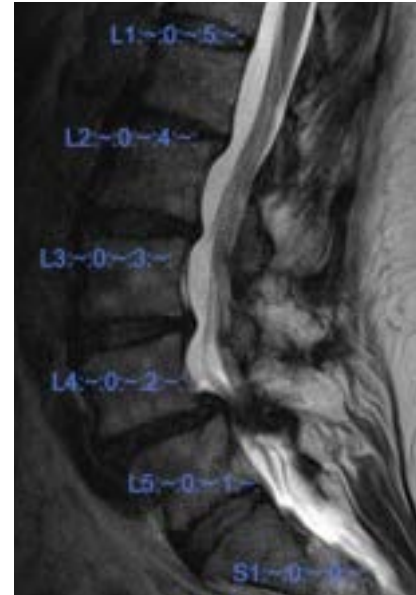


# Clinical Benefits and Safety

Significantly less complication rate compared to other expandables

- 1,600+ levels treated
- Only 2 adverse events reported to the FDA
  - One training related; one label related
- < 0.2% adverse event rate
  - Compared to 2-5% expected by FDA for new technologies
- Clinical study sites enrollment in process
  - 100-patient retrospective study with NYU
  - Multi-site (AZ, CA, OR) retrospective study planning initiated

# Lumbar Spondylolisthesis





# dualLIF

- Unilateral laminotomy, bilateral decompression
- Facetectomy
- Exposure of Kambin's Triangle
- Cage placement
- Same steps as MIS TLIF



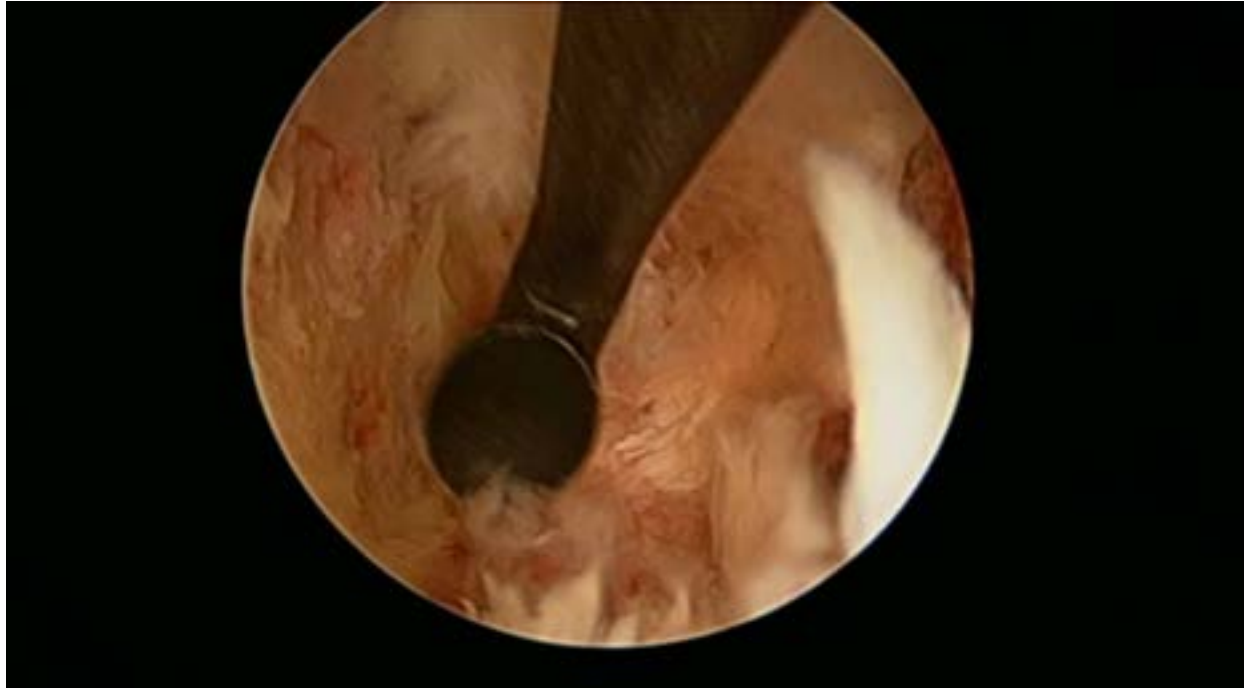
# Endoscopic Disc Preparation



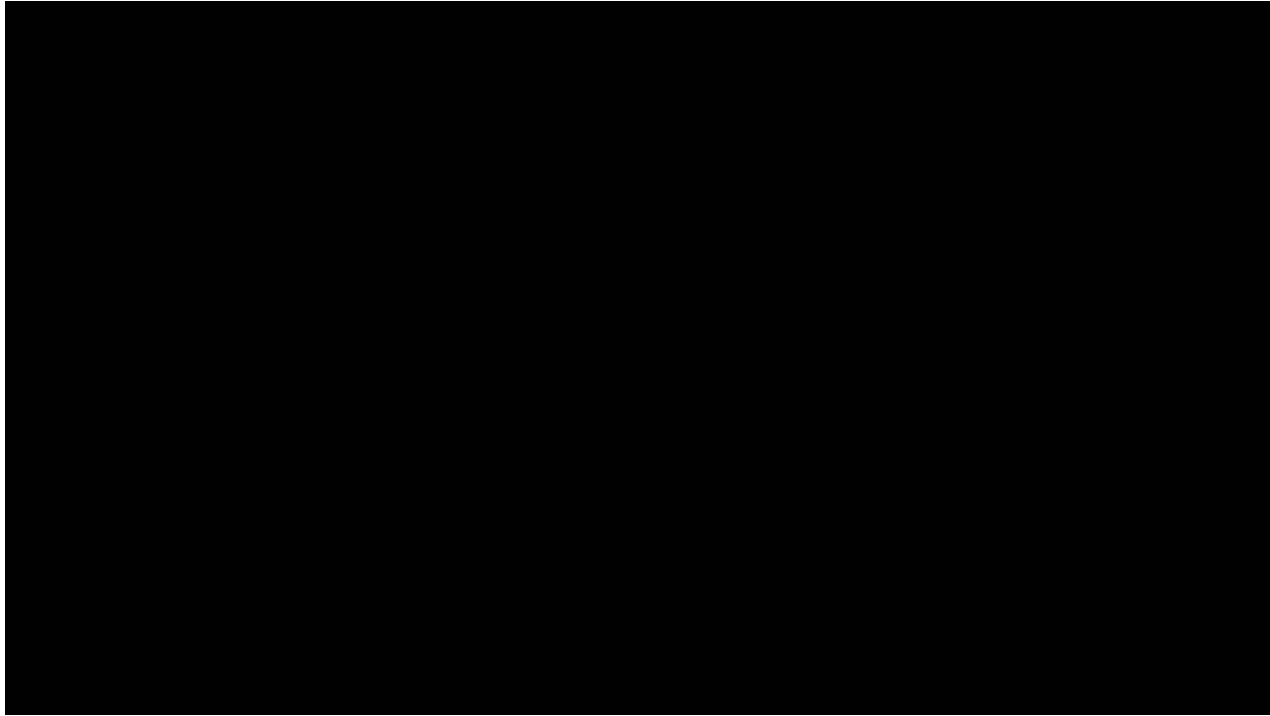
# Endoscopic Disc Preparation



# dualLIF



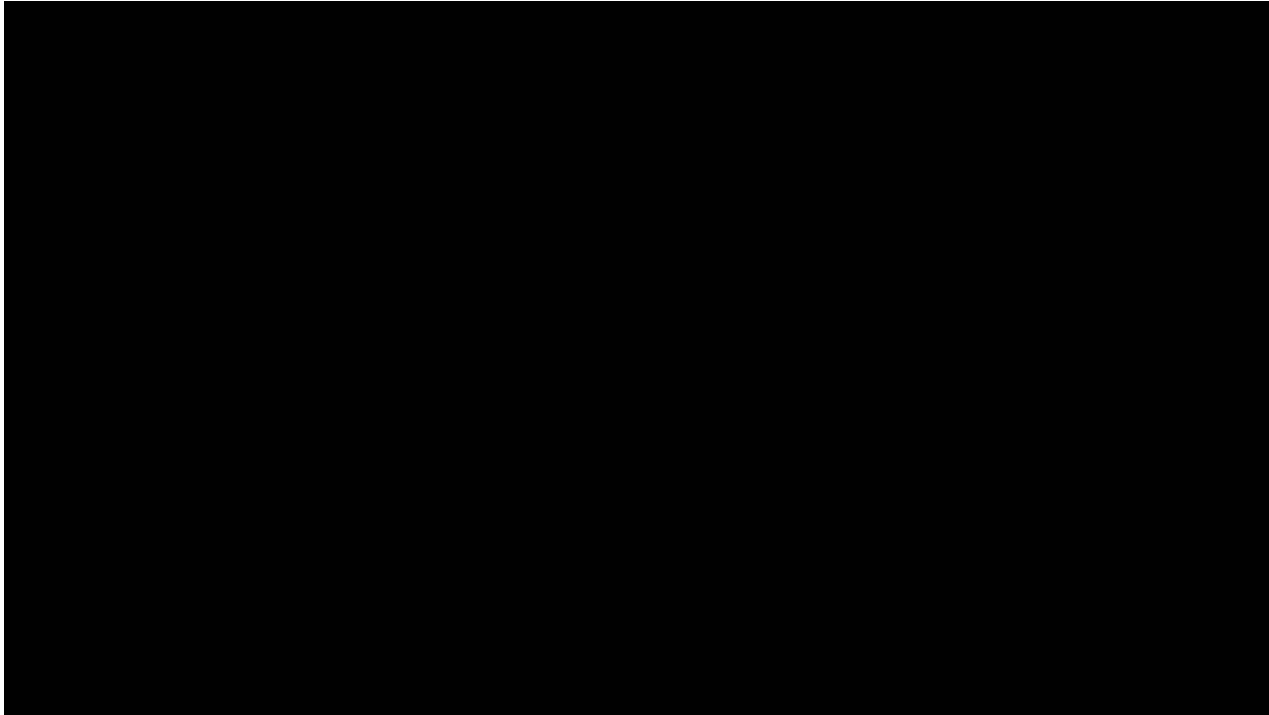
# dualLIF



# dualLIF



# dualLIF



# dualLIF





# dualLIF



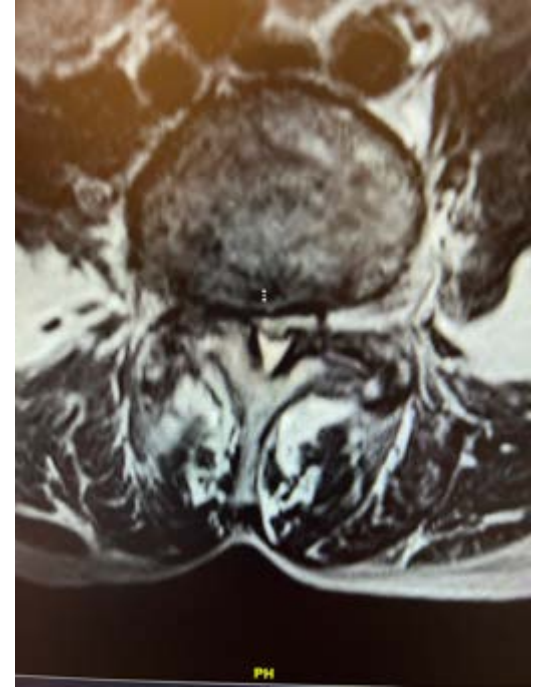
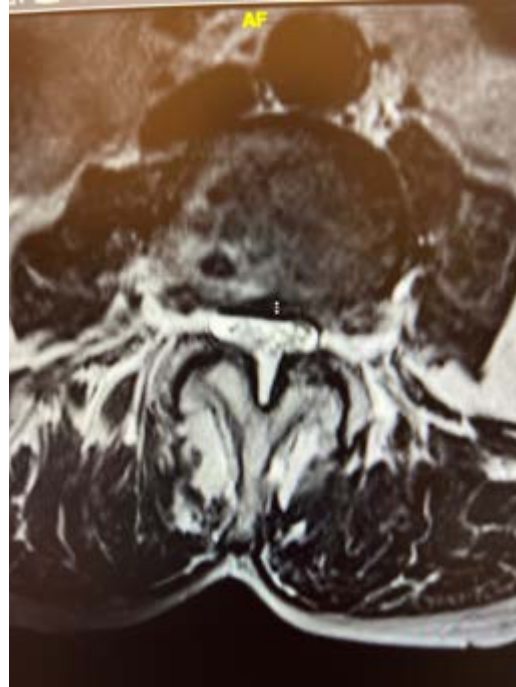
# dualLIF



# dualLIF



# dualLIF





# dualLIF





# dualLIF



# The Novel Use of Dual Direction Expandable Titanium Cage Technology with Biportal Endoscopic Transforaminal Lumbar Interbody Fusion, A Technical Consideration with Preliminary Results.

Don Young Park, Dong Hwa Heo

Characteristics	
Age (years)	68.5 ± 8
Gender (male/female)	4/6
Operation segment	L4-5 (8), L5-S1 (2)
Diagnosis	Degenerative spondylolisthesis (9) Isthmus spondylolisthesis (1) Central stenosis (9)
Mean operation time (min)	295.4 ± 50.6
Mean estimated blood loss (mL)	156.6 ± 74.2
Complications	Epidural hematoma (1)

	Preop	6 Weeks Postop	3 Months Postop	6 Months Postop
VAS of Back	6.9±1.19	2.1±1.85	1.3±1.57	1.25±0.63
VAS of Leg	8.3±1.16	0.55±1.57	1.6±1.65	1±0.94
ODI	55%±9%	32%±17%	29%±15%	26%±7.5%



# The Novel Use of Dual Direction Expandable Titanium Cage Technology with Biportal Endoscopic Transforaminal Lumbar Interbody Fusion, A Technical Consideration with Preliminary Results.

Don Young Park, Dong Hwa Heo

	Preoperative	Immediate Postoperative	6 Months Postoperative
Disc height of operative segment (mm)	$5.7 \pm 2.7$	$13.2 \pm 1.1$	$12.6 \pm 1.1$
Lordotic angle of operative segment (degree)	$17.6 \pm 7.7$	$21.1 \pm 6.2$	$20.3 \pm 6.0$
Lumbar lordotic angle (degree)	$34.3 \pm 6.2$	$41.1 \pm 2.6$	$42.9 \pm 4.7$

Minimally invasive transforaminal lumbar interbody fusion  
using the biportal endoscopic techniques versus  
microscopic tubular technique

Min-Seok Kang, MD<sup>a,\*</sup>, Ki-Han You, MD<sup>b,\*</sup>, Jun-Young Choi, MD<sup>b</sup>,  
Dong-Hwa Heo, MD<sup>c</sup>, Hoon-Jae Chung, MD<sup>c</sup>, Hyun-Jin Park, MD<sup>b,\*</sup>

The Spine Journal 21 (2021) 2066–2077

- MIS TLIF vs dualLIF, at least 1 year followup
- VAS scores and ODI scores significantly improved after surgery in both groups
  - VAS Back and SF-36 at 1 month postop more significantly improved in dualLIF vs MIS TLIF
  - No significant difference in VAS, ODI, SF-36 between groups at 6 months and 1 year
- No significant difference in fusion rates, segmental height, lordosis
- No difference with post-operative complications

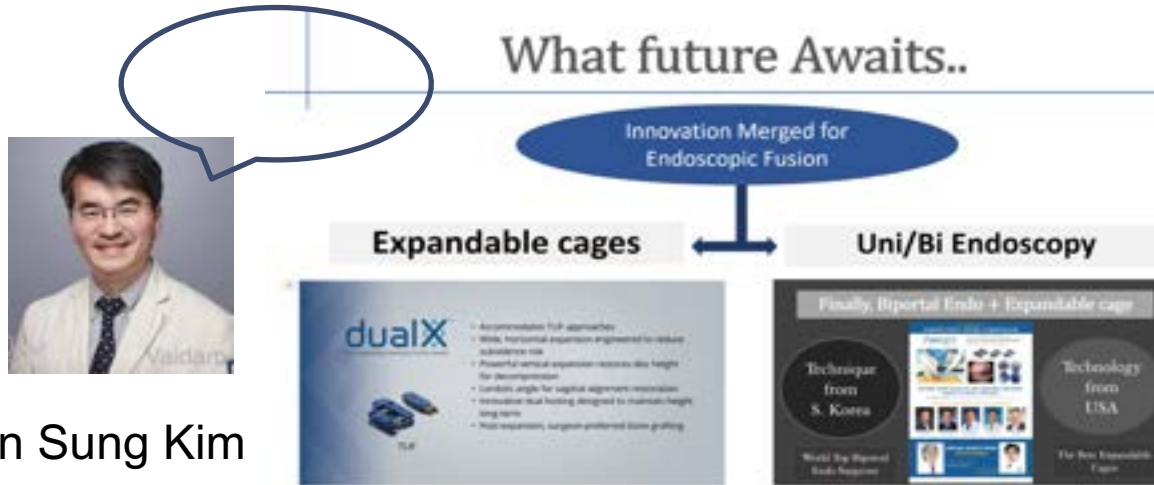
## Clinical Results and Complications of Endoscopic Lumbar Interbody Fusion for Lumbar Degenerative Disease: A Meta-Analysis

*Dong Hwa Heo<sup>1</sup>, Dong Chan Lee<sup>2</sup>, Hyeun Sung Kim<sup>3</sup>, Choon Keun Park<sup>2</sup>, Hungtae Chung<sup>1</sup>*

- Significant improvements in pain and disability outcomes
- Hospital stay shorter with endoscopic fusion vs MIS fusion
- Complication rates: 1-5% with dualLIF
- Fusion rates: up to 95%

# dualPortal+dualX: dualLIF

- dualLIF is completely endoscopic TLIF that does not compromise decompression or cage footprint.



Luke Jin Sung Kim

# Thank You.

