

# AMPLIFY™

SURGICAL

Transforming the Ordinary

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

Don Young Park, M.D.

Professor, UC Irvine Department of Orthopaedic Surgery

Director, UCI Advanced Endoscopic and Outpatient Spine Program

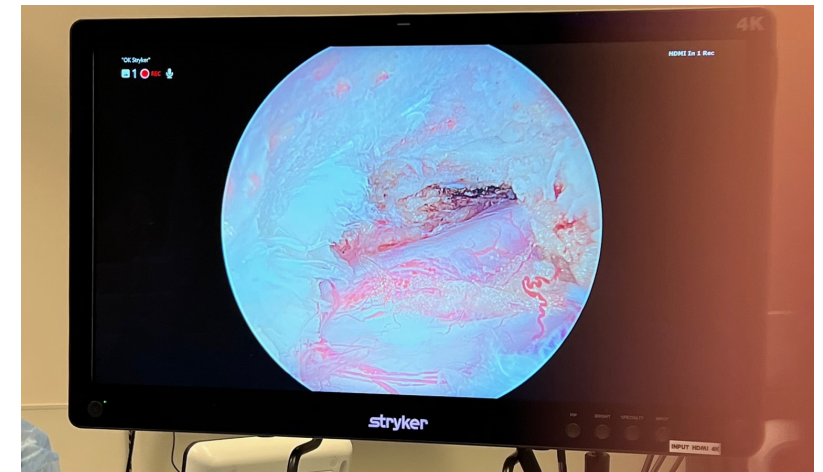
Transforming the Ordinary

# Disclosures

- **Consultant: Stryker, GS Medical, Seaspine, Alphatec, Globus/Nuvasive**
- **Royalties: Seaspine, Alphatec**
- **Strategic Board Member: Amplify Surgical**

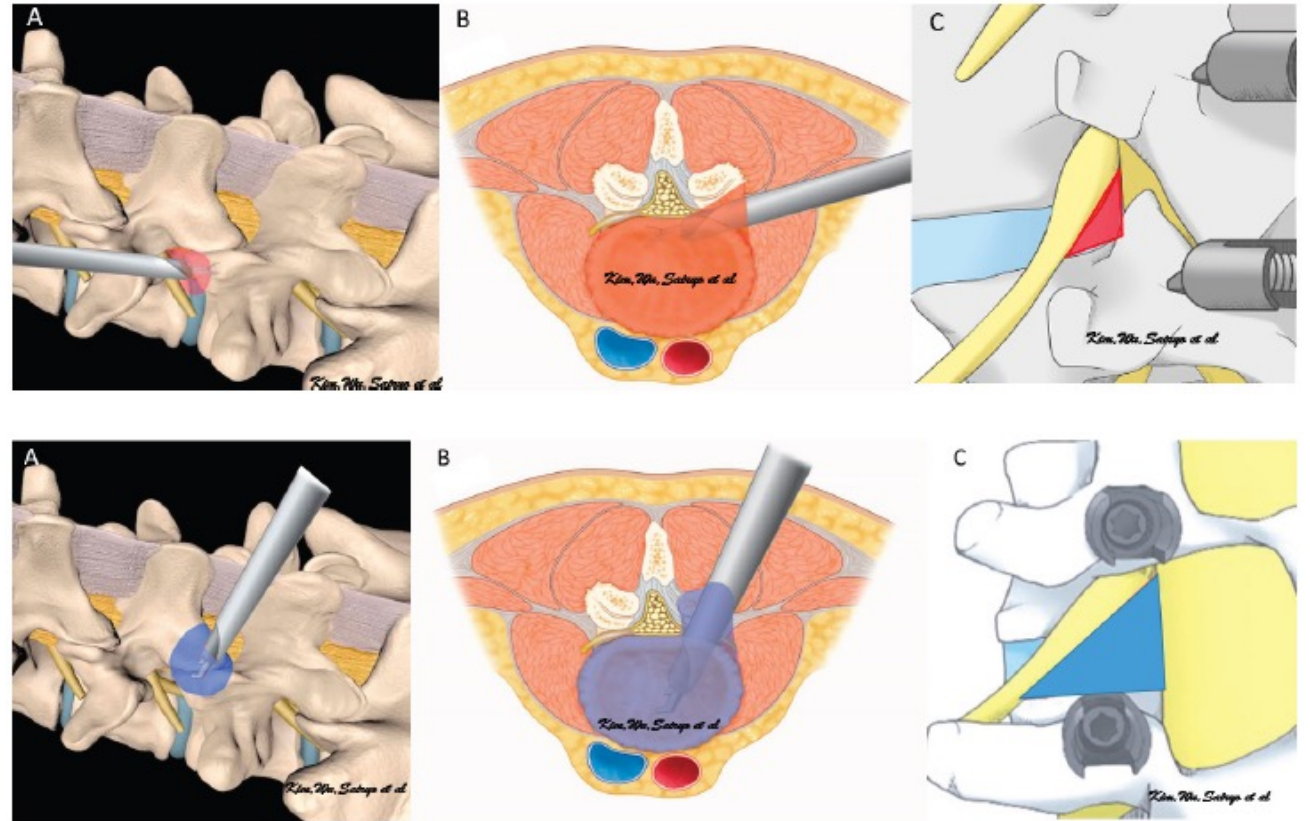
# dualPortal Spinal Endoscopy

- dualPortal: endoscopic viewing portal + working portal
  - Same surgery with same instruments
  - Different tool to visualize
  - Water based endoscopy: enhanced visualization



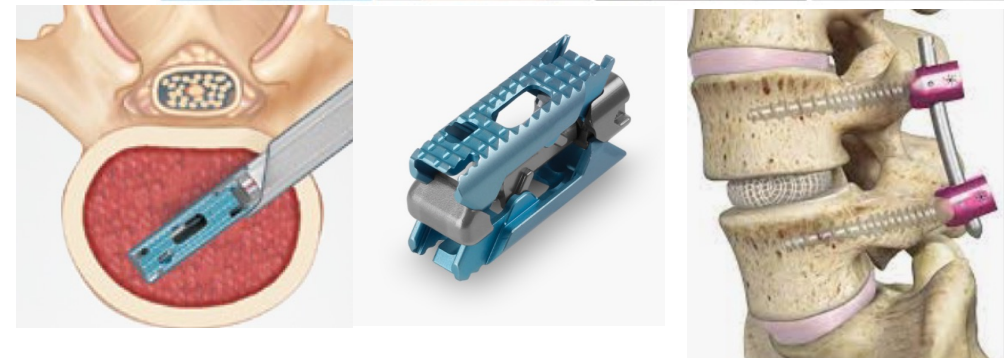
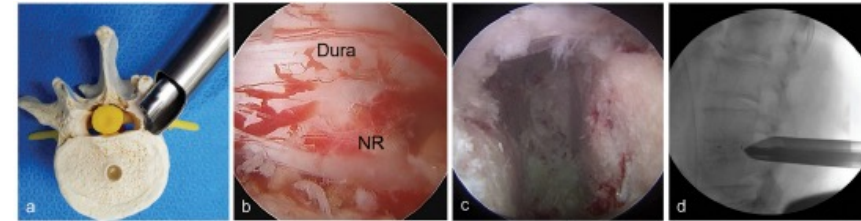
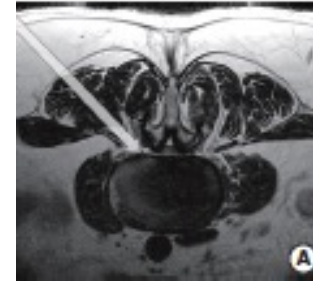
# Endoscopic Fusion: True Advances in Spine Surgery

- 2 uniportal techniques:
  - Uniportal facet preserving trans-Kambin endoscopic fusion
  - Uniportal facet sacrificing posterolateral TLIF
- Advanced endoscopic technique



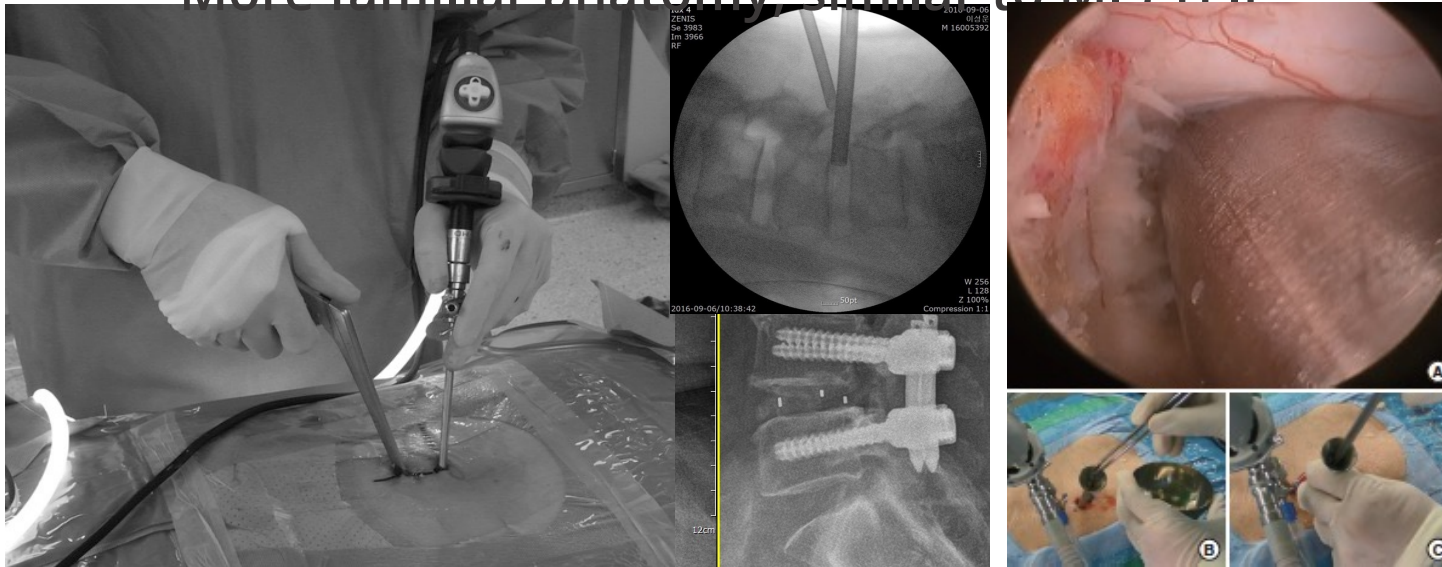
# Challenges of EndoTLIF

- **Uniportal limitations**
  - Trans-Kambin: Quad palsy, exiting nerve root injury, radiculitis, fusion?...
  - Trans-facet: Requires large stenosis scope
- **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



# dualPorta™ Endoscopic TLIF

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



**JNS** JOURNAL OF  
NEUROSURGERY  
OFFICIAL JOURNALS OF THE AANS SINCE 1944

[Home](#) [COVID-19](#) [Jour](#)

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>3</sup>, ...

[View More +](#)

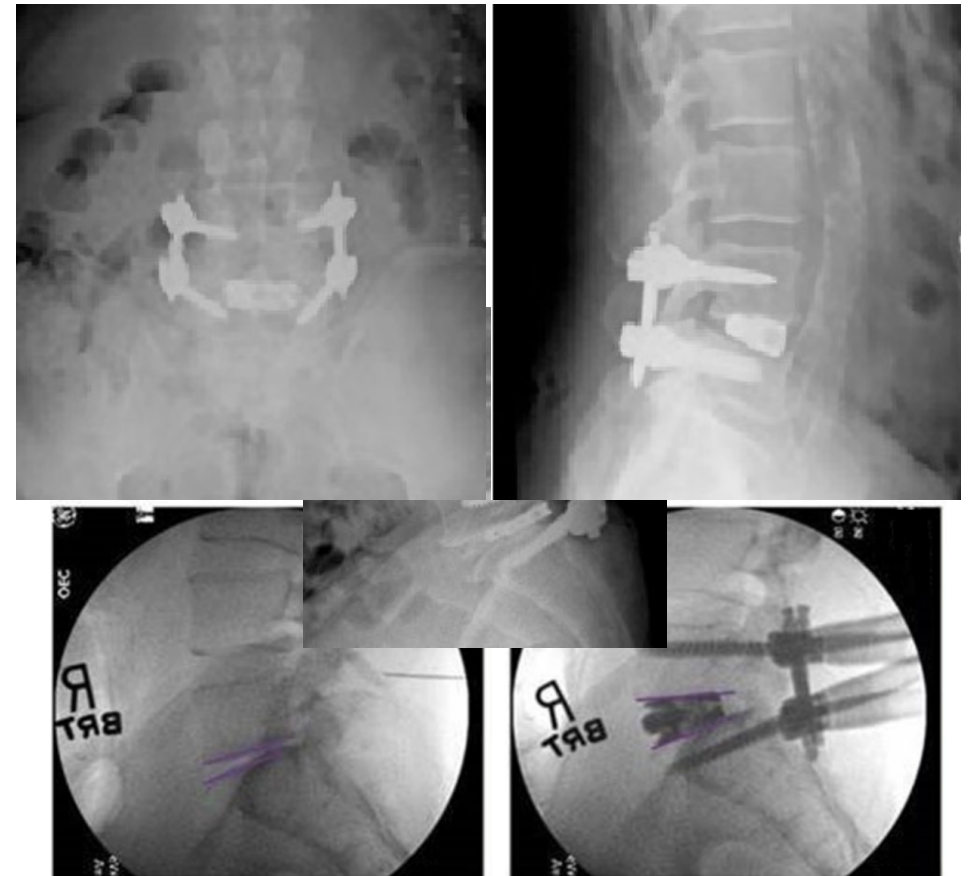
Technique of Biportal Endoscopic Transforaminal Lumbar Interbody Fusion

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

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

# Advantages of Expandable Cages in TLIF

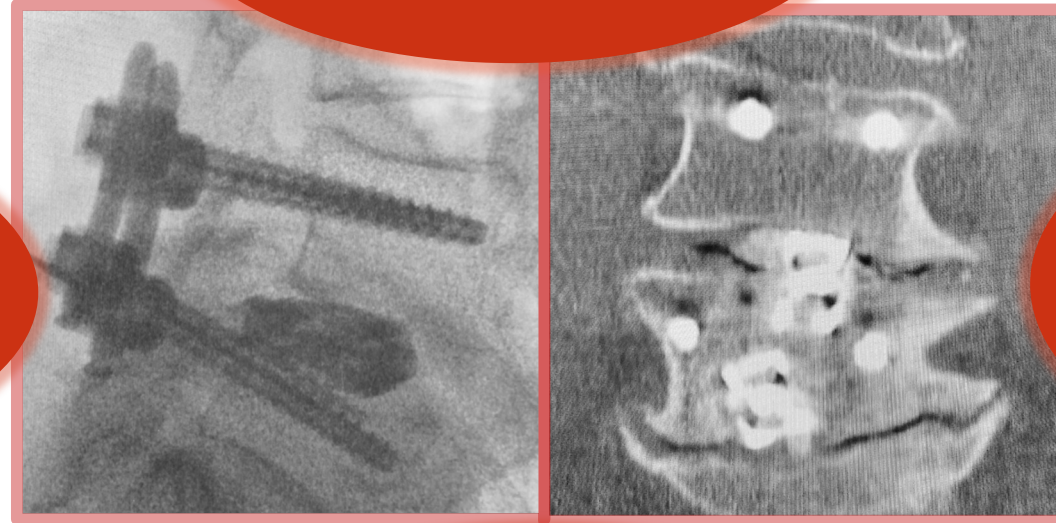
- **Ease of insertion**
  - Insert in collapsed state, expand to larger final state
  - Reduce backing out into foramen
- **Improve disc height restoration**
- **Improve sagittal alignment**





# Challenges of Expandable Interbody Devices

**Risk of  
Subsidence**



**Difficult to  
Revise/Reposition  
Implant**

**Minimal Volume of  
Post-Expansion Bone  
Grafting**

**Post-operative  
Collapse**

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

**JNS** JOURNAL OF  
NEUROSURGERY  
OFFICIAL JOURNALS OF THE AANS SINCE 1944

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 Rivera<sup>5</sup>, Lee A Tan<sup>1</sup>, Sigurd Berven<sup>6</sup>, Praveen V Mummaneni<sup>1</sup>

Affiliations + expand

PMID: 33186902 DOI: 10.3171/2020.6.SPINE191378

### 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 (SL), lumbar lordosis (LL), pelvic incidence-lumbar lordosis mismatch (PI-LL), pelvic tilt (PT), sacral 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  $42.9 \pm 29.4$  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

**Minimize Subsidence** –  
Wide Horizontal Expansion  
Largest footprint

**Easy to Reverse or  
Reposition**



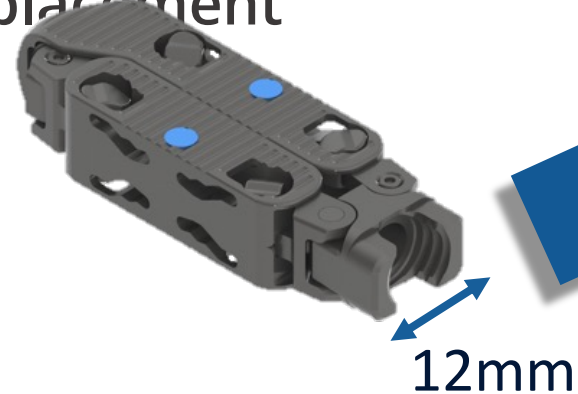
**Long Term Durability,  
Stability** – Two  
Independent Locking  
Mechanisms

**Highest  
Post-Expansion Graft  
Volume Delivery**

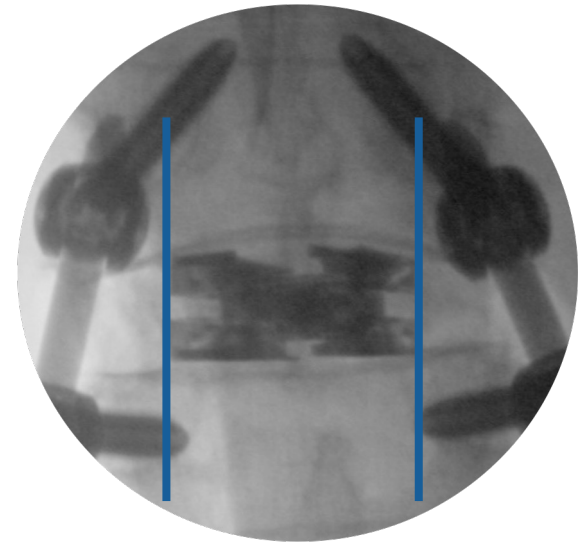
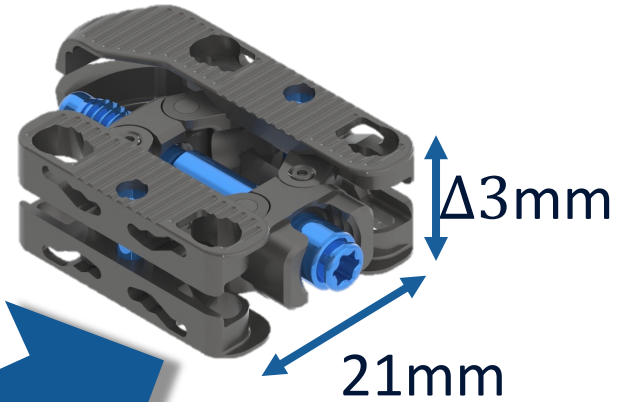
# dualX – The Largest Footprint Expandable Cage

## 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



75% Increase in Width



# dualX – Long Term Durability and Inherent Stability

Ensures Durability and Stability with Two Independent Locking Mechanisms

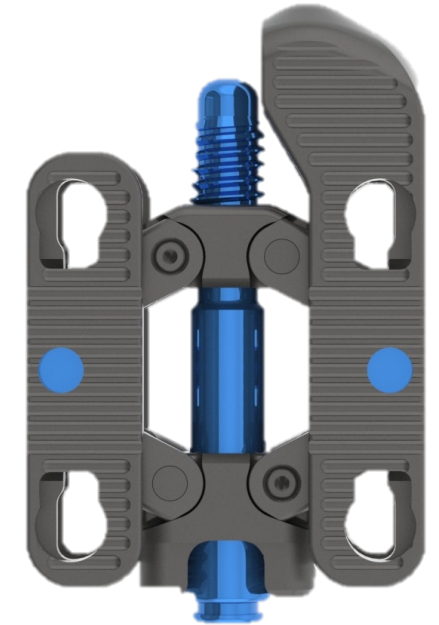
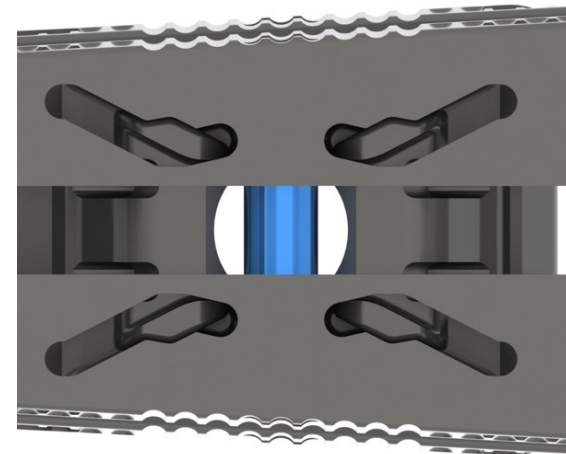
## dual Locking

- 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

Expansion Locking Mechanism



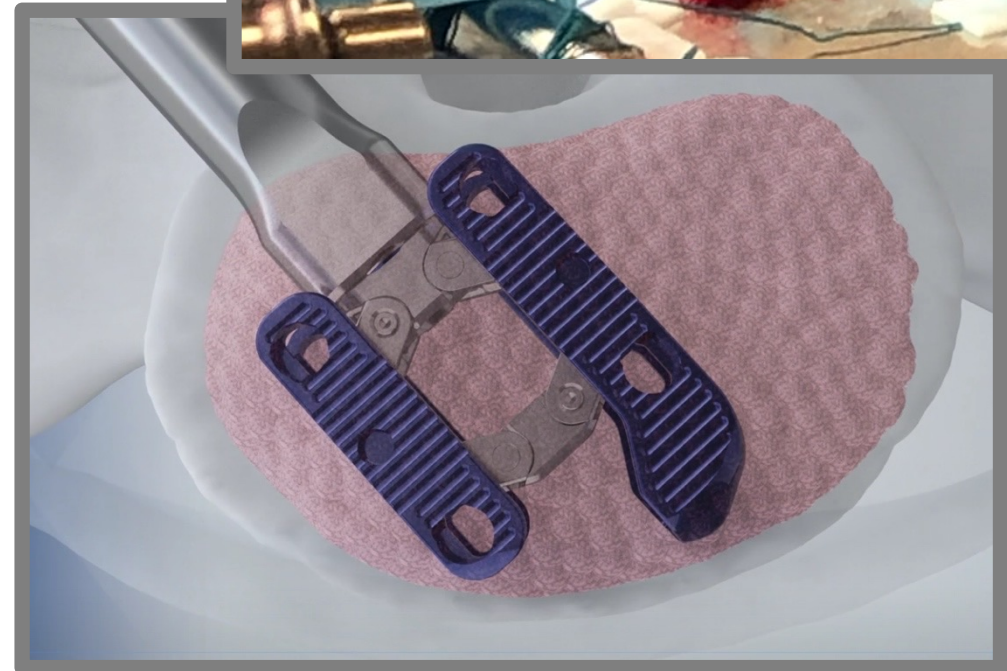
Secondary Screw Lockout


































# 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

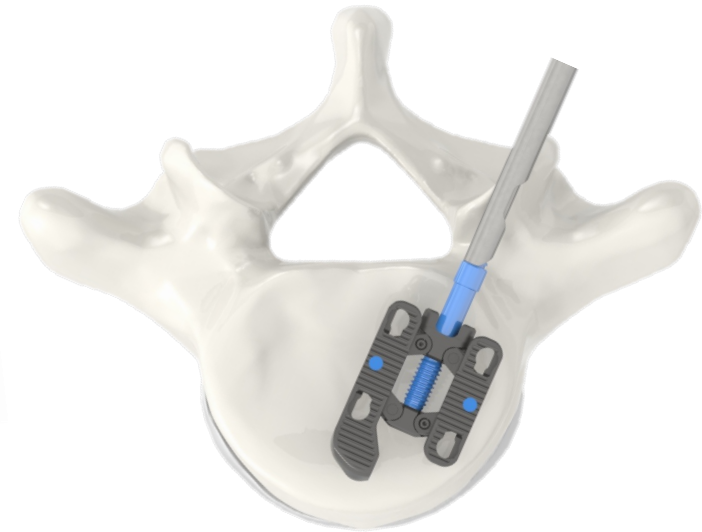


# Market Leading, Differentiated Benefits

		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

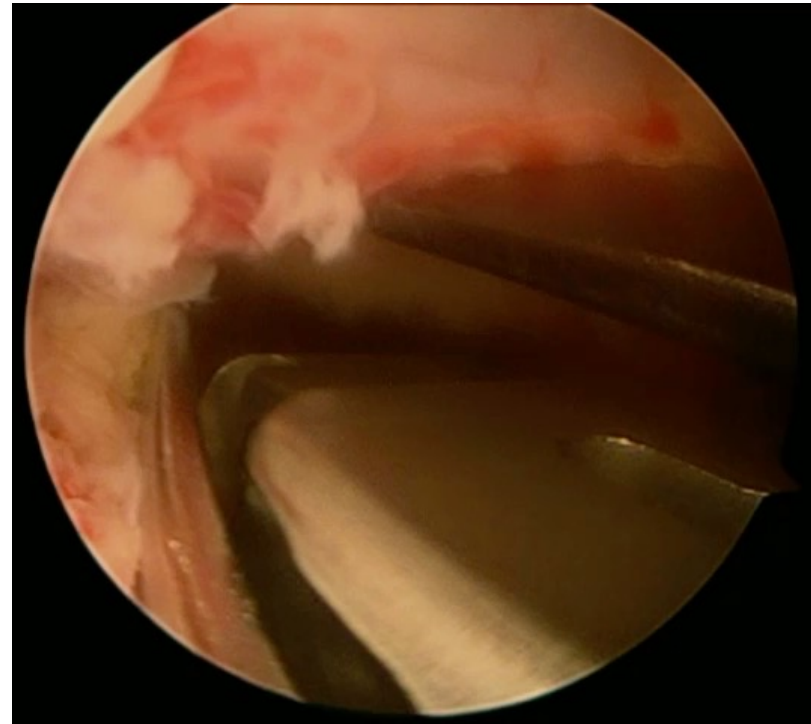
- All steps performed safely through a single inserter
  - Insertion
  - Lateral expansion
  - Vertical expansion
  - Graft filling
  - Screw lock out





# dualLIF: dualPortal + dualX

- Unilateral laminotomy, bilateral decompression
- Facetectomy
- Exposure of Kambin's Triangle
- Disc Preparation
- Cage placement
- Pedicle screw placement



# Case Presentation

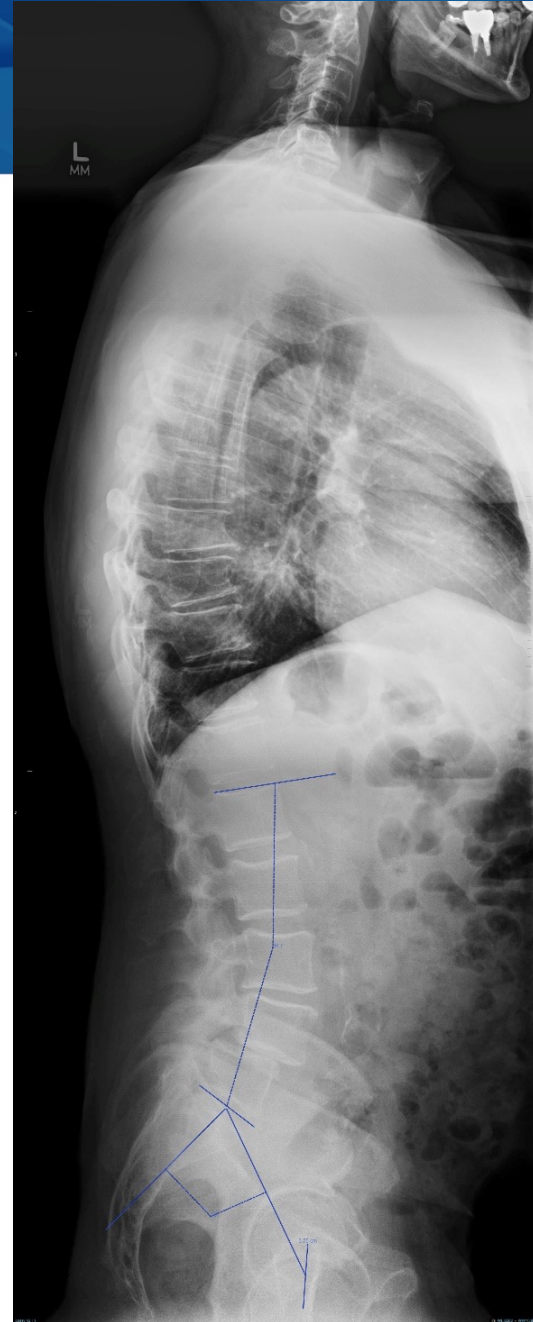
- 69-year-old male with back and left lateral thigh pain with occasional tingling for 1 year.
- Difficulty with bicycling and golf
- Failed nonsurgical treatment including pain meds, PT, ESIs
- No changes in bowel and bladder function.



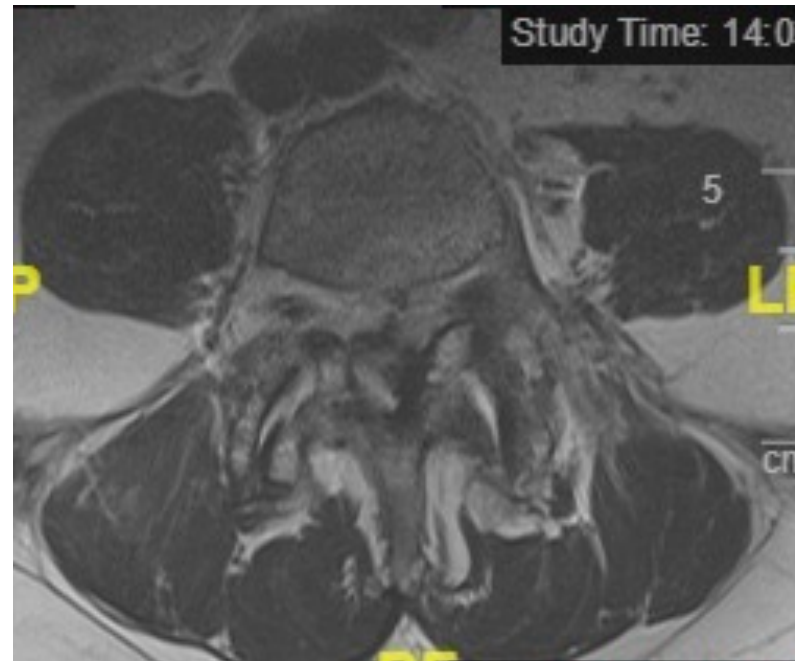
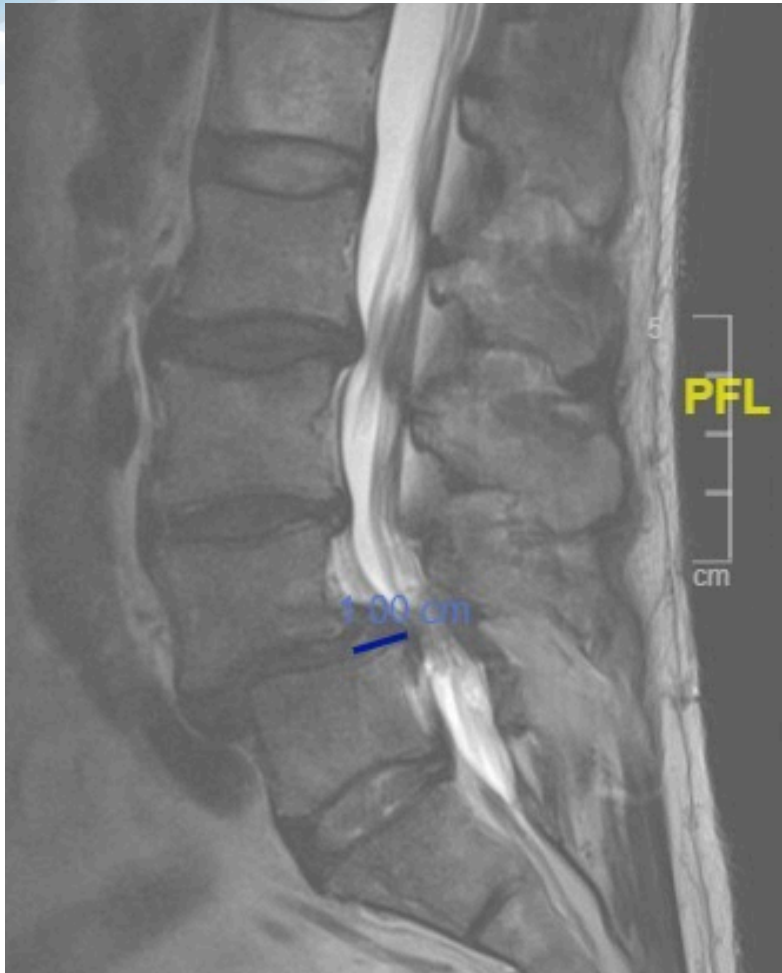
- Grade 2 L4-5 unstable spondylolisthesis

# Pelvic Parameters

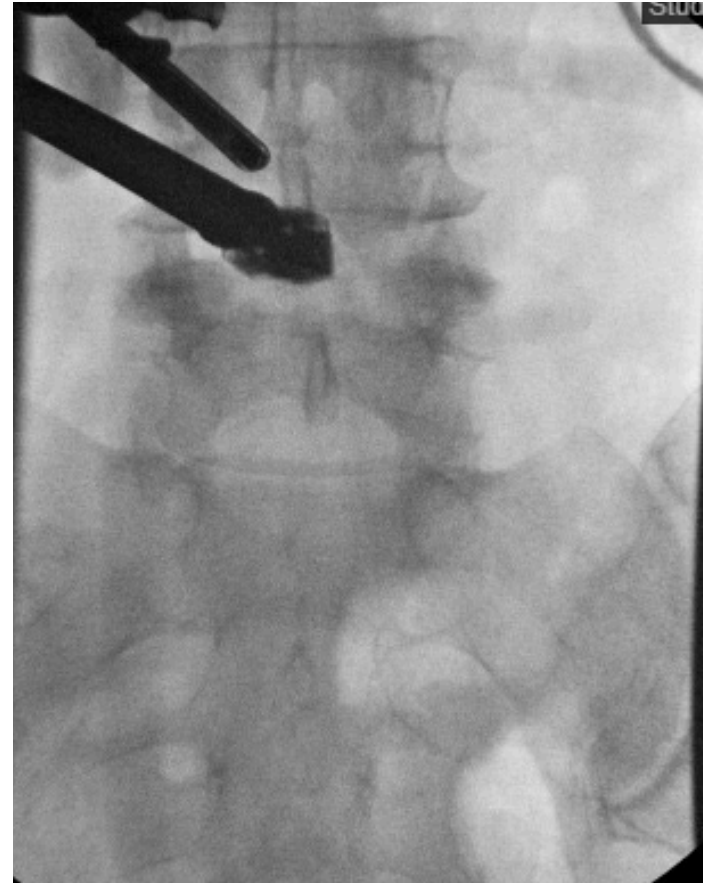
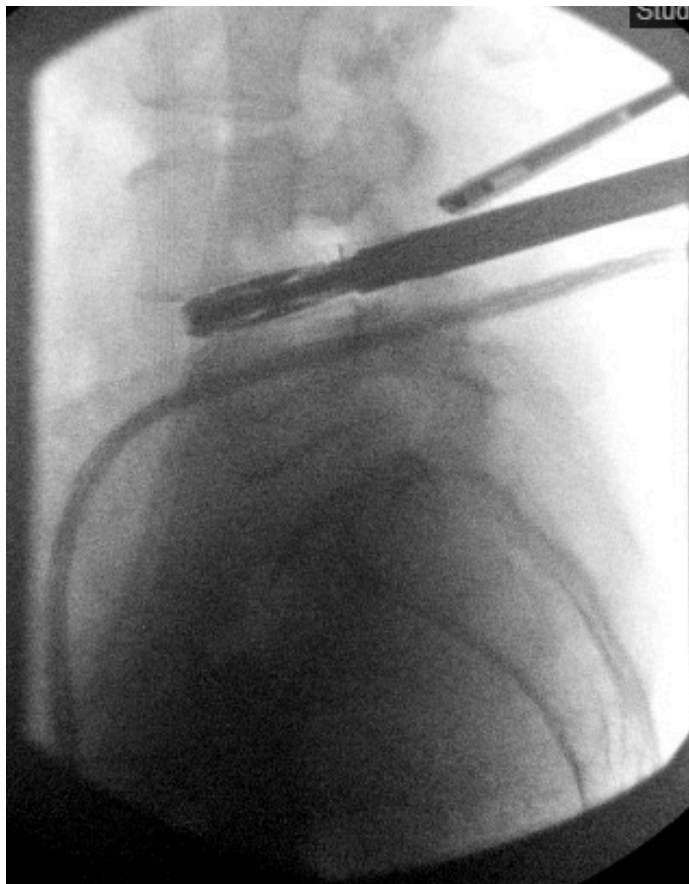
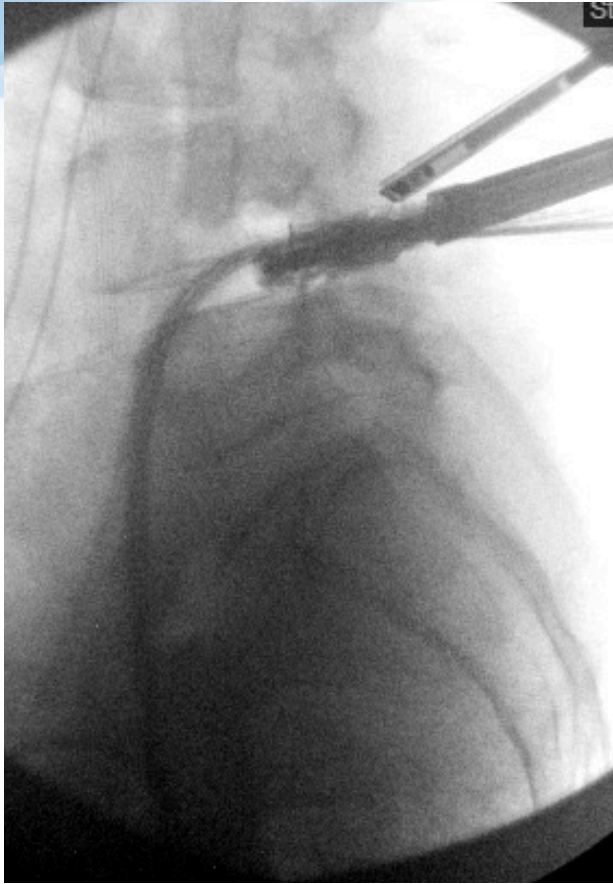
- Pelvic Incidence: 70 degrees
- Lumbar Lordosis: 50 degrees
- Segmental Lordosis: 18 degrees
- PI-LL Mismatch: 20 degrees



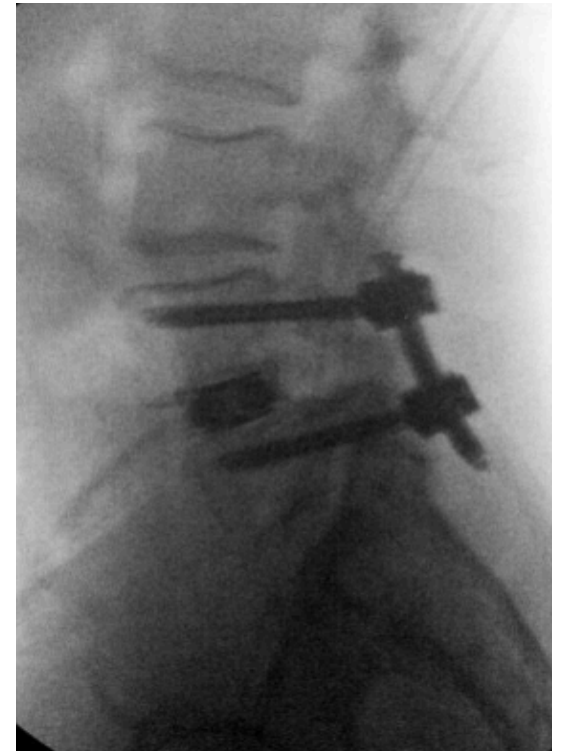
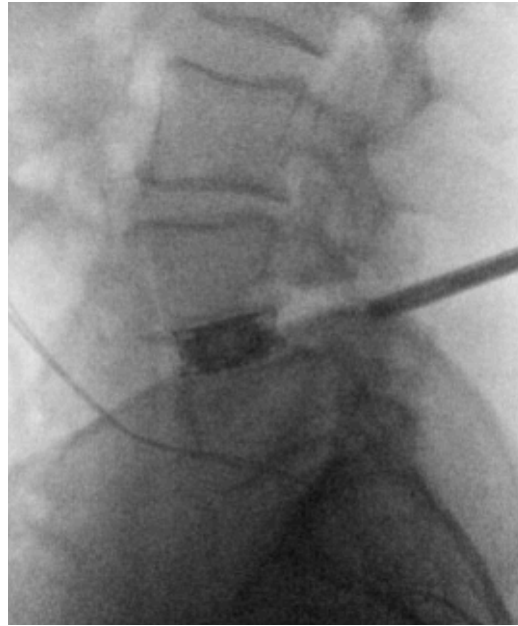
# MRI: Severe L4-5 central stenosis



# Biportal Endoscopic Fusion

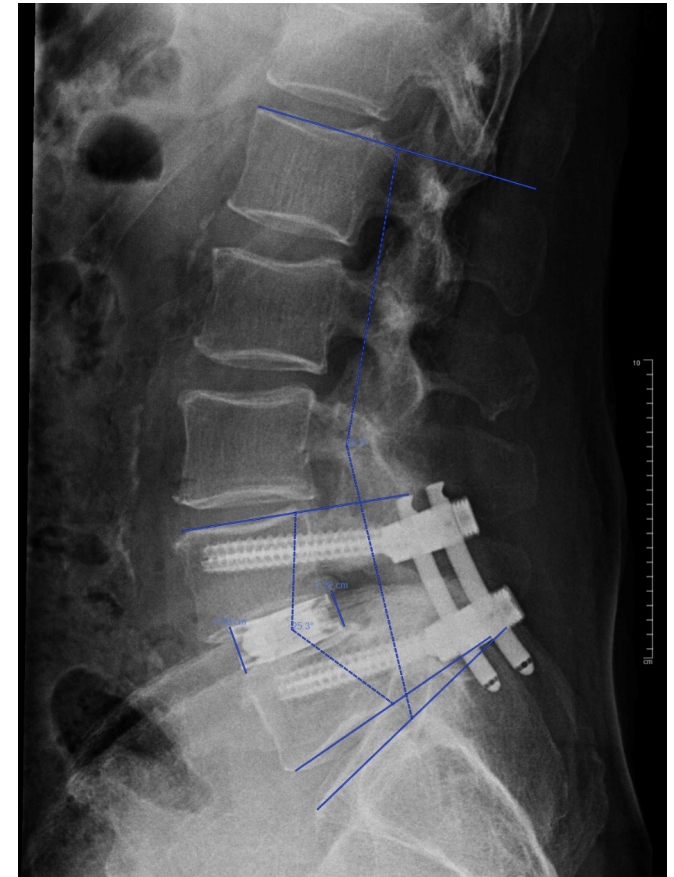


# Biportal Endoscopic Fusion

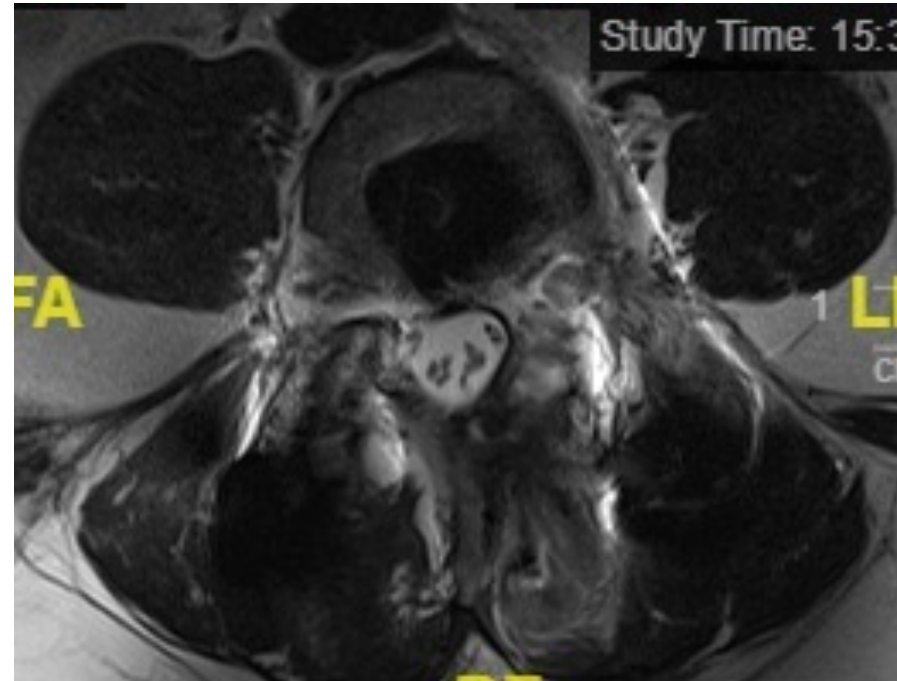


# 12-Month Follow-Up

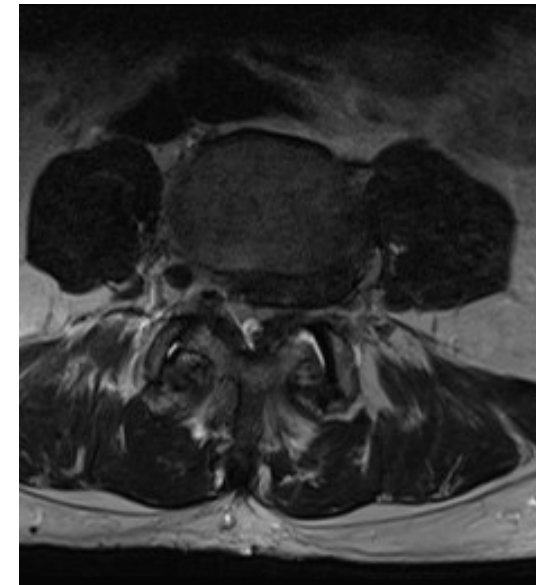
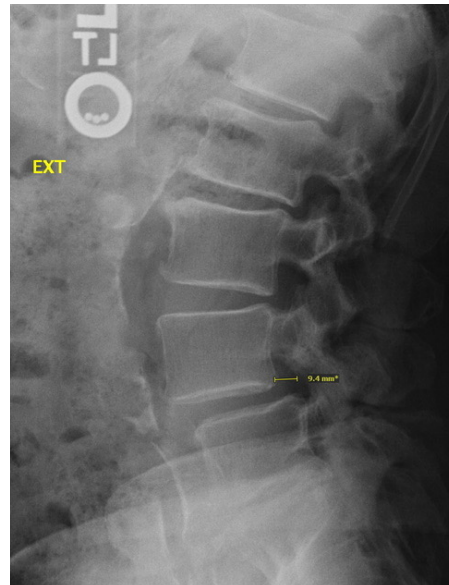
- Lumbar Lordosis: 60 degrees
- Segmental Lordosis: 25 degrees
- PI-LL Mismatch 10 degrees
- Disc Height = 14 mm
- No subsidence or implant failure





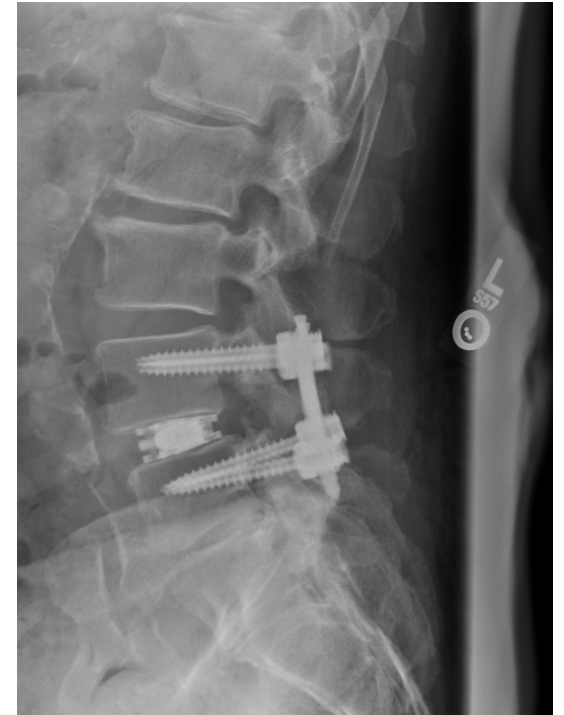
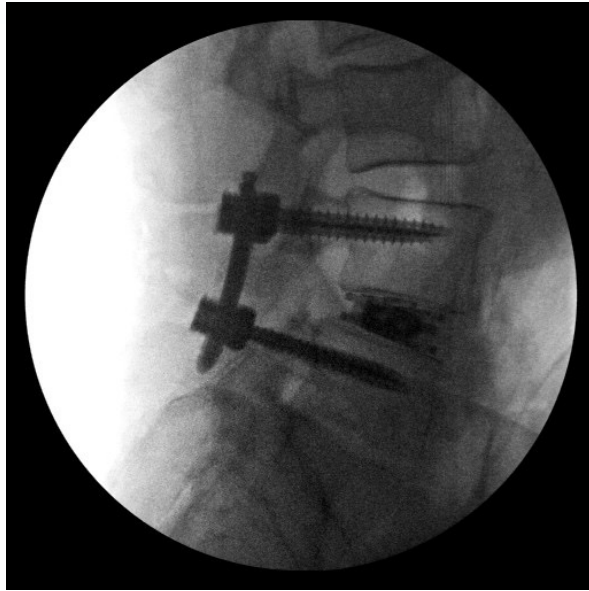


- 76-year-old male with LBP, BLE pain
- Pain radiates to the bilateral thighs posteriorly
- Numbness in the feet with walking more than 10 minutes
- Failed pain medications, physical therapy, ESIs



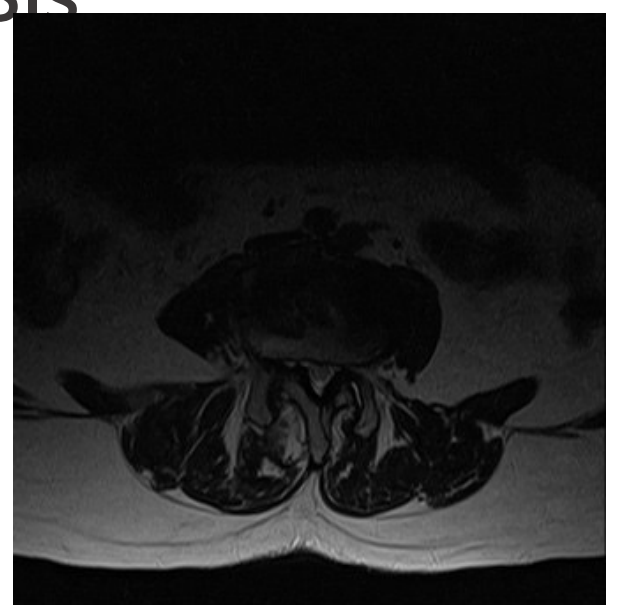


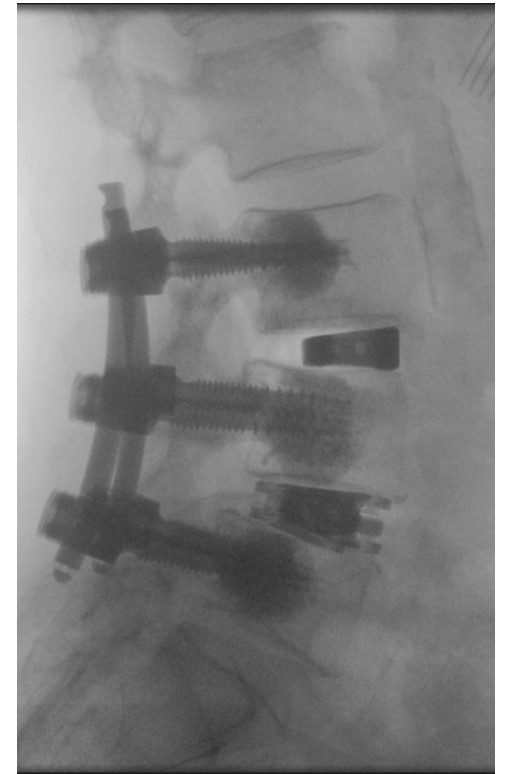
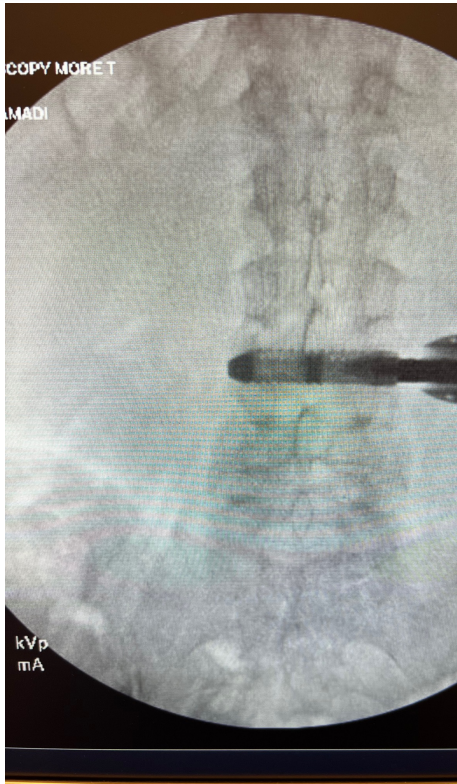
- Initial dimensions: 8 mm height, 10 mm width, 40 mm length
- Final dimensions: 11 mm height, 20 mm width, 23 mm length  
15 degrees of lordosis



- Triple threat: Titanium cage that expands in width, height with greater lordosis
  - Significant advancement in expandable cage technology

- 78-year-old female with LBP, R anterior thigh pain, BLE numbness
- Difficulty with walking or standing for any prolonged period
- Failed pain medications, physical therapy, ESIs





# The Use of Dual Direction Expandable Titanium Cage With Biportal Endoscopic Transforaminal Lumbar Interbody Fusion: A Technical Consideration With Preliminary Results

Don Young Park<sup>1</sup>, Dong Hwa Heo<sup>2</sup>

Neurospine 2023;20(1):110-118.  
<https://doi.org/10.14245/ns.2346116.058>

- Early experience, 6 months Follow-up

Characteristic	Value
Age (yr)	68.5 ± 8.0
Sex, male:female	4:6
Operation segment	
L4-5	8
L5-S1	2
Diagnosis	
Degenerative spondylolisthesis with central stenosis	9
Isthmus spondylolisthesis	1
Mean operation time (min)	151.4 ± 30.6
Mean estimated blood loss (mL)	156.6 ± 74.2
Complication, epidural hematoma	1

Values are presented as mean ± standard deviation or number.

Variable	Preoperative	Postoperative		
		6 Weeks	3 Months	6 Months
VAS back*	6.9 ± 1.19	2.1 ± 1.85	1.3 ± 1.57	1.25 ± 0.63
VAS leg*	8.3 ± 1.16	0.55 ± 1.57	1.6 ± 1.65	1.0 ± 0.94
ODI*	55.2 ± 9.1	32.3 ± 17.3	29.1 ± 15.5	26.6 ± 7.5

Values are presented as mean ± standard deviation.

VAS, visual analogue scale; ODI, Oswestry Disability Index.

\*p < 0.05.

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

Values are presented as mean ± standard deviation.

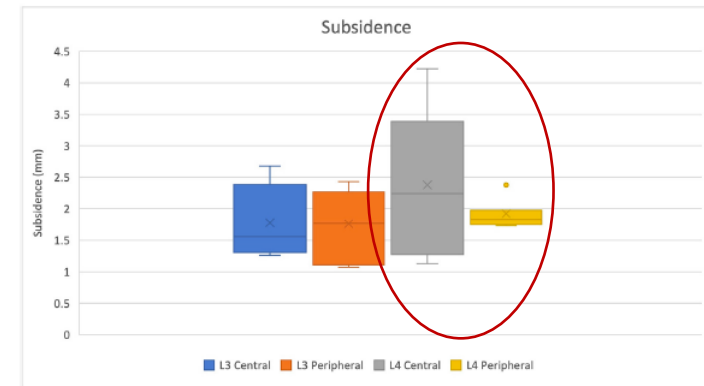
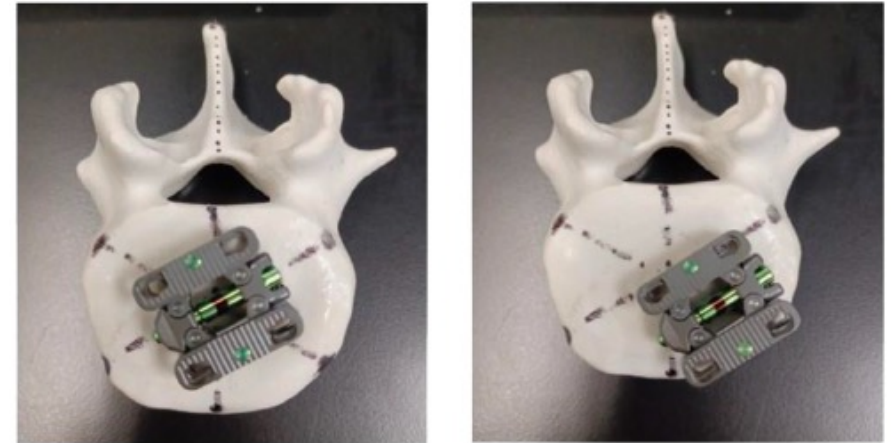
\*p < 0.05.

# Influence of Placement of Lumbar Interbody Cage on Subsidence Risk: Biomechanical Study

Henintsoa Fanjaniaina Andriamifidy<sup>1</sup>, Matthew Rohde<sup>2</sup>, Pooja Swami<sup>1</sup>, Haixiang Liang<sup>1</sup>, Daniel Grande<sup>1</sup>, Sohrab Virk<sup>3</sup>

WORLD NEUROSURGERY ■: E1-E7, ■ 2024

- Biomechanical study
- Anterior apophyseal cage placement vs central placement
  - Higher stiffness of vertebra-cage assembly ( $K_s$ , 962.89 N/mm)
  - Higher subsidence stiffness ( $K_b$ , 987.21 N/mm)



	Central		Peripheral		P Values; P < 0.05 Significant
	Mean	Standard Deviation	Mean	Standard Deviation	
$K_b$ (N/mm)	863.37 + 105.57	±105.57	987.21	±67.07	0.03
$K_s$ (N/mm)	844.55	±101.15	962.89	±63.94	0.03



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>a</sup>, Hyun-Jin Park, MD<sup>b,\*</sup>

*The Spine Journal* 21 (2021) 2066–2077

- MIS TLIF vs dualPortal TLIF, at least 1 year followup
- VAS scores and ODI scores significantly improved after surgery in both groups
  - Greater improvements in VAS Back and SF-36 at 1 month postop in dualPortal TLIF 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

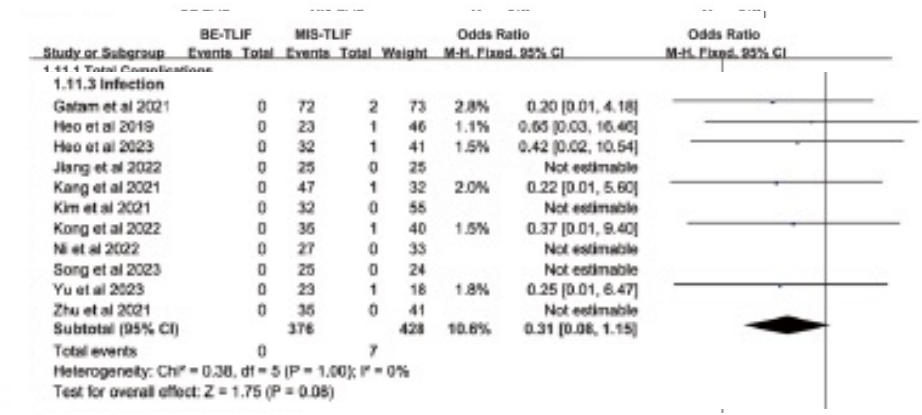
# Comparing the efficacy of unilateral biportal endoscopic transforaminal lumbar interbody fusion and minimally invasive transforaminal lumbar interbody fusion in lumbar degenerative diseases: a systematic review and meta-analysis

Haopeng Luan<sup>1†</sup>, Cong Peng<sup>1†</sup>, Kai Liu<sup>2</sup> and Xinghua Song<sup>1\*</sup>

*Journal of Orthopaedic Surgery and Research* (2023) 18:888

<https://doi.org/10.1186/s13018-023-04393-1>

- 14 studies, 1007 patients
  - 472 biportal TLIF, 535 MIS TLIF
- Biportal TLIF with lower intraoperative blood loss, postop drainage
- MIS TLIF with greater surgical time
- VAS Back, Leg, ODI favored biportal
- Total complications, infections favored biportal
- No difference in fusion rate, radiographic parameters

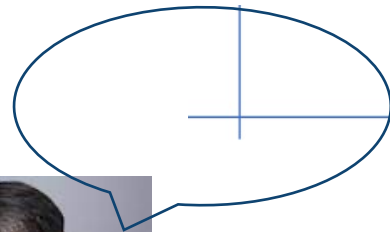


# dualLIF: dualPortal + dualX

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



Luke Jin Sung Kim



What future Awaits..

Innovation Merged for  
Endoscopic Fusion

Expandable cages

Uni/Bi Endoscopy

**dualX™**  
Dual Expanding Intervertebral Fusion System

- Accommodates TLIF approaches
- Wide, horizontal expansion engineered to reduce subsidence risk
- Powerful vertical expansion restores disc height for decompression
- Lordotic angle for sagittal alignment restoration
- Innovative dual locking designed to maintain height long-term
- Post-expansion, surgeon-preferred bone grafting

TLIF

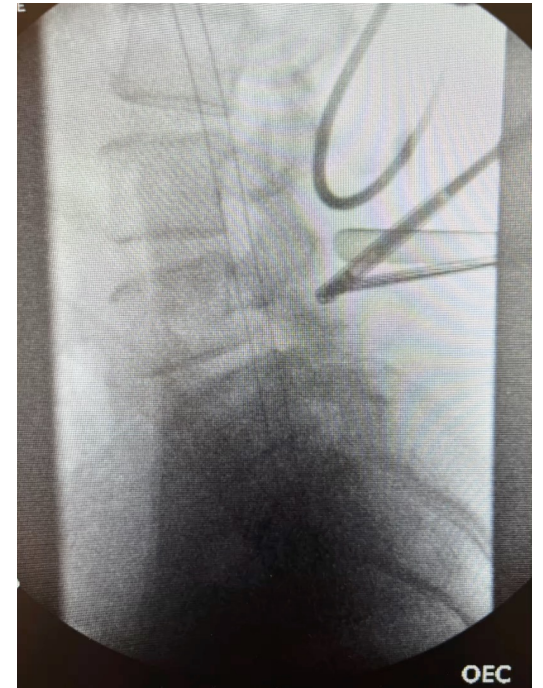
Finally, Biptoral Endo + Expandable cage

Technique from S. Korea

Technology from USA

World Top Biptoral Endo Surgeons

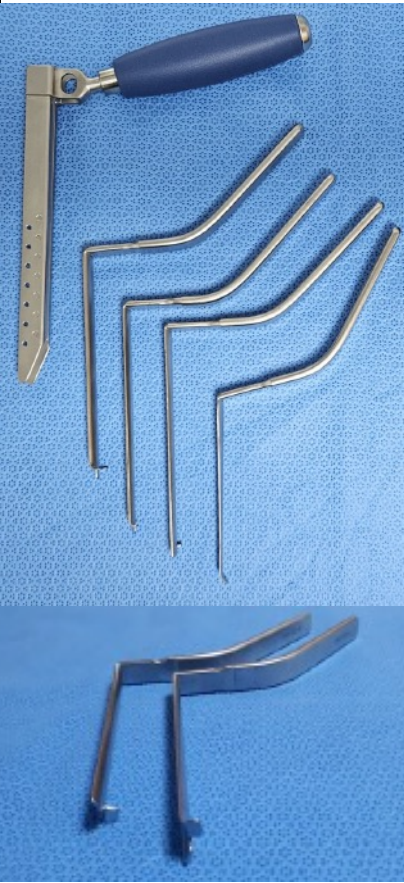
The Best Expandable Cages



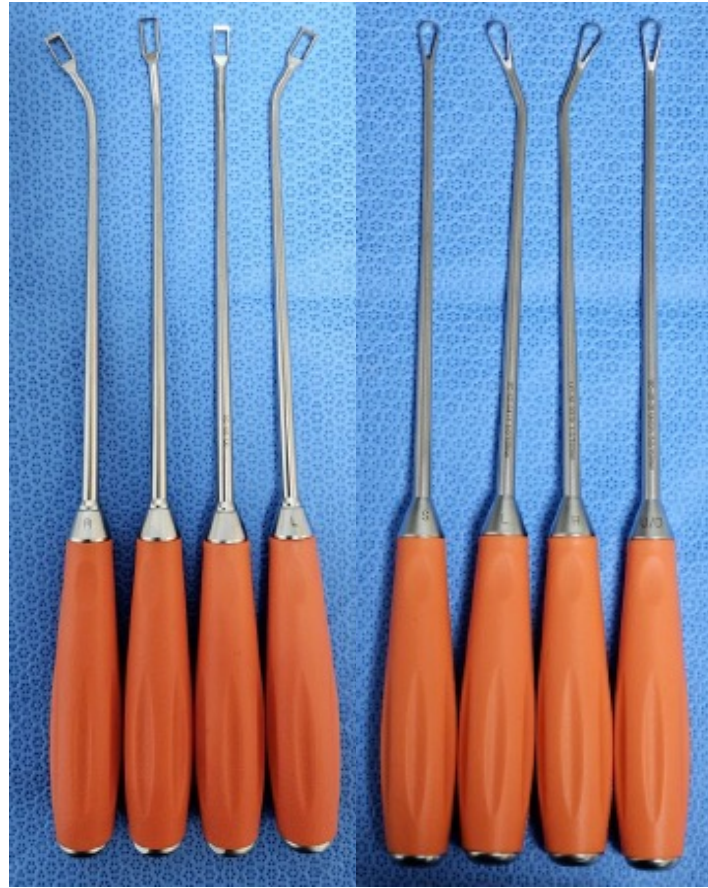
OEC

# New Product Launch

## dualPortal Fusion - dualLIF® System



Cage Guides



Disc Prep

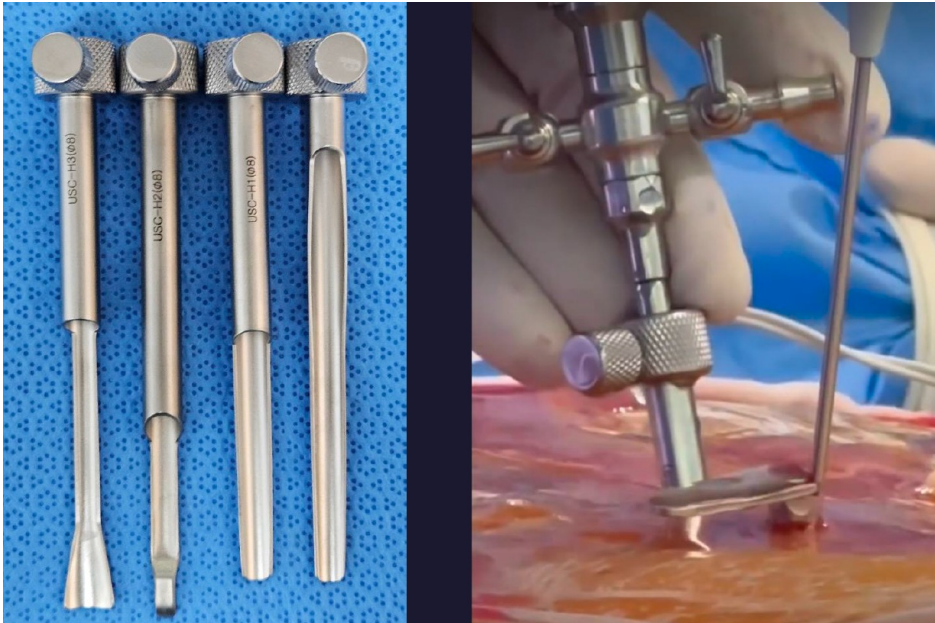


Osteotomes

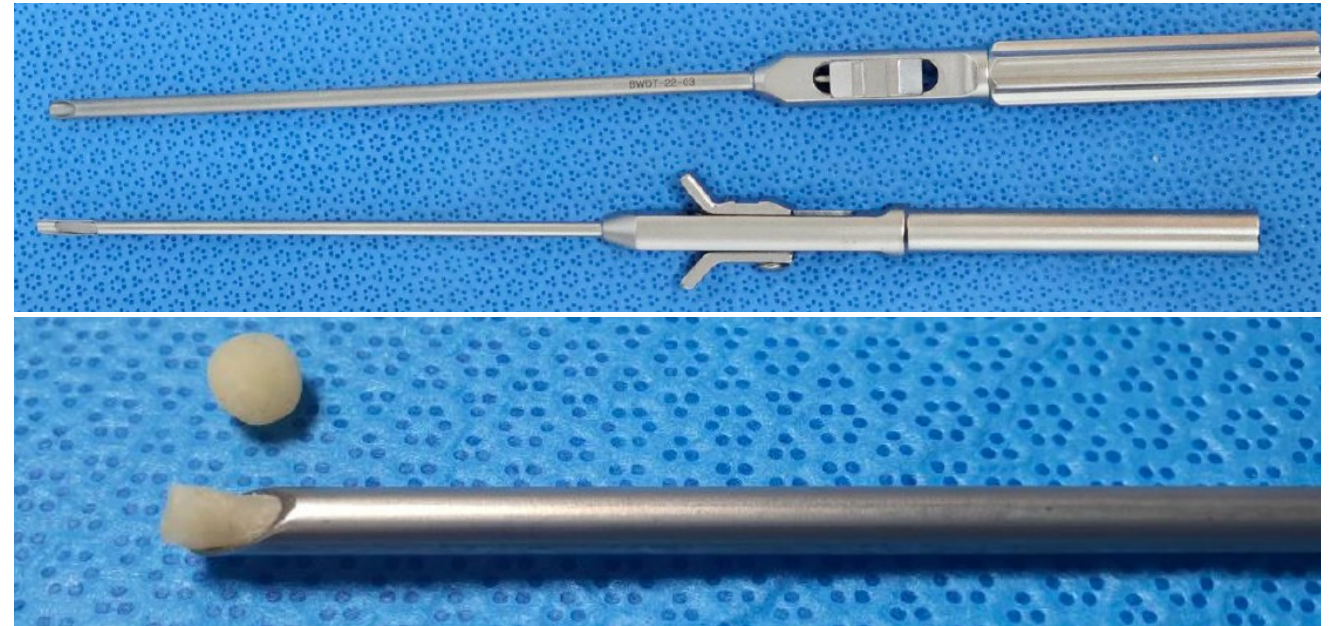


# New Product Launch Cont.

## dualPortal Fusion - dualLIF® System



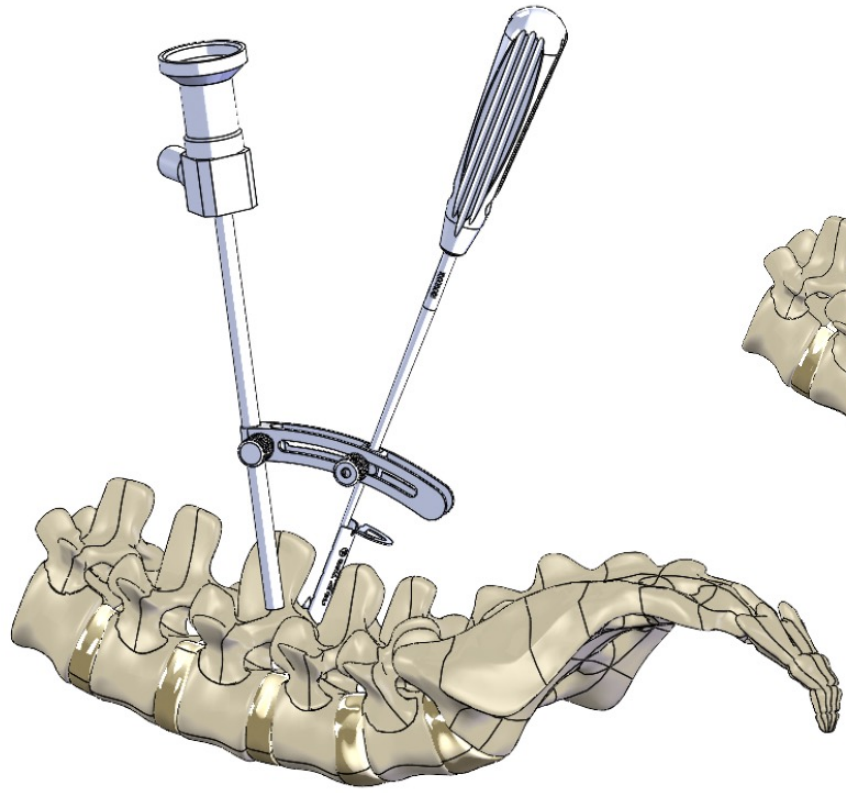
Scope-Cannula  
Self-Retractor



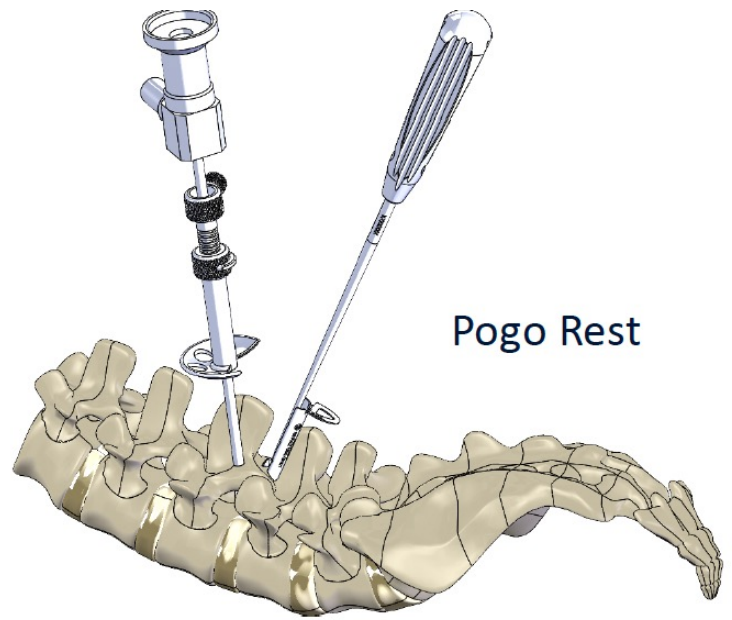
Bone Wax Delivery Device

# New Product Launch Cont.

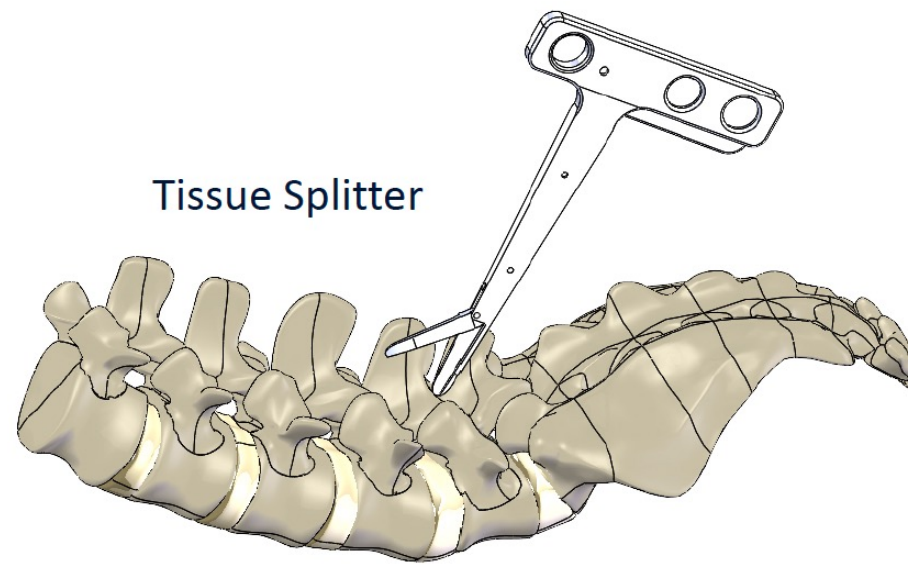
**dualPortal 2.0 – Available Q3 2024**



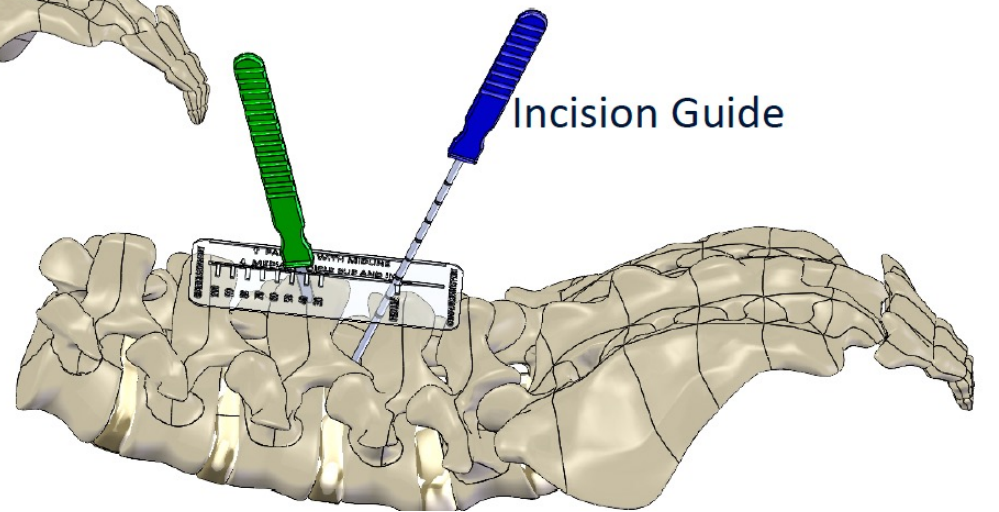
Triangulation Guide



Pogo Rest

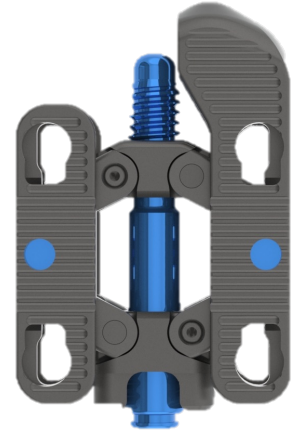


Tissue Splitter



Incision Guide





**AMPLIFY**<sup>TM</sup>  
SURGICAL

Transforming the Ordinary