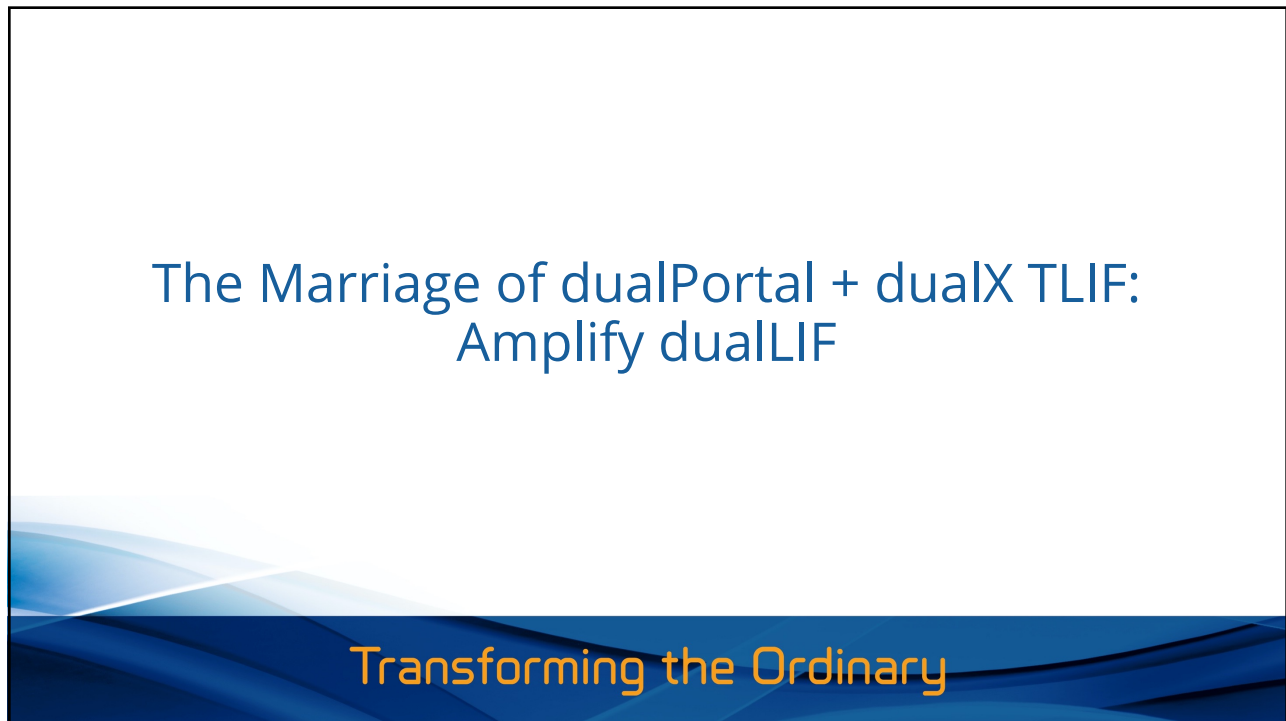




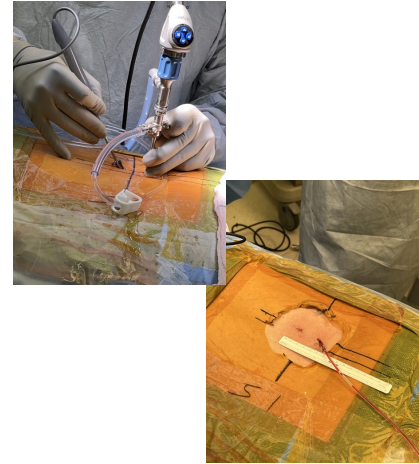
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2

dualPortal™ Spinal Endoscopy

- dualPortal: endoscopic viewing portal + working portal
 - Decouples the endoscopic camera with the surgical instruments
 - Greater flexibility, enhanced visualization, increased versatility
 - Familiar territory, similar to microscopic view of anatomy



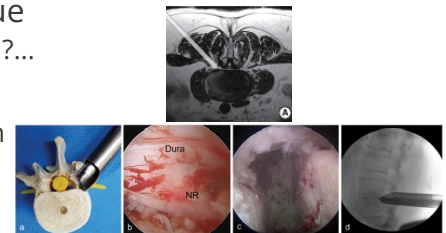
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3

Challenges of EndoTLIF

- Uniportal 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



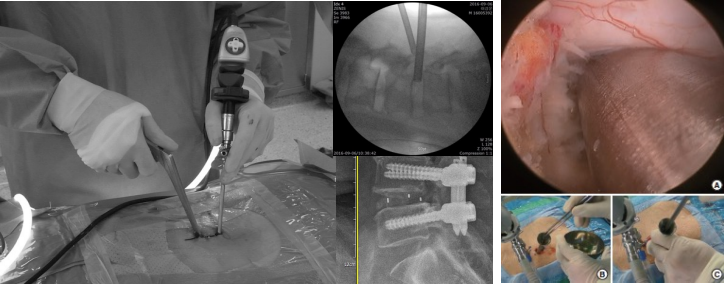
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4

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, PhD¹, Sang Kyu Son MD², Jin Hwa Eum MD³, ... [View More](#)

Technique of Biportal Endoscopic Transforaminal Lumbar Interbody Fusion

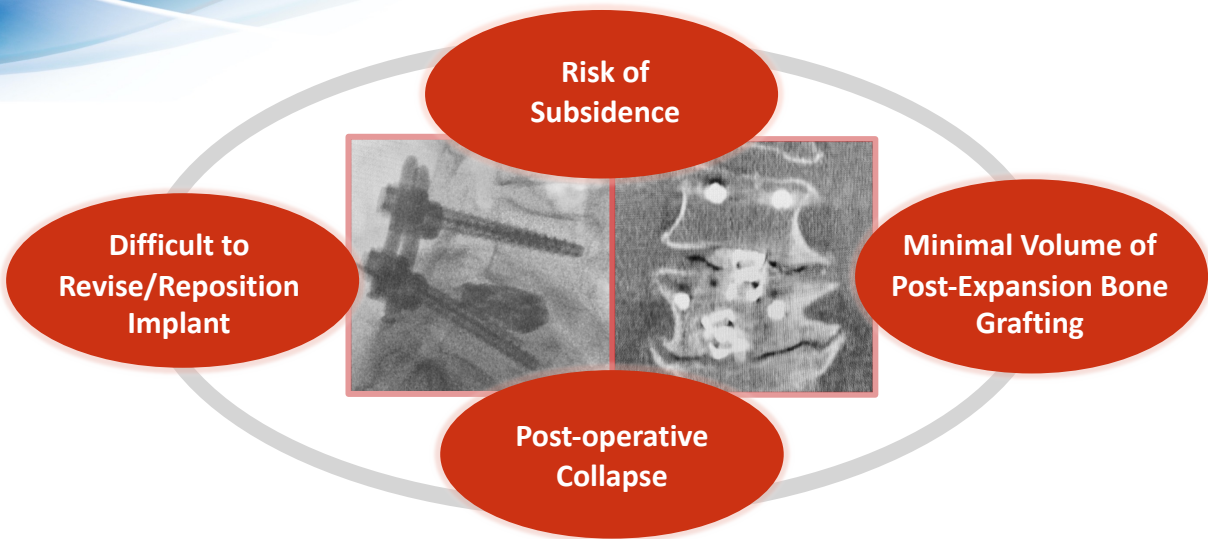
Dong Hwa Heo^{1*}, Young Ho Hong^{2*}, Dong Chan Lee³, Hun Jae Chung⁴, Choon Keun Park⁵

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

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5

Challenges of Expandable Interbody Devices



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6

High Subsidence / Collapse Risk with Uni-directional Expandable Cages

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NEUROSURGERY
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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

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

Chih-Chang Chang^{1,2,3,4}, Dean Chou¹, Brenton Pennicooke¹, Joshua Rivera⁵, Lee A Tan¹, Sigurd Berven⁶, Praveen V Mummaneni¹

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.

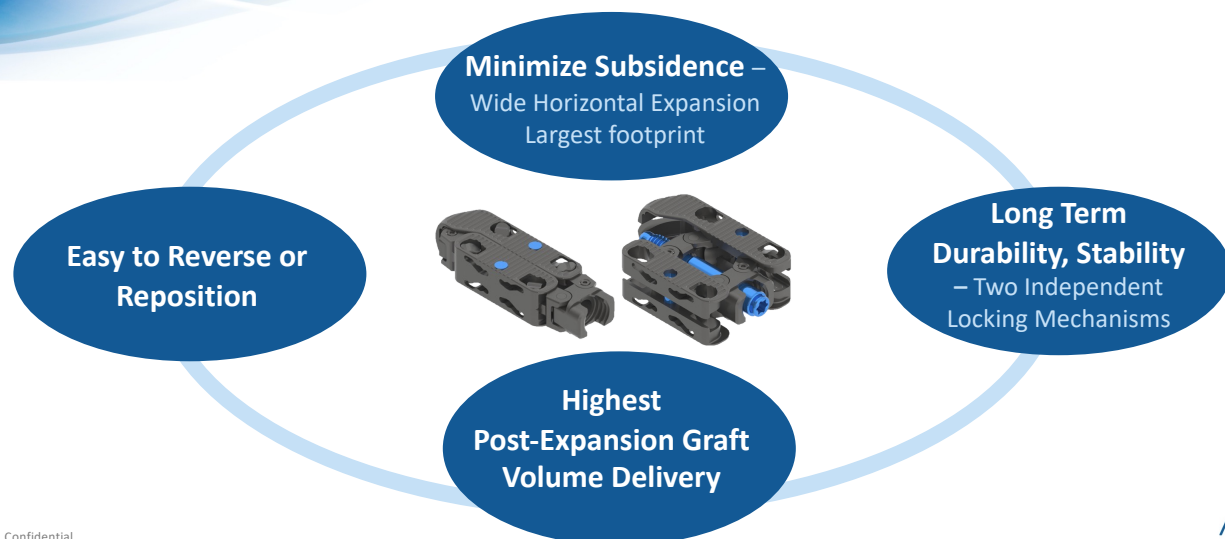
Results: A consecutive series of 178 patients (with a total of 210 levels) who underwent TLIF (using either static (148 levels) or expandable cages (62 levels)) was reviewed. The mean patient age was 60.3 ± 11.5 years and 62.8 ± 14.1 years for the static and expandable cage groups, respectively. The mean follow-up was 42.9 ± 29.4 months for the static cage group and 27.6 ± 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.



7

dualX TLIF cage: A Revolution in Expandable Interbody Devices



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8

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

12mm

21mm

$\Delta 3\text{mm}$

75% Increase in Width

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9

dualX – Long Term Durability and Inherent Stability

Ensures Durability and Stability with Two Independent Locking Mechanisms

dualLocking

- 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

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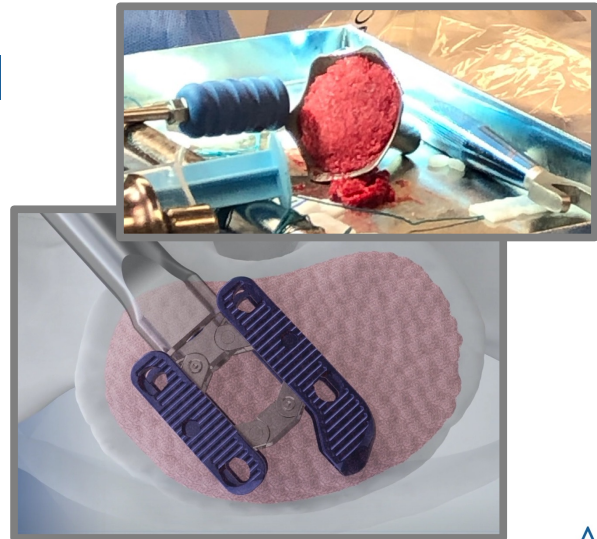
10

Post-expansion, Surgeon Preferred Bone Grafting

11

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



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11

Market Leading, Differentiated Benefits

12

	AMPLIFY [™] SURGICAL	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	●	●	●	●	●

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12

Instrument Simplicity & Safety

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



13

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 publishing 2022
 - Multi-site (AZ, CA, OR) retrospective study planning initiated

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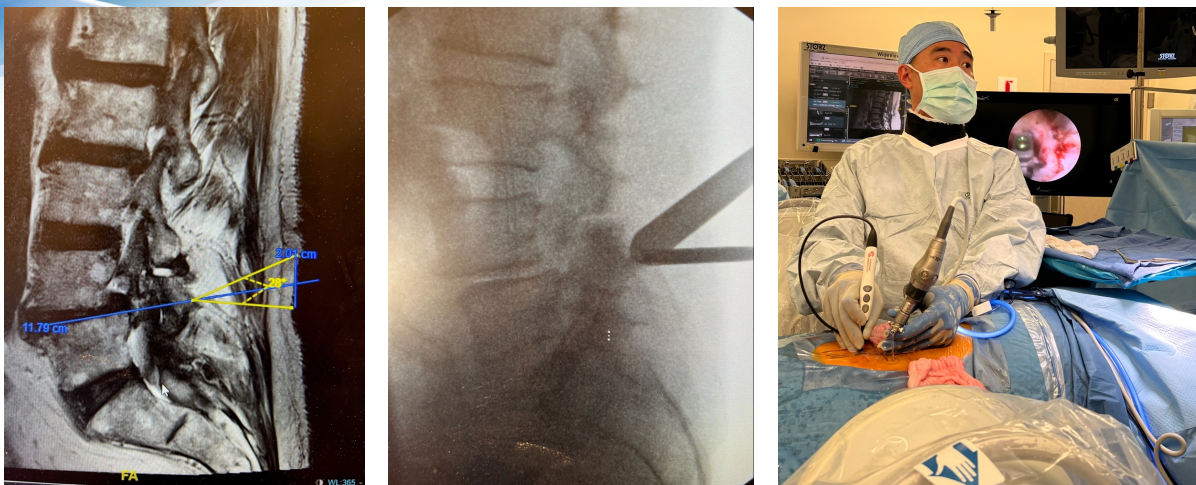
Seoul Bumin Hospital: EndoTLIF



A

15

dualLIF Procedure



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A

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Endoscopic Disc Preparation

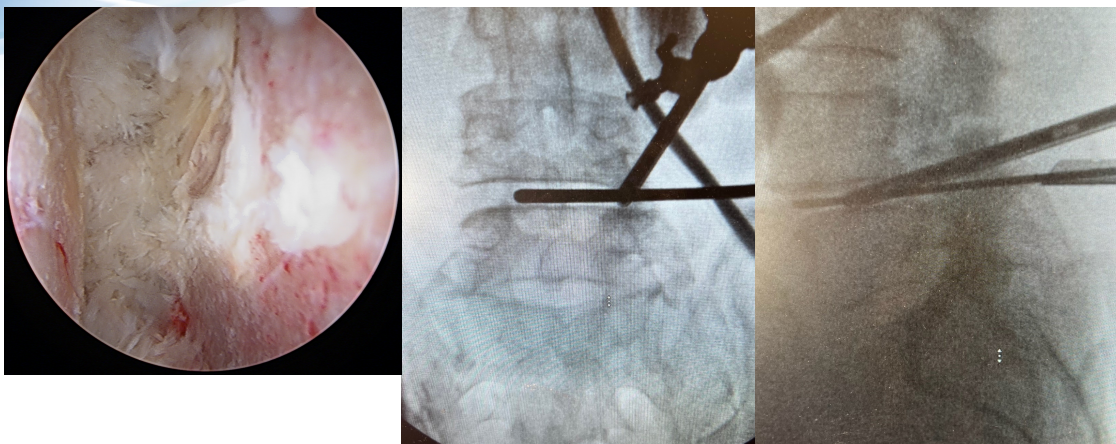


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dualLIF Procedure

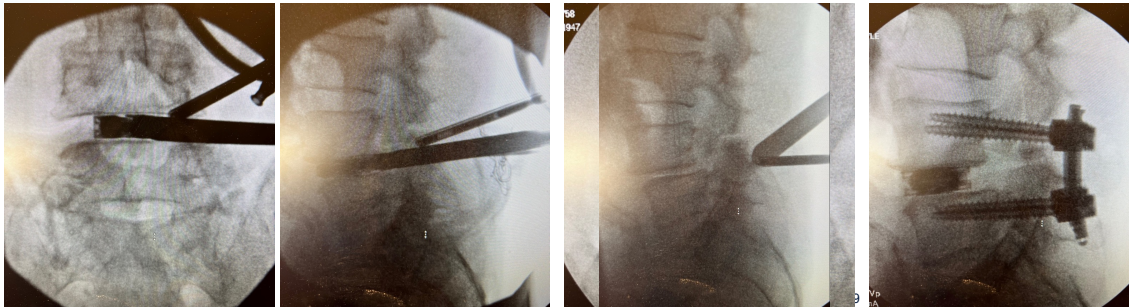


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dualLIF Procedure



- Preop: VAS Back 7, Leg 7, ODI 62%
- Postop: VAS Back 3, Leg 0, ODI 30%

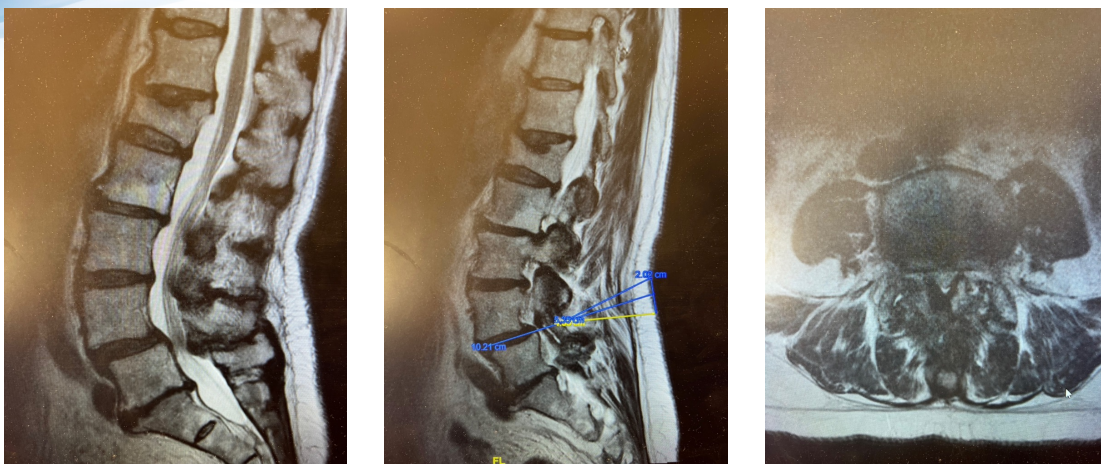
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dualLIF Procedure

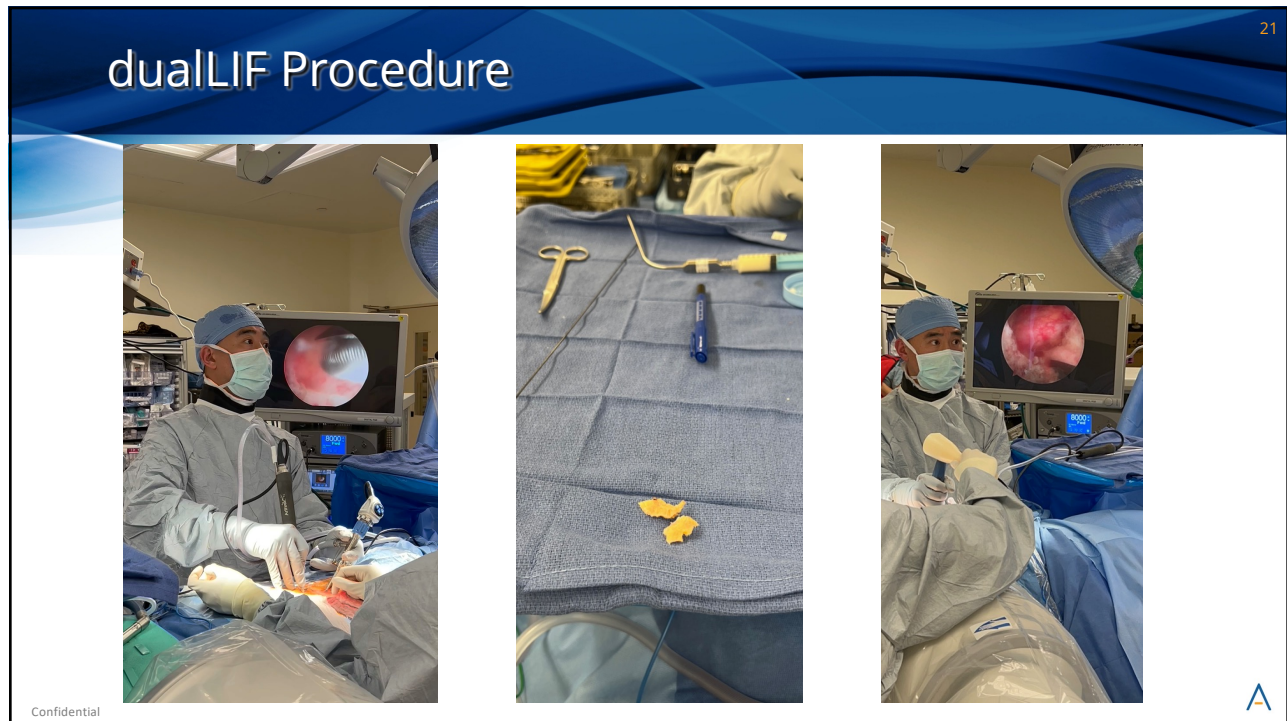
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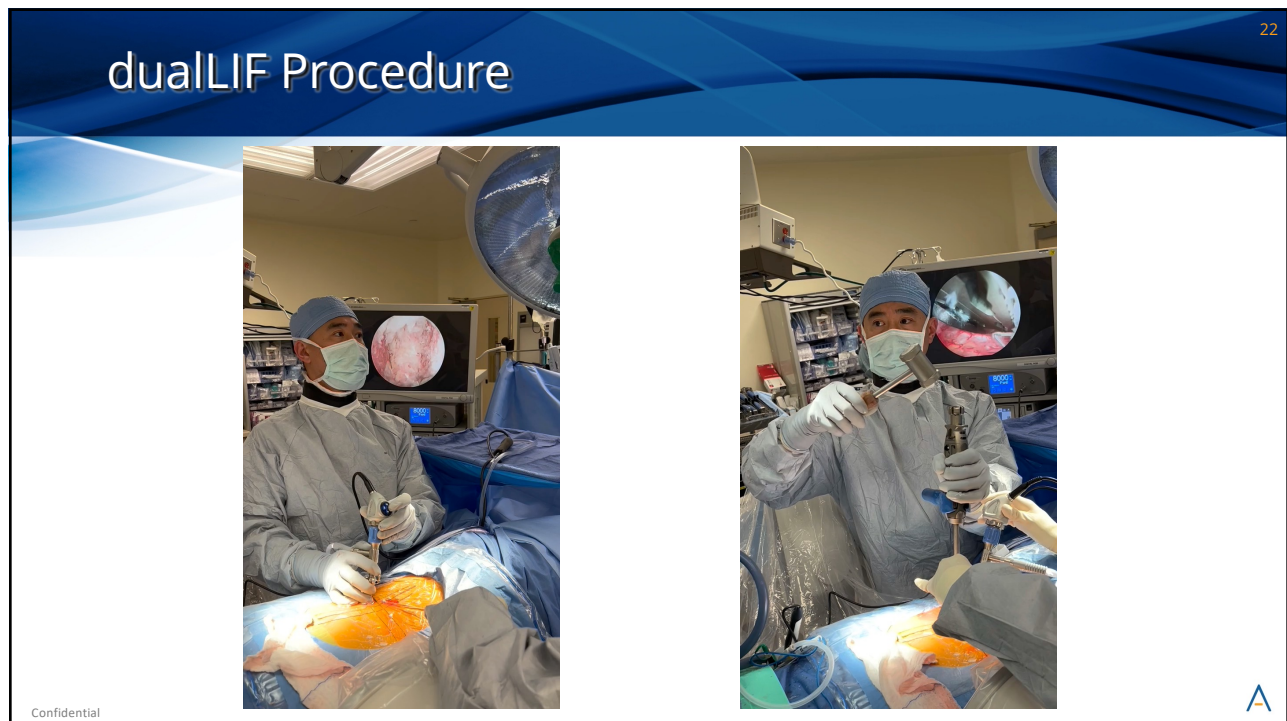
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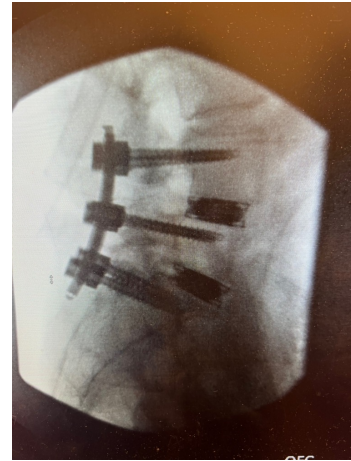
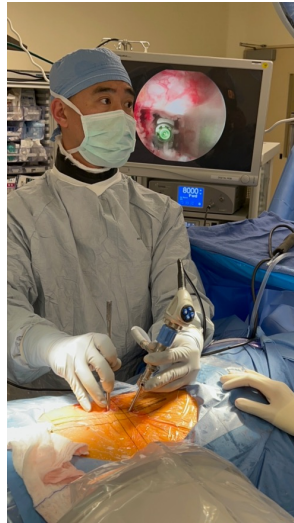
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dualLIF Procedure

23



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Clinical and radiological outcomes of unilateral biportal endoscopic lumbar interbody fusion (ULIF) compared with conventional posterior lumbar interbody fusion (PLIF): 1-year follow-up

Min-Kyu Park¹ • Soo-An Park^{2,3} • Sang-Kyu Son¹ • Weon-Wook Park² • Saung-Hyun Choi²

- 70 open PLIF, 71 dual portal TLIF, 1 year follow-up
- Surgical time longer in dual portal vs open group (158 vs 137 min)
- Transfusions in 13 cases (20%) in open vs none in dual portal
- No difference in complications or fusion rates
- Both groups with significant improvement at 1 year vs preop
 - Less back pain in dual portal vs open at 1 week ²⁴
 - Better improvement of disability outcomes with dual portal vs open



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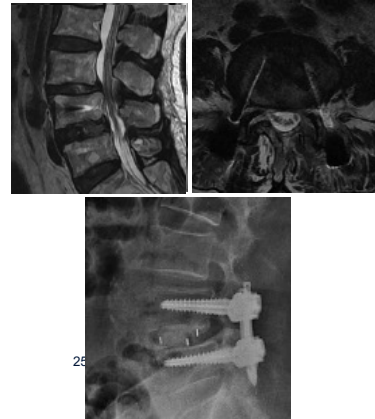


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Clinical results of percutaneous biportal endoscopic lumbar interbody fusion with application of enhanced recovery after surgery

*Dong Hwa Heo, MD, PhD, and Choon Keun Park, MD, PhD

- 46 with MIS TLIF, 23 with dual portal TLIF, >12 month followup
- Leg pain and disability outcomes significantly reduced after surgery in both groups
- Back pain on day 1 and 2 were higher in MIS TLIF group vs dual portal TLIF group
 - No significant differences in back and leg pain or disability outcome at final F/U between the 2 groups.



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

Dong Hwa Heo¹, Dong Chan Lee², Hyeun Sung Kim³, Choon Keun Park², Hungtae Chung¹

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

26

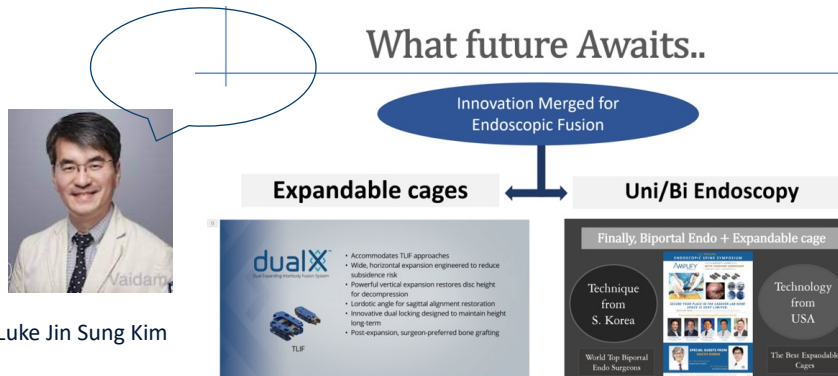
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dualPortal+dualX: dualLIF

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



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Thank you. Questions?

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