AMPLIFY®
SURGICAL

SEEING IS BELIEVING

dualPortal® + dualX®

A novel **two-portal endoscopic** approach to the spine

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

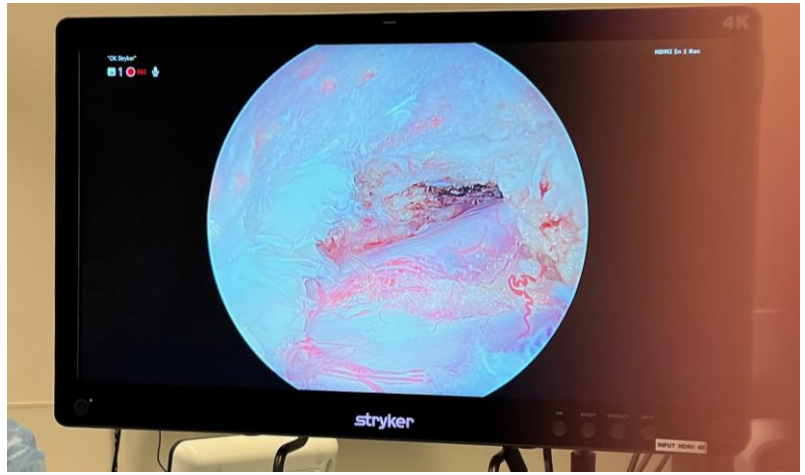
Transforming the Ordinary

Disclosures

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

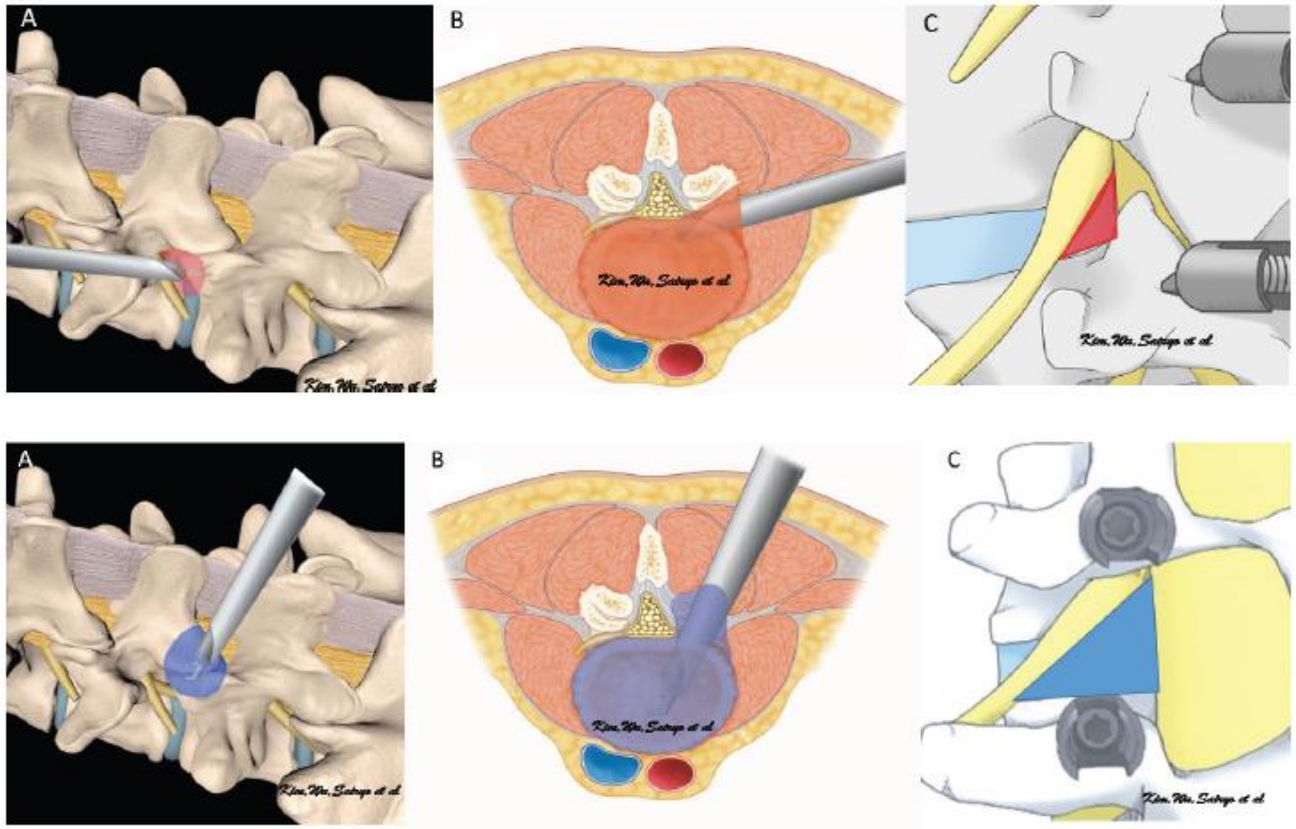
dualPortal Spinal Endoscopy

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



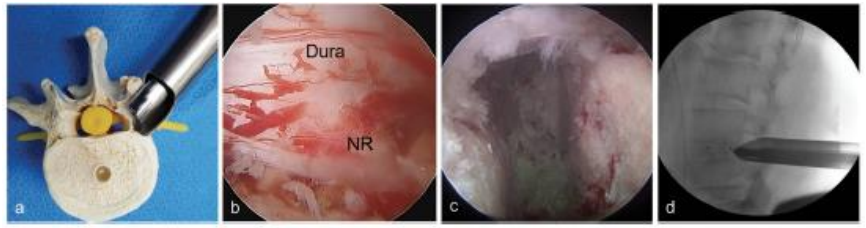
Endoscopic Fusion: True Advances in Spine Surgery

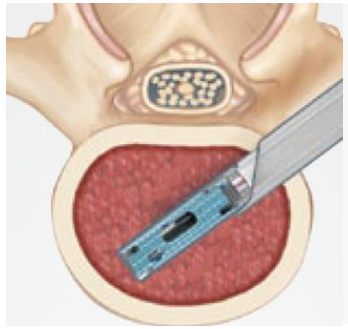
- 2 uniportal techniques:
  - Uniportal facet preserving trans-Kambin endoscopic fusion
  - Uniportal facet sacrificing posterolateral TLIF
- Advanced endoscopic technique



Challenges of EndoTLIF

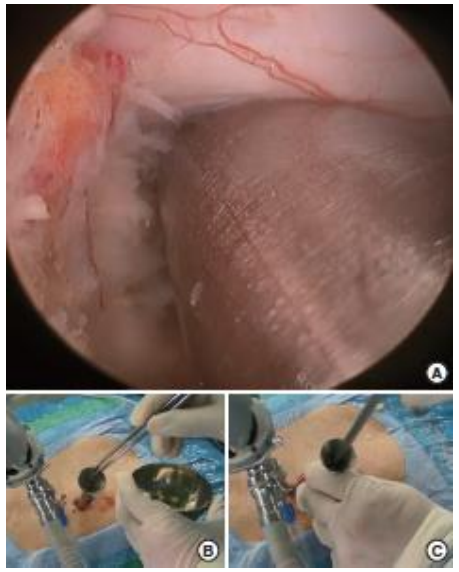
- Uniportal limitations
  - Trans-Kambin: Quad palsy, exiting nerve root injury, radiculitis, fusion?...
  - Trans-facet: Requires large stenosis scope
- Limitations in cage options for endoscopic TLIF
  - Narrow cage to fit through the trans-Kambin approach
  - Endplate resorption
- Biggest limitation: unfamiliar territory
  - Steep learning curve





dualPortal™ 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 [1], Sang Kyu Son MD [2], Jin Hwa Eum MD [3], ...

View More +

Technique of Biportal Endoscopic Transforaminal Lumbar Interbody Fusion

Dong Hwa Heo[1,*], Young Ho Hong[2,*], Dong Chan Lee[3], Hun Jae Chung[1], Choon Keun Park[3]

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
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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 [1 2 3 4], Dean Chou [1], Brenton Pennicooke [1], Joshua Rivera [5], Lee A Tan [1], Sigurd Berven [6], Praveen V Mummaneni [1]

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.

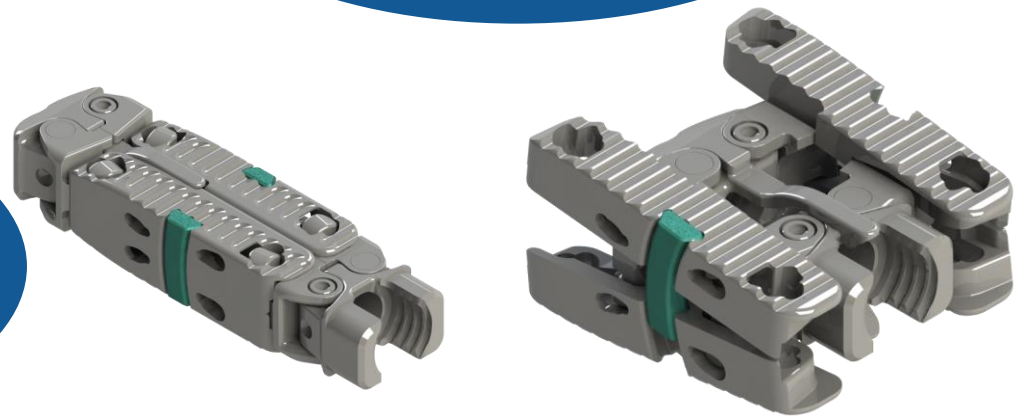
Results: A consecutive series of 178 patients (with a total of 210 levels) who underwent TLIF using either static (148 levels) or expandable cages (62 levels) was reviewed. The mean patient age was 60.3 ± 11.5 years and 62.8 ± 14.1 years for the static and expandable cage groups, respectively. The mean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

dualX TLIF cage: A Revolution in Expandable Interbody Devices

Minimize Subsidence – Wide Horizontal Expansion Largest Footprint

trueLordosis™
8°, 12°, 15°, 18°*



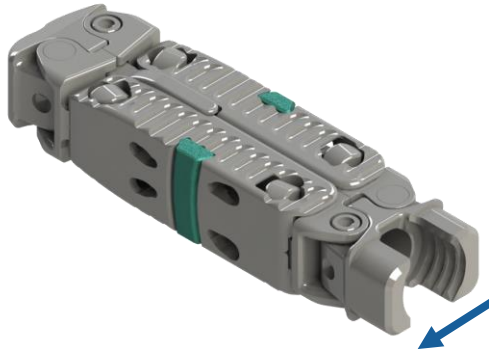
Long Term Durability, Stability
– Two Independent Locking Mechanisms

Highest Post-Expansion Graft Volume Delivery

dualX – The Largest Footprint Expandable Cage

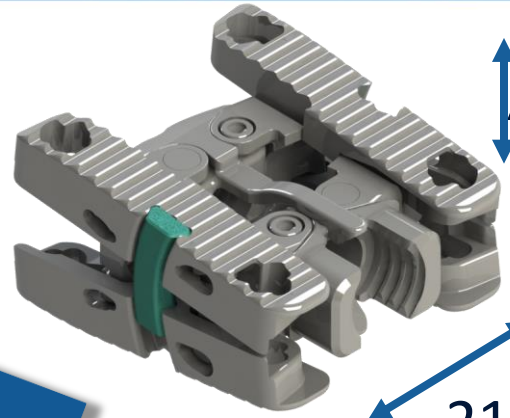
Safe and Secure

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



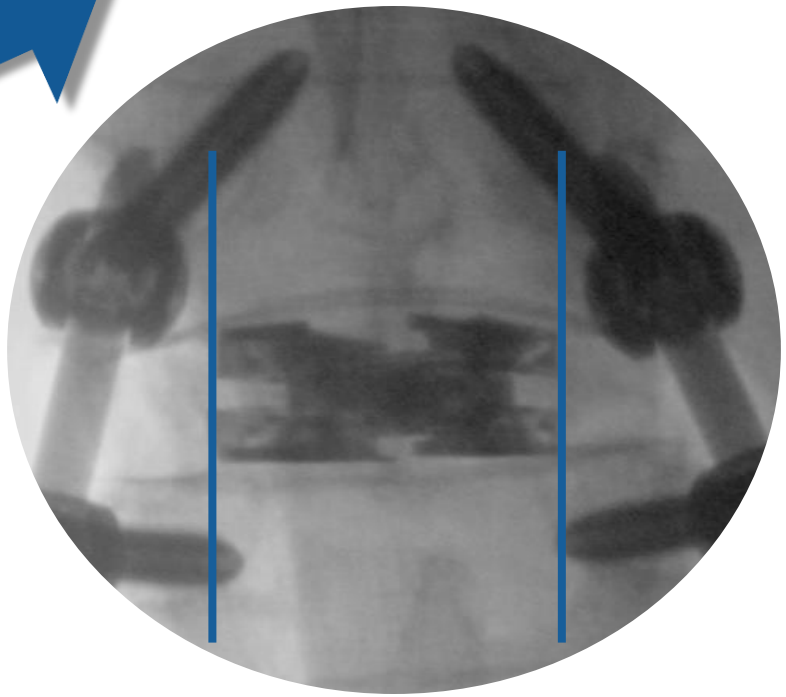
10mm

110% Increase in Width



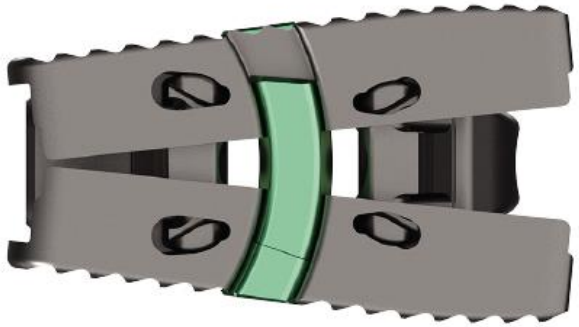
Δ3mm

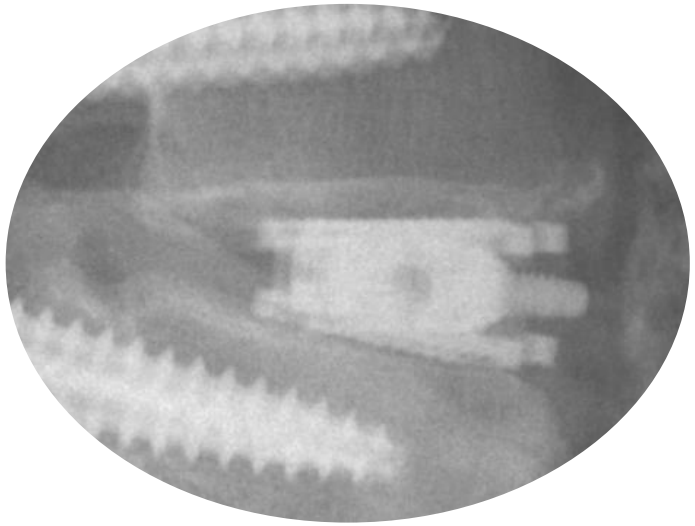
21mm



trueLordosis™

- The Implant will always provide the prescribed Lordosis
- Available in **8°, 12°, 15°, 18°***





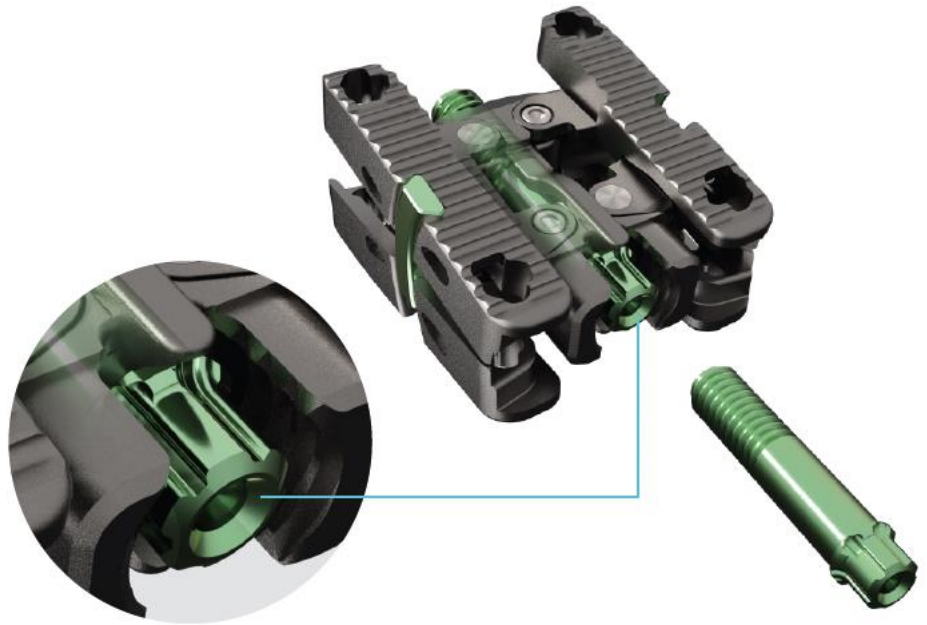
dualX – Long Term Durability and Inherent Stability

Ensures Durability and Stability with Two Independent Locking Mechanisms

dual Locking

Expansion Locking Mechanism + Secondary Screw Lockout

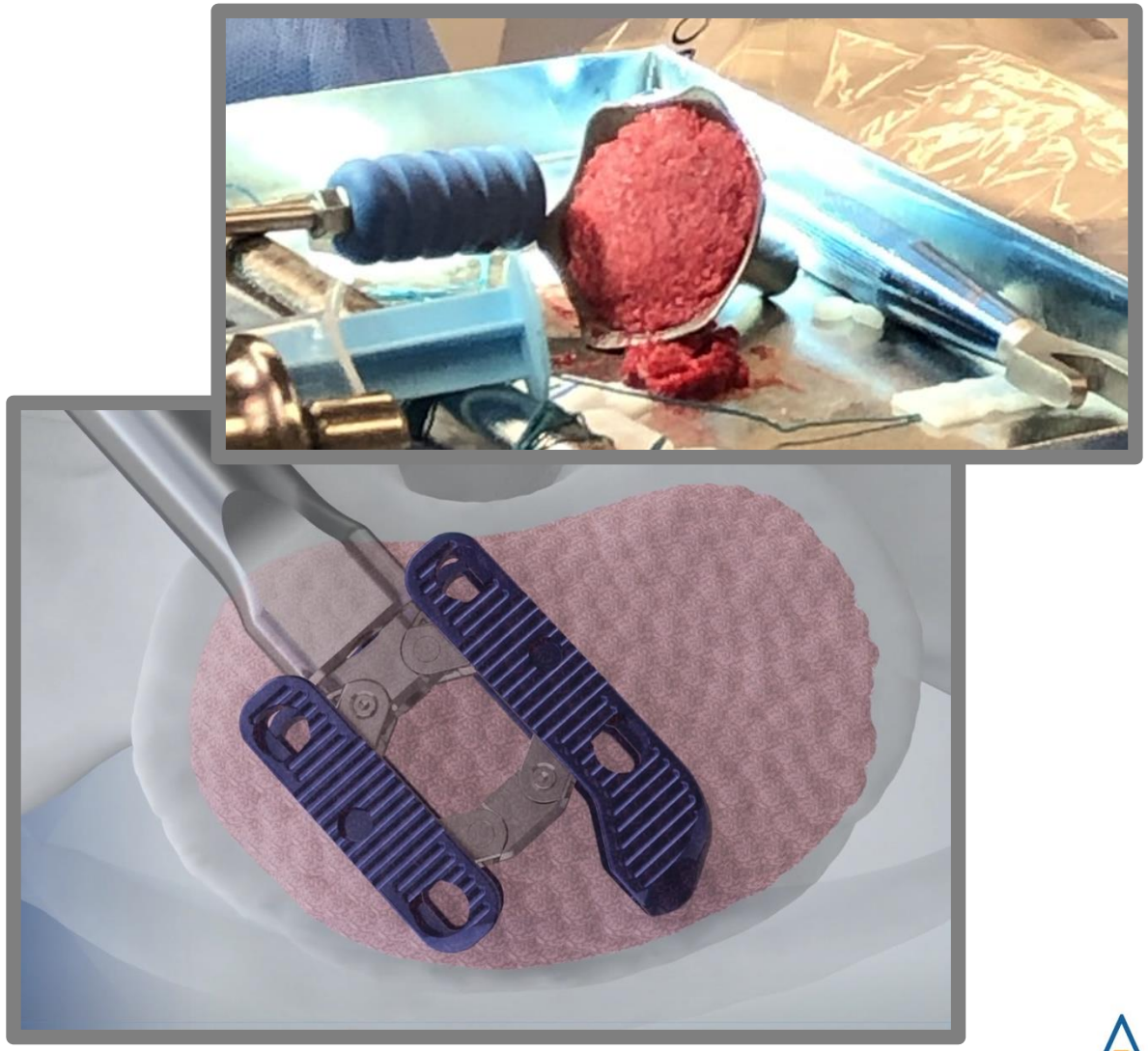
- Innovative dual locking design
  - Maintains the integrity of the implant until the patient is fused
- Final locking screw
  - Ensures implant stays expanded in width and height
- The only one of two “non-screw based” Expansion Mechanism



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



dualX 2.0 – dualXSlim

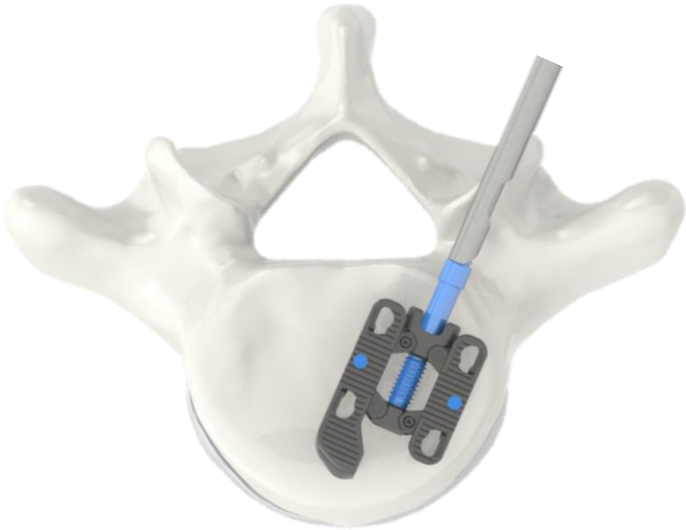
dualX®Slim

Market Leading, Differentiated Benefits

	AMPLIFY™ SURGICAL	Accelus	Globus	Medtronic	Nuvasive
Bi-Directional Expansion					
Large Footprint					
Largest Footprint Size (WxL) (vs. height expanding devices)	**21**x30mm (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					

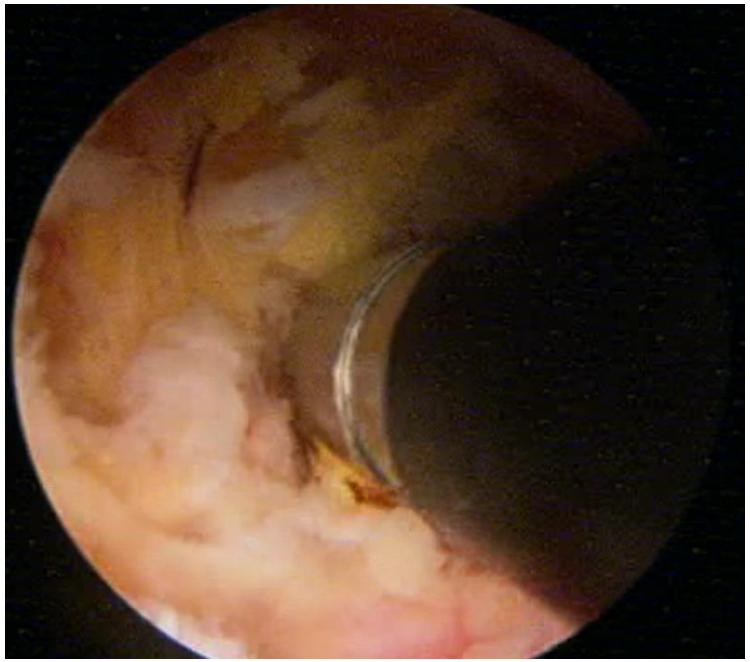
Instrument Simplicity & Safety

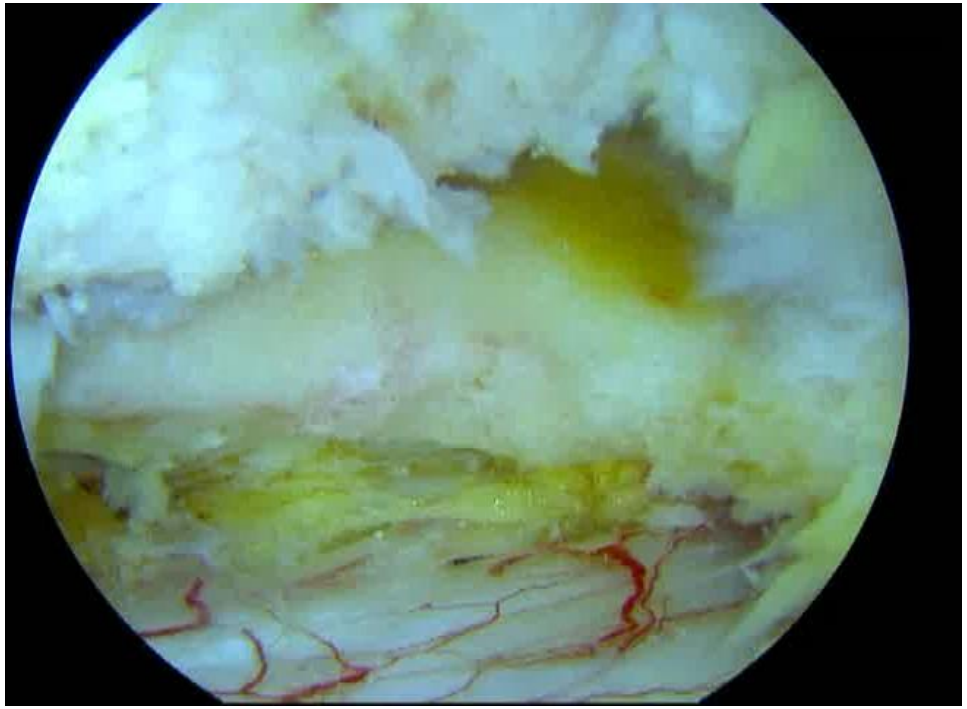
- All steps performed safely through a single inserter
  - Insertion
  - Lateral expansion
  - Vertical expansion
  - Graft filling
  - Screw lock out



Biportal Endoscopic Lumbar Fusion

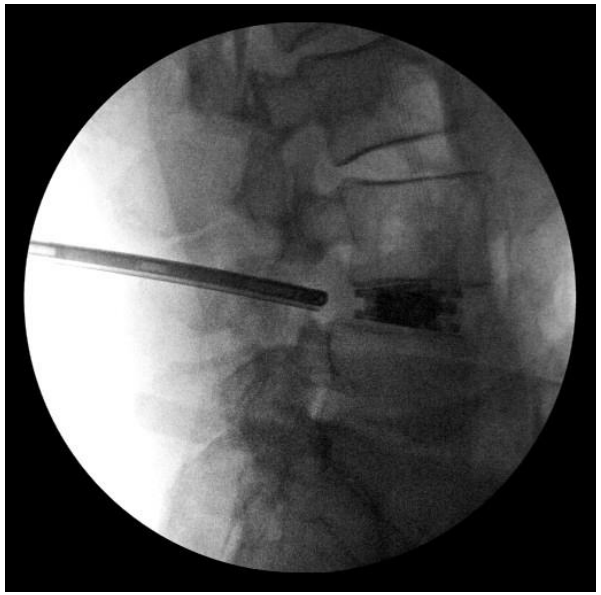
- Unilateral laminotomy, bilateral decompression
- Facetectomy
- Exposure of Kambin's Triangle

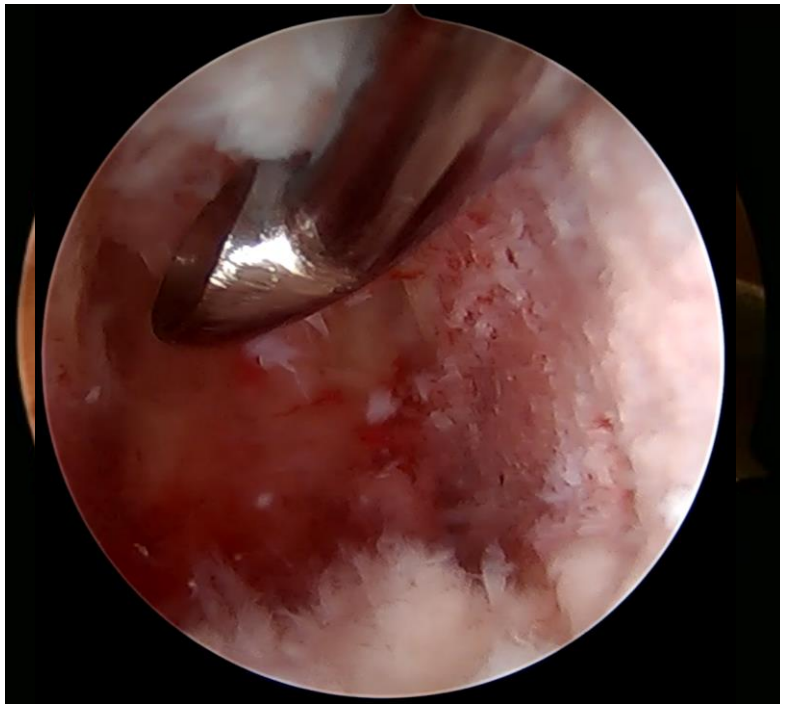




Biportal Endoscopic Lumbar Fusion

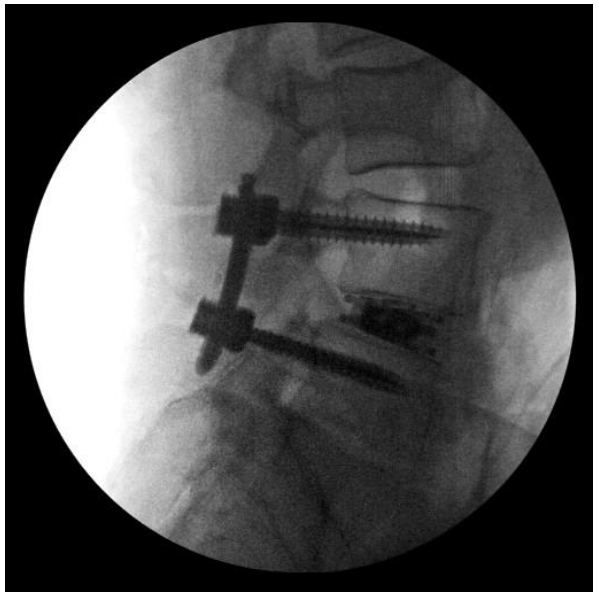
- Unilateral laminotomy, bilateral decompression
- Facetectomy
- Exposure of Kambin's Triangle
- Disc Preparation
- Cage placement

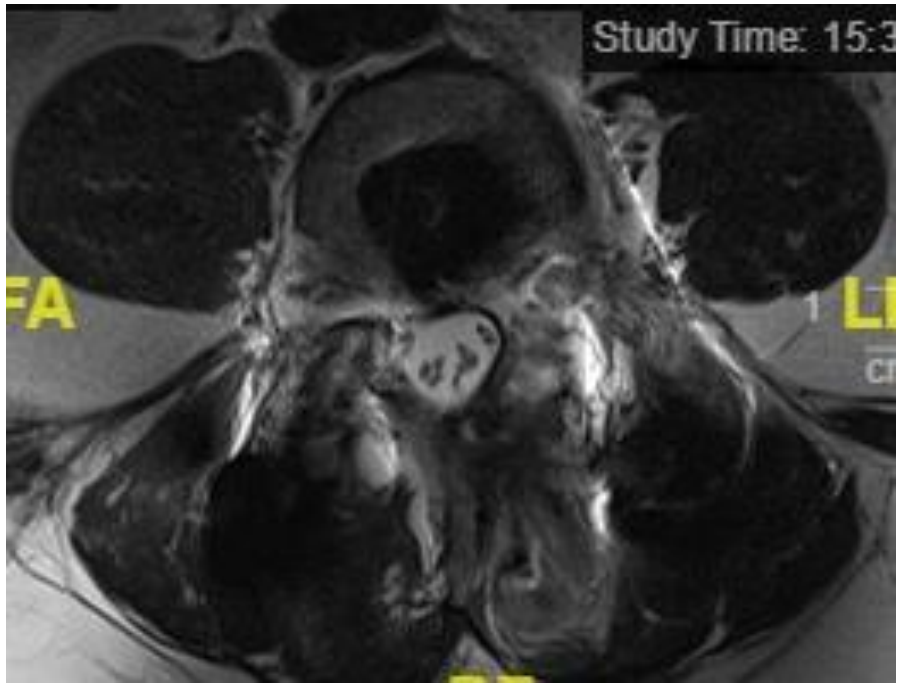




Biportal Endoscopic Lumbar Fusion

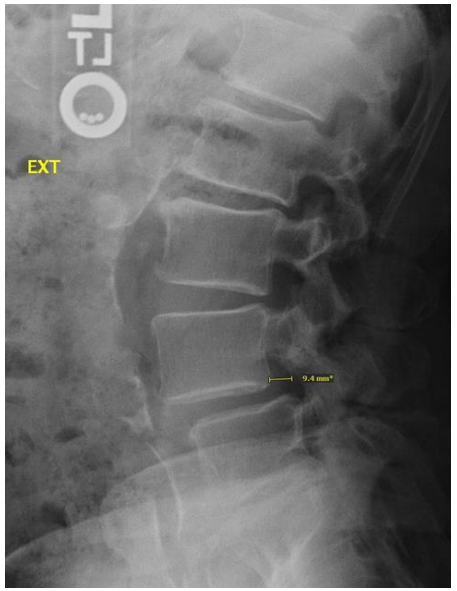
- Unilateral laminotomy, bilateral decompression
- Facetectomy
- Exposure of Kambin's Triangle
- Disc Preparation
- Cage placement
- Pedicle screw placement

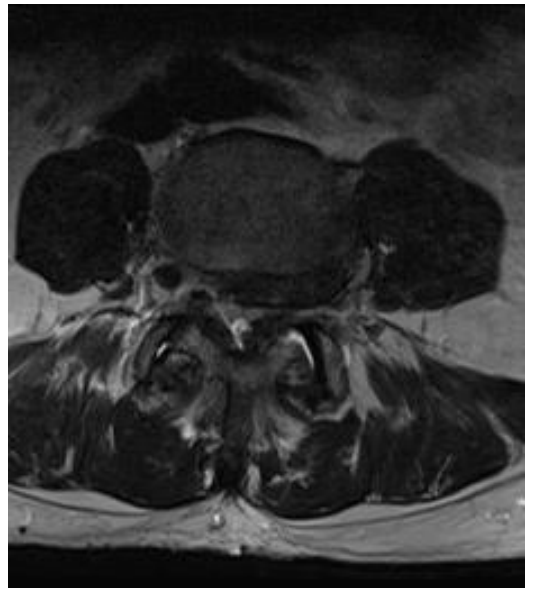


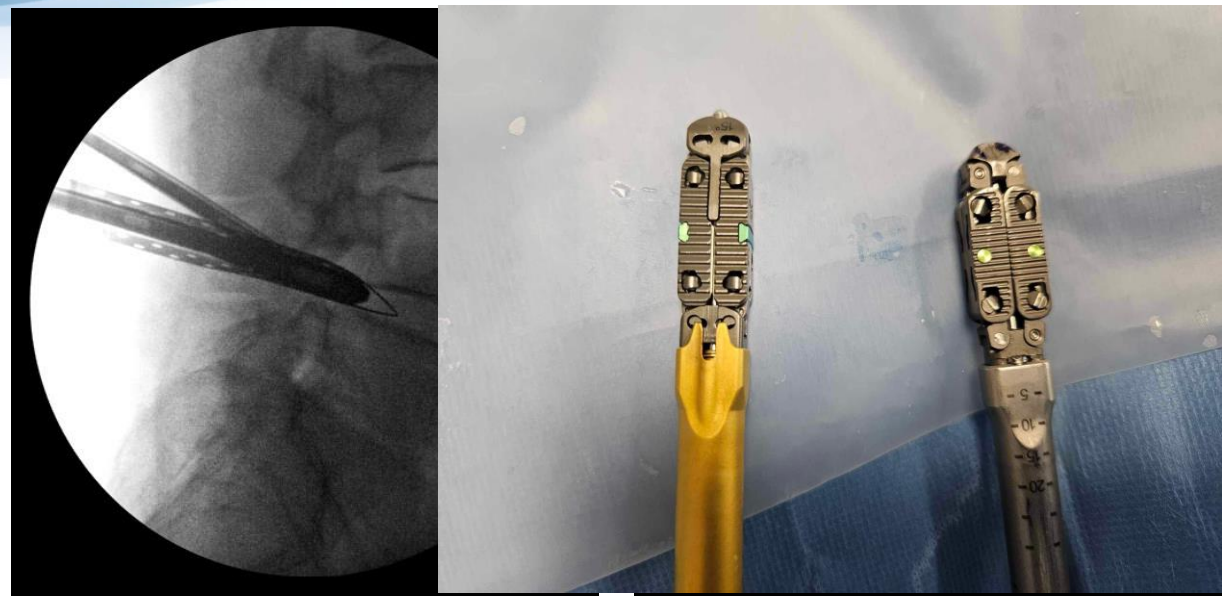


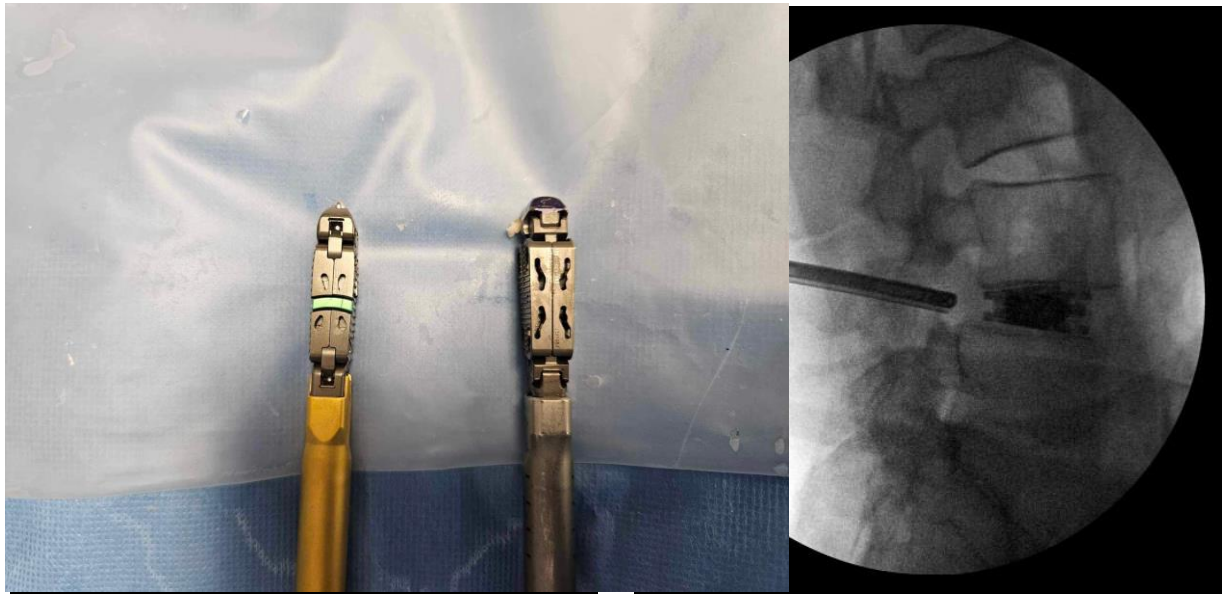
Case Presentation

- 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

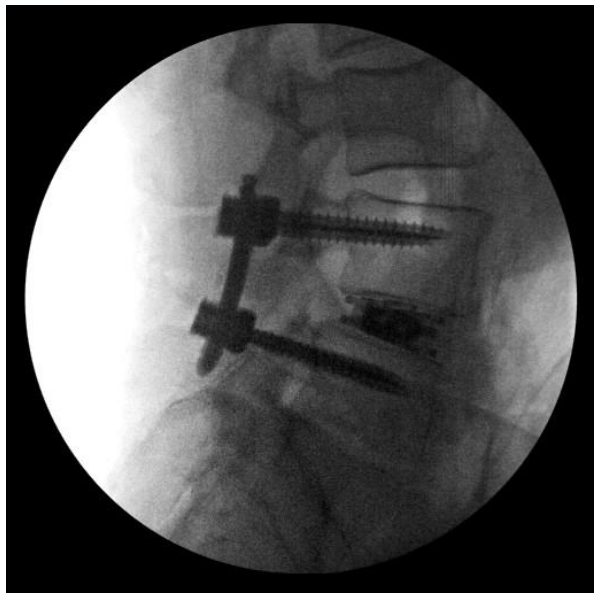


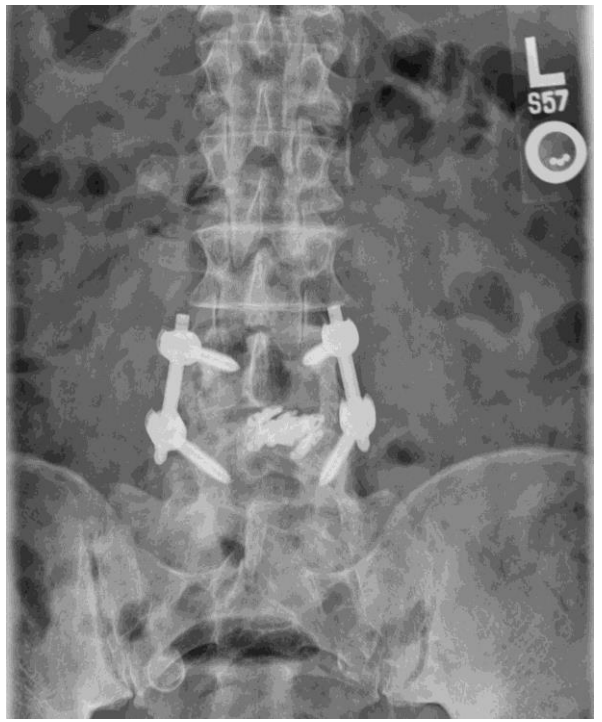






- Initial dimensions: 8 mm height, 10 mm width, 40 mm length
- Final dimensions: 11 mm height, 20 mm width, 23 mm length
  15 degrees of lordosis





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

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

Don Young Park[1], Dong Hwa Heo[2]

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

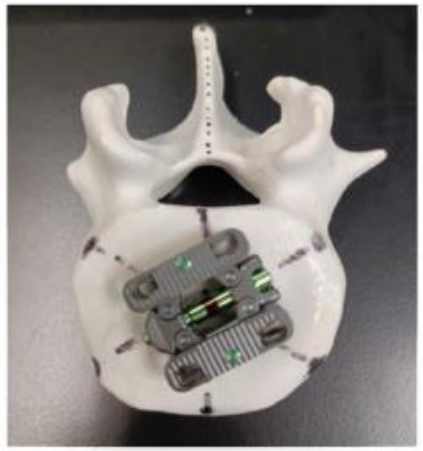
Values are presented as mean ± standard deviation.
*$p < 0.05$.

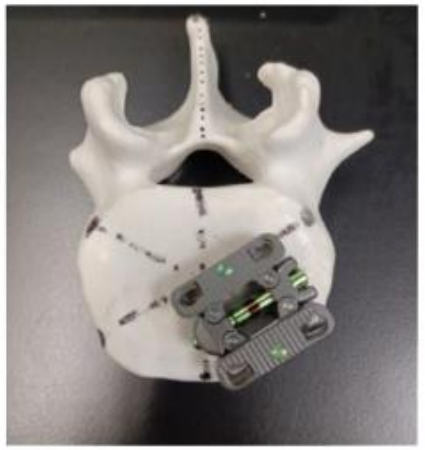
Influence of Placement of Lumbar Interbody Cage on Subsidence Risk: Biomechanical Study

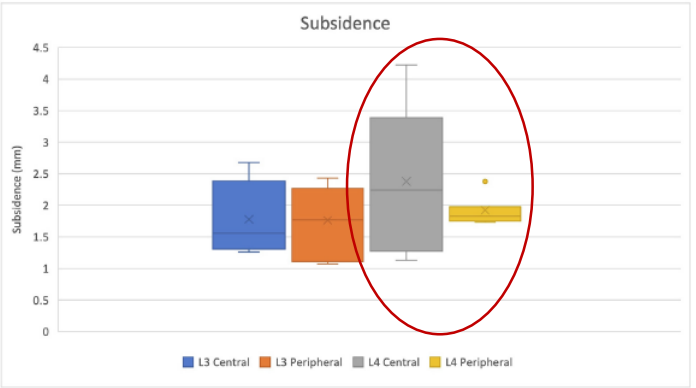
Henintsoa Fanjaniaina Andriamifidy[1], Matthew Rohde[2], Pooja Swami[1], Haixiang Liang[1], Daniel Grande[1], Sohrab Virk[3]

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[a,#], Ki-Han You, MD[b,#], Jun-Young Choi, MD[b], Dong-Hwa Heo, MD[c], Hoon-Jae Chung, MD[a], Hyun-Jin Park, MD[b,*]

The Spine Journal 21 (2021) 2066–2077

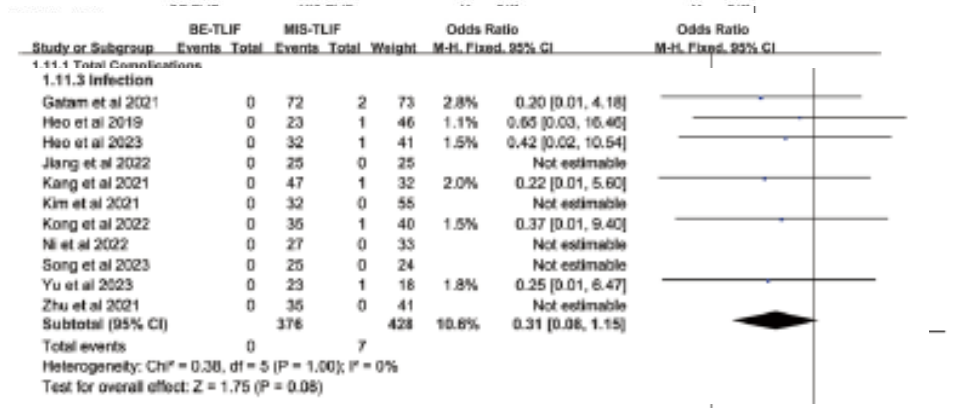
- MIS TLIF vs dualPortal TLIF, at least 1 year followup
- VAS scores and ODI scores significantly improved after surgery in both groups
  - Greater improvements in VAS Back and SF-36 at 1 month postop in dualPortal TLIF vs MIS TLIF
  - No significant difference in VAS, ODI, SF-36 between groups at 6 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[1†], Cong Peng[1†], Kai Liu[2] and Xinghua Song[1*]

Journal of Orthopaedic Surgery and Research (2023) 18:888
https://doi.org/10.1186/s13018-023-04393-1

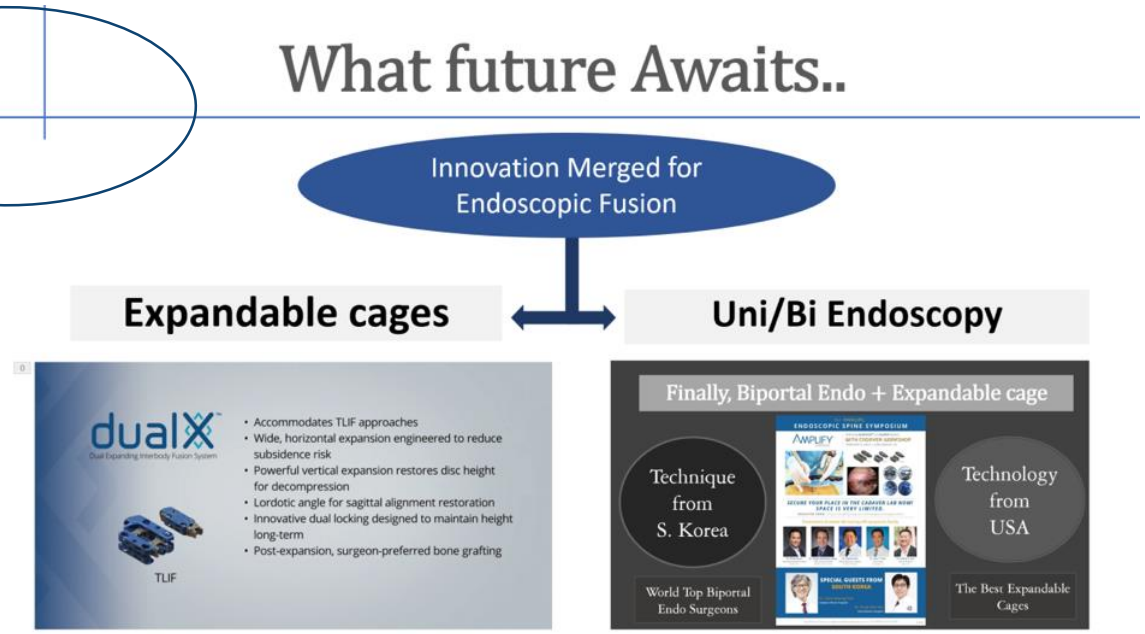
- 14 studies, 1007 patients
  - 472 biportal TLIF, 535 MIS TLIF
- Biportal TLIF with lower intraoperative blood loss, postop drainage
- MIS TLIF with less surgical time
- VAS Back, Leg, ODI favored biportal
- Total complications, infections favored biportal
- No difference in fusion rate, radiographic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

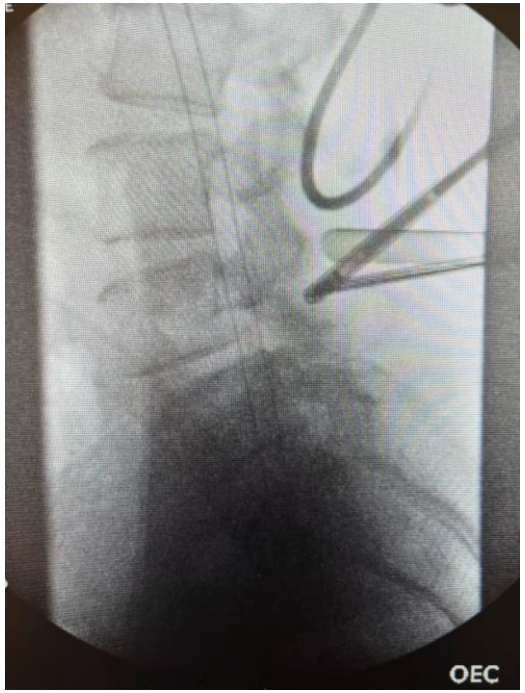


dualLIF: dualPortal + dualX

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

Luke Jin Sung Kim





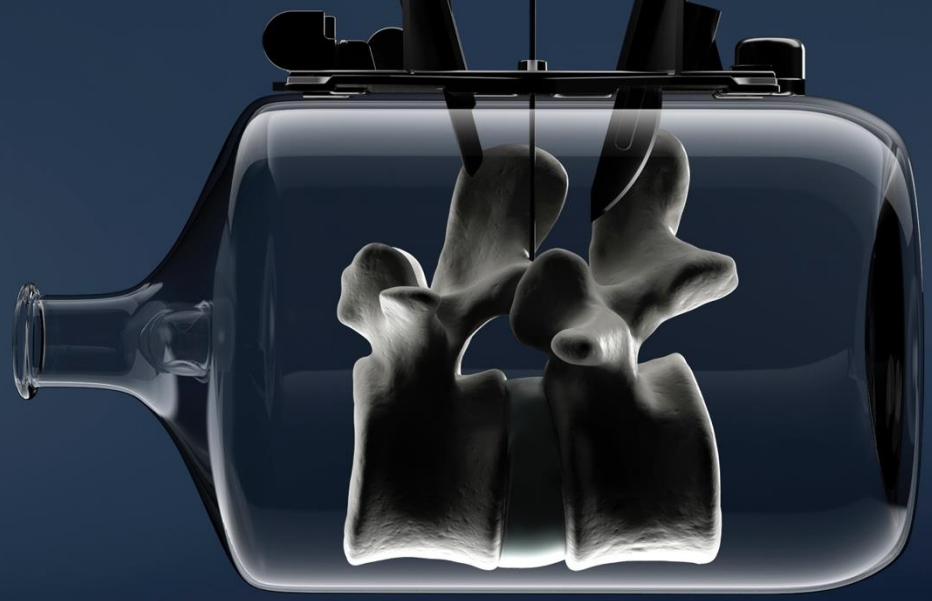
Introducing

dualPortal® 2.0

ENDOSCOPIC SYSTEM

DESIGNED TO BE SEEN

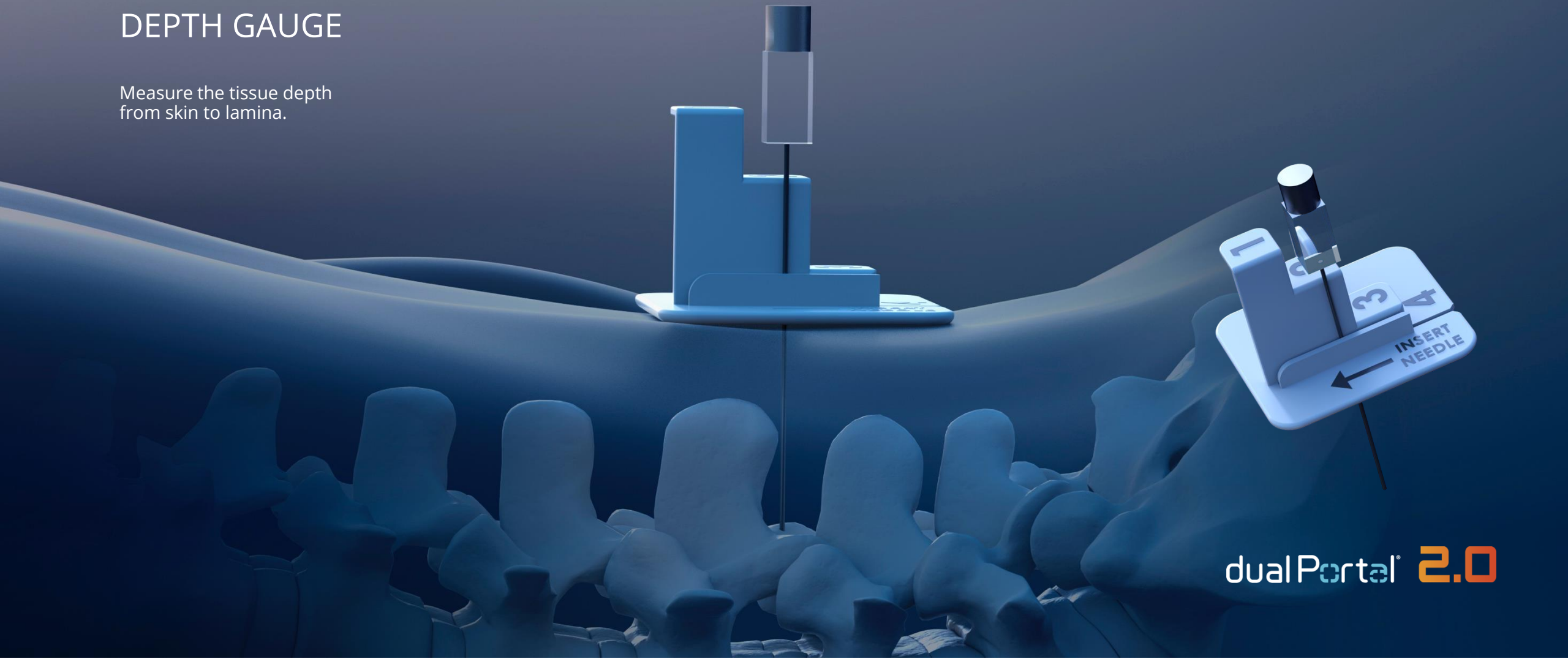
A COMPREHENSIVE SOLUTIONFROM O.R. PREP TO FINAL CLOSE



AMPLIFY® SURGICAL

DEPTH GAUGE

Measure the tissue depth
from skin to lamina.



dualPortal® 2.0

MULTI-PURPOSE GUIDE

Provide controlled guidance on proper position, angle, and depth for creating the two incisions needed for dualPortal® surgery

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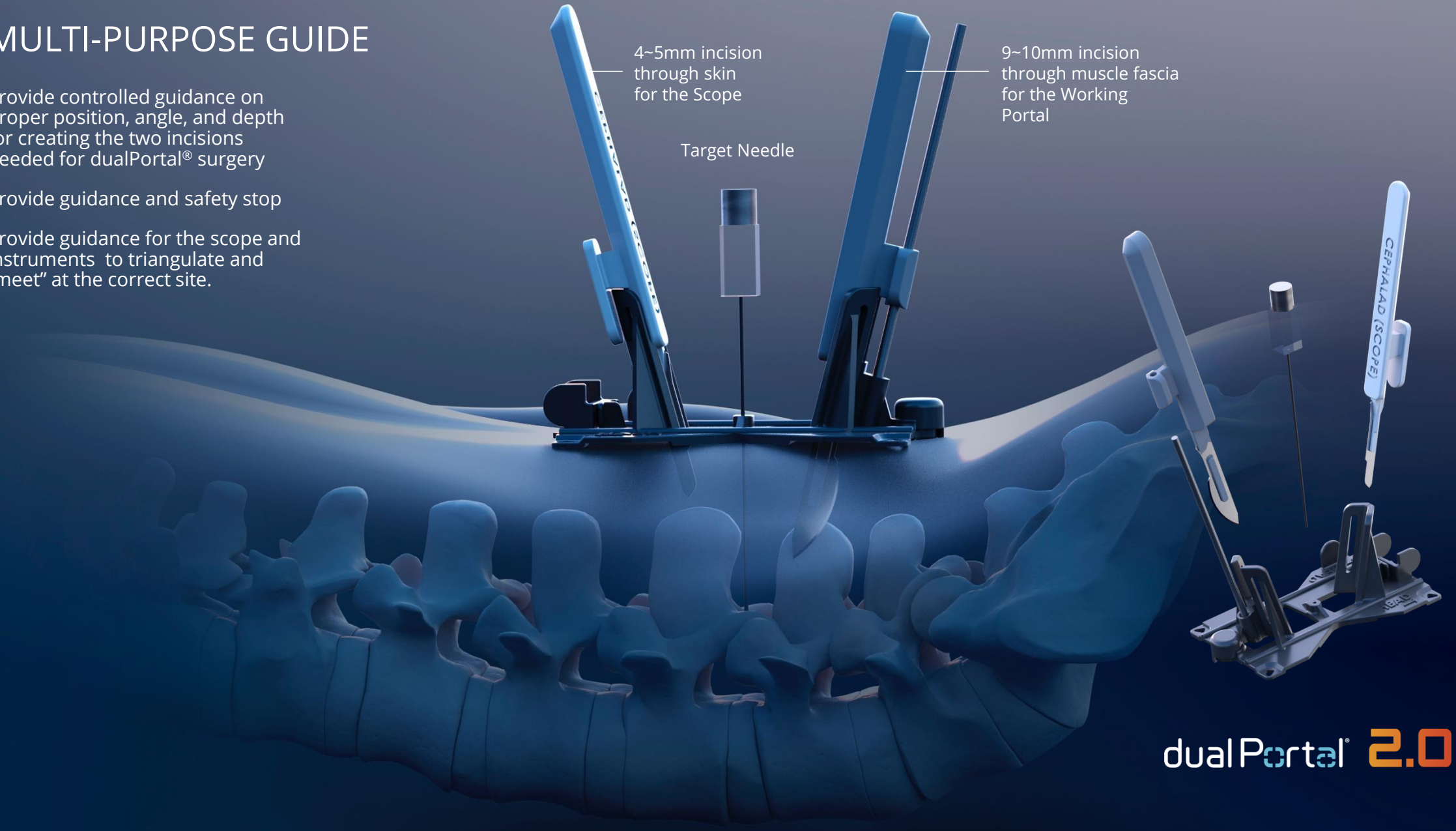
Provide guidance for the scope and instruments to triangulate and “meet” at the correct site.



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ANGLE GUIDE

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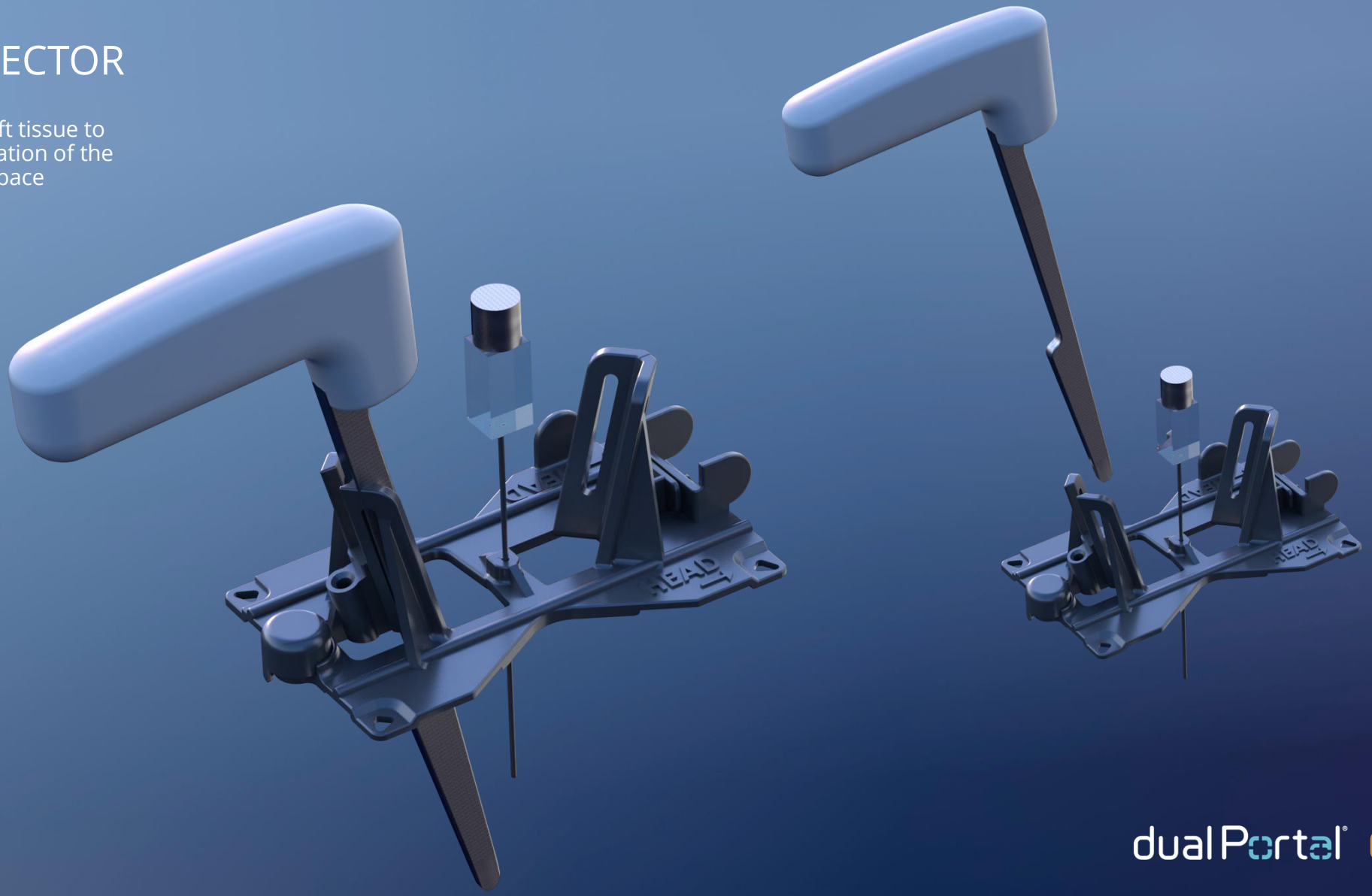
TISSUE DISSECTOR

Dissect and loosen soft tissue to prepare space for creation of the endoscopic working space



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ERGONOMIC SCOPE HANDLE

Ergonomic Scope Handle to distribute weight and provide support

Detachable Stabilizer Legs for additional support

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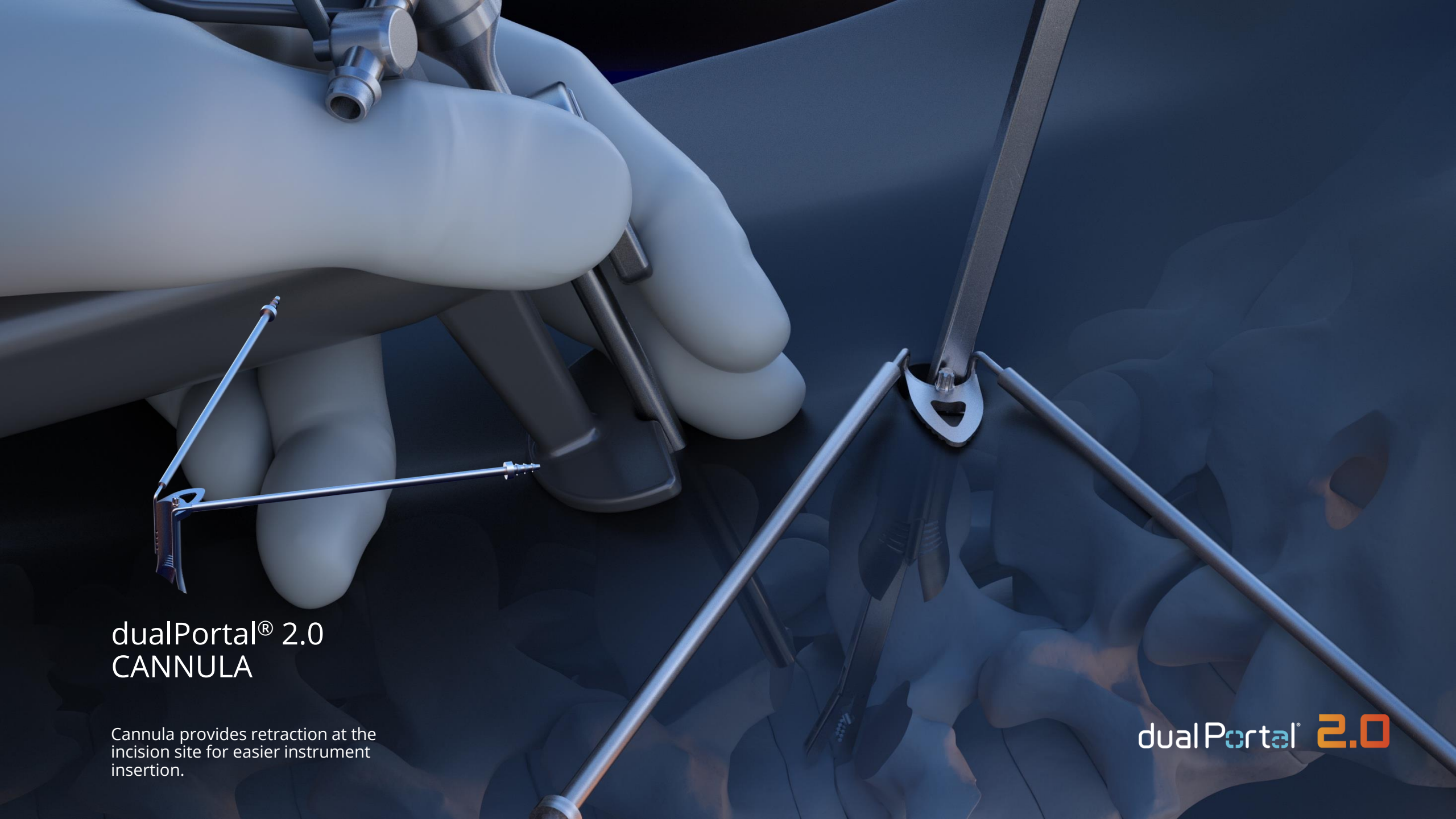

dualPortal® 2.0 CANNULA

Cannula provides retraction at the incision site for easier instrument insertion.

dualPortal® 2.0

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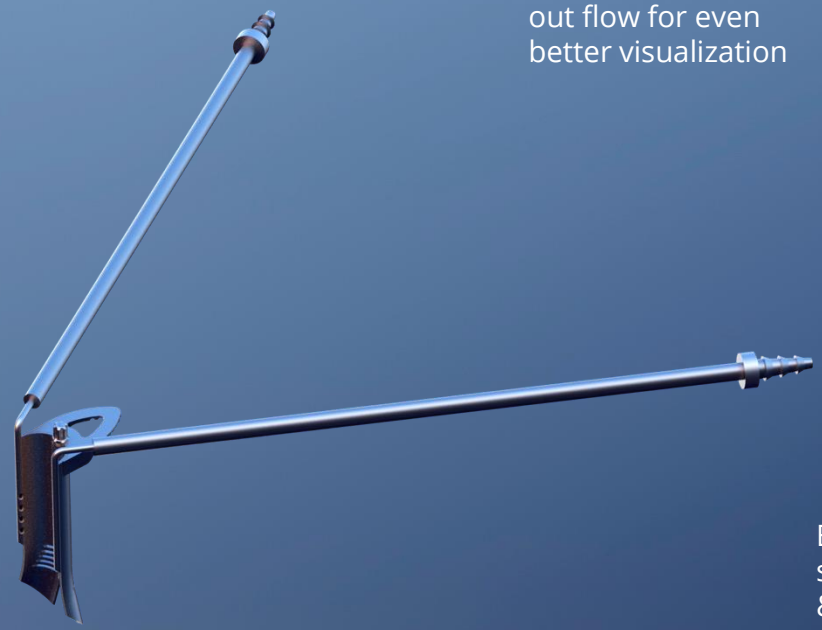
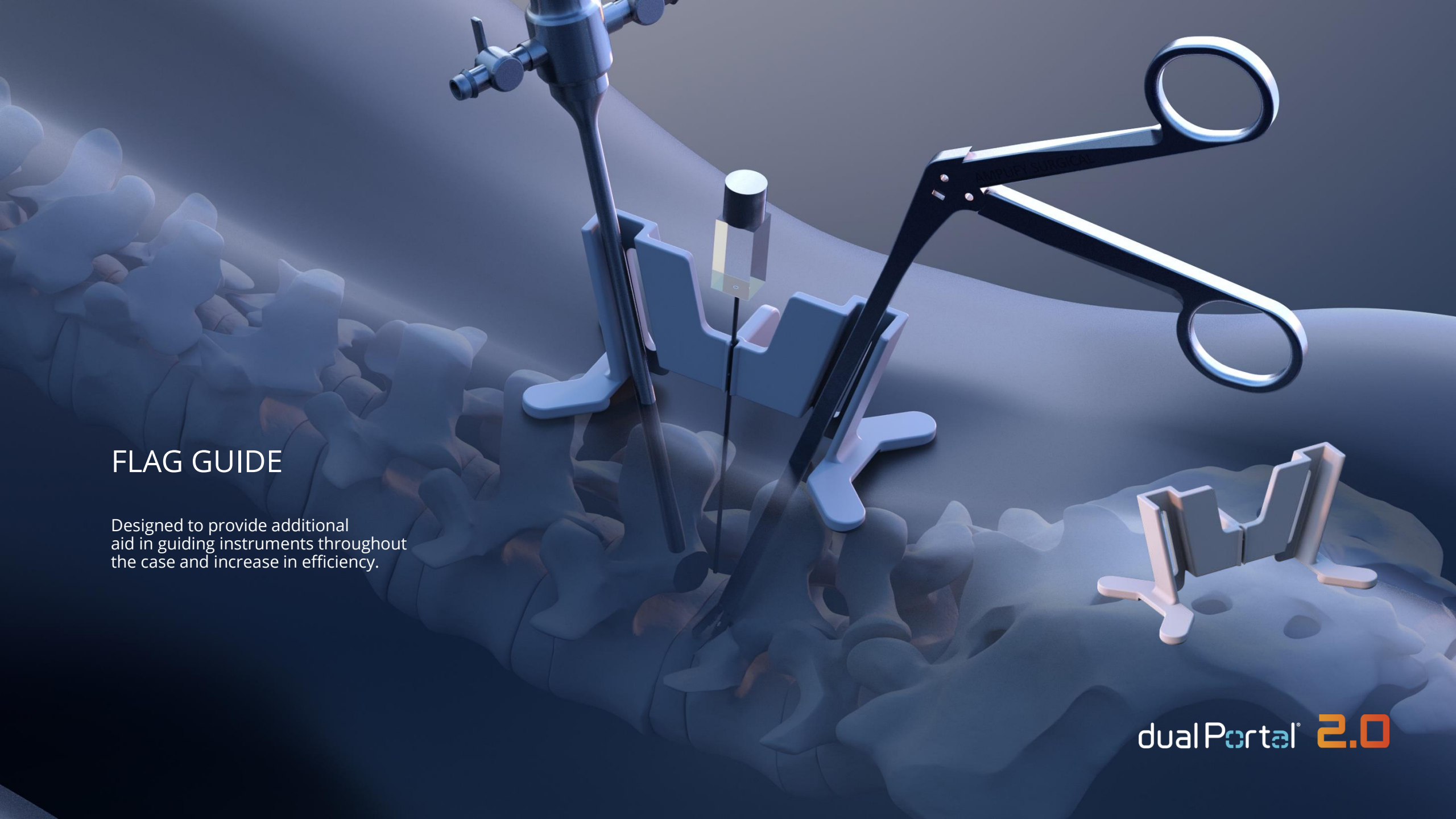


Active in-flow and out flow for even better visualization

Expanding tip for secure placement & retention.

Distal flare for additional soft tissue retraction

dualPortal® 2.0



FLAG GUIDE

Designed to provide additional aid in guiding instruments throughout the case and increase in efficiency.

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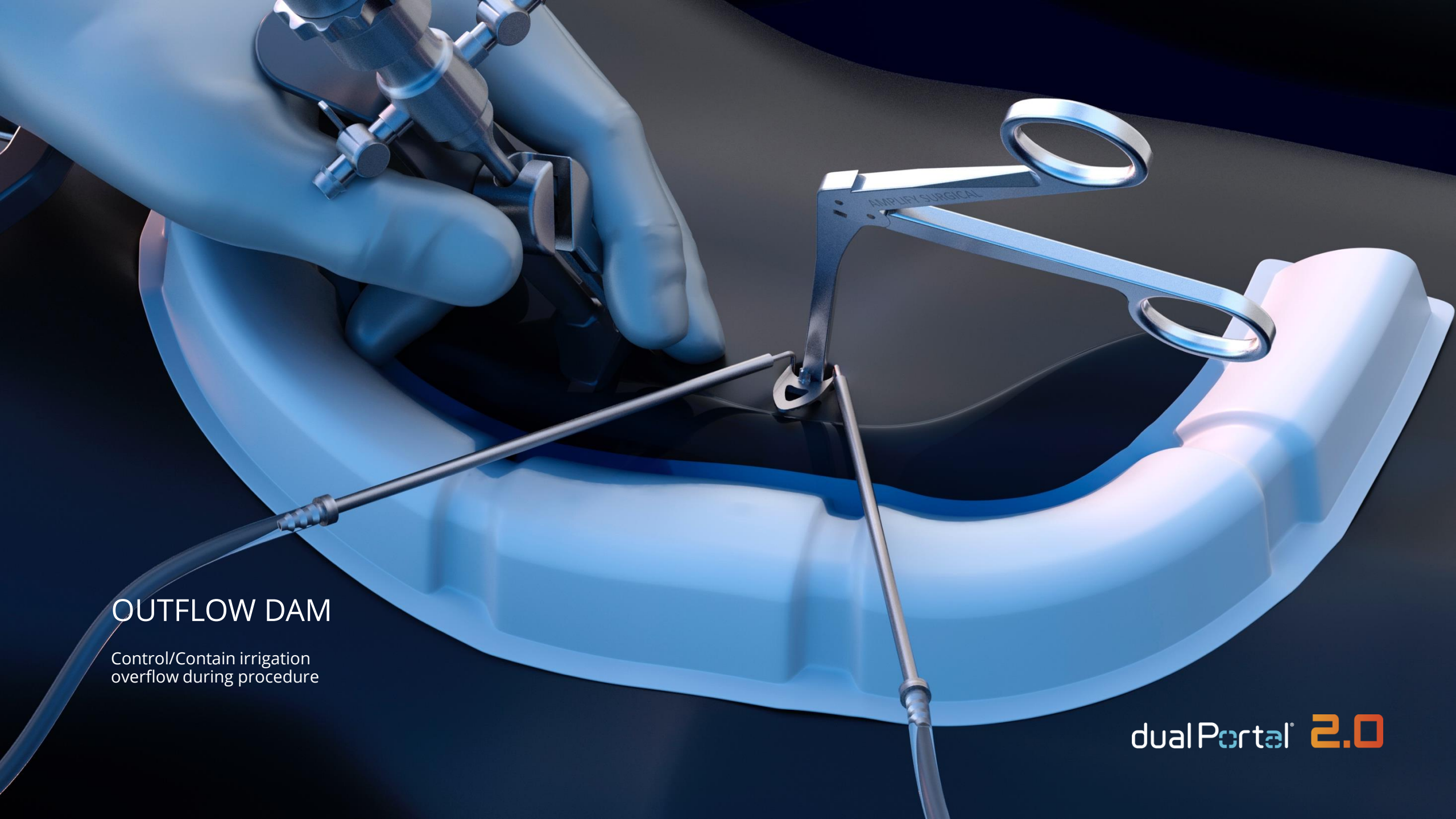
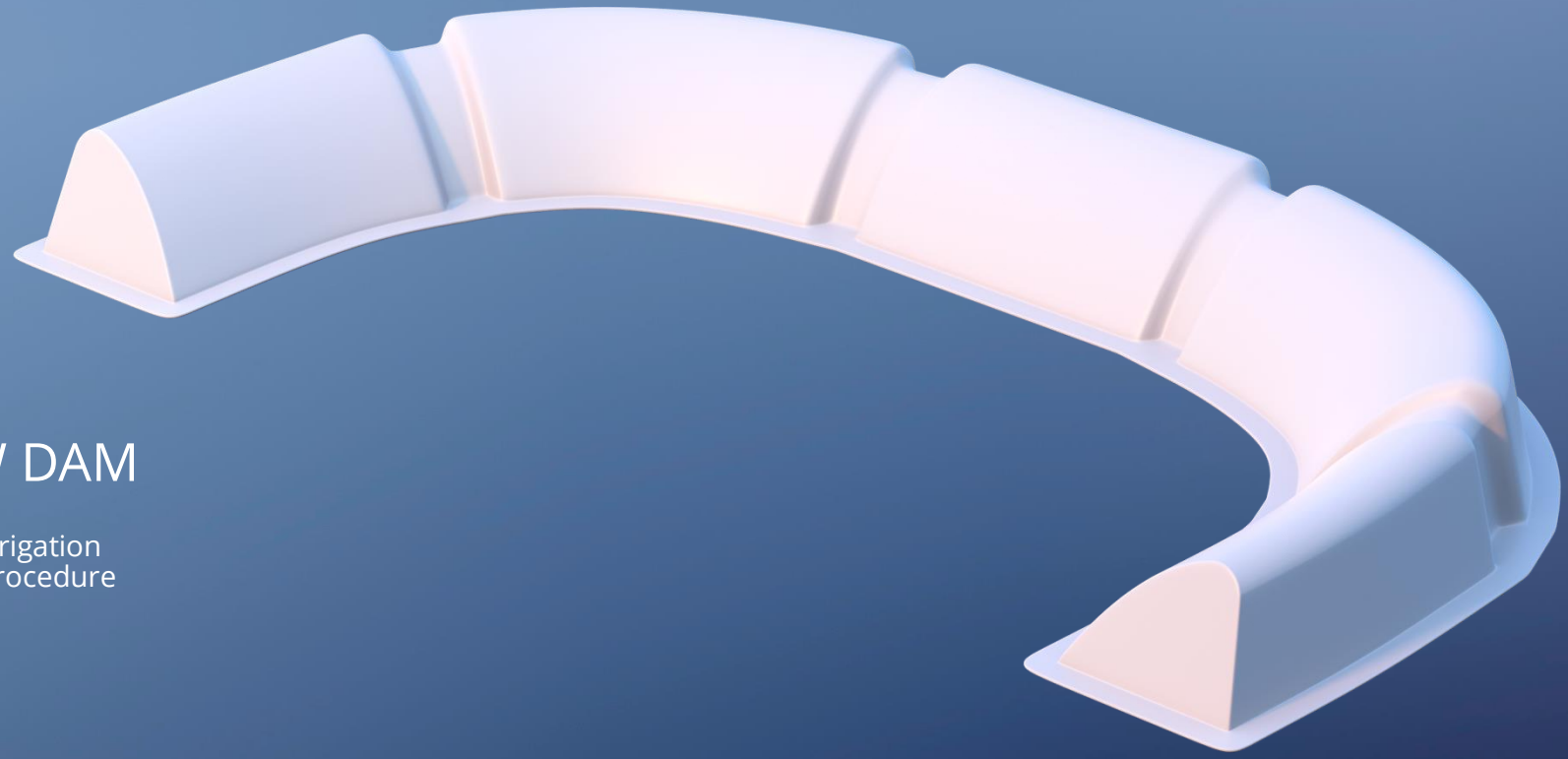


OUTFLOW DAM

Control/Contain irrigation
overflow during procedure

dualPortal® 2.0



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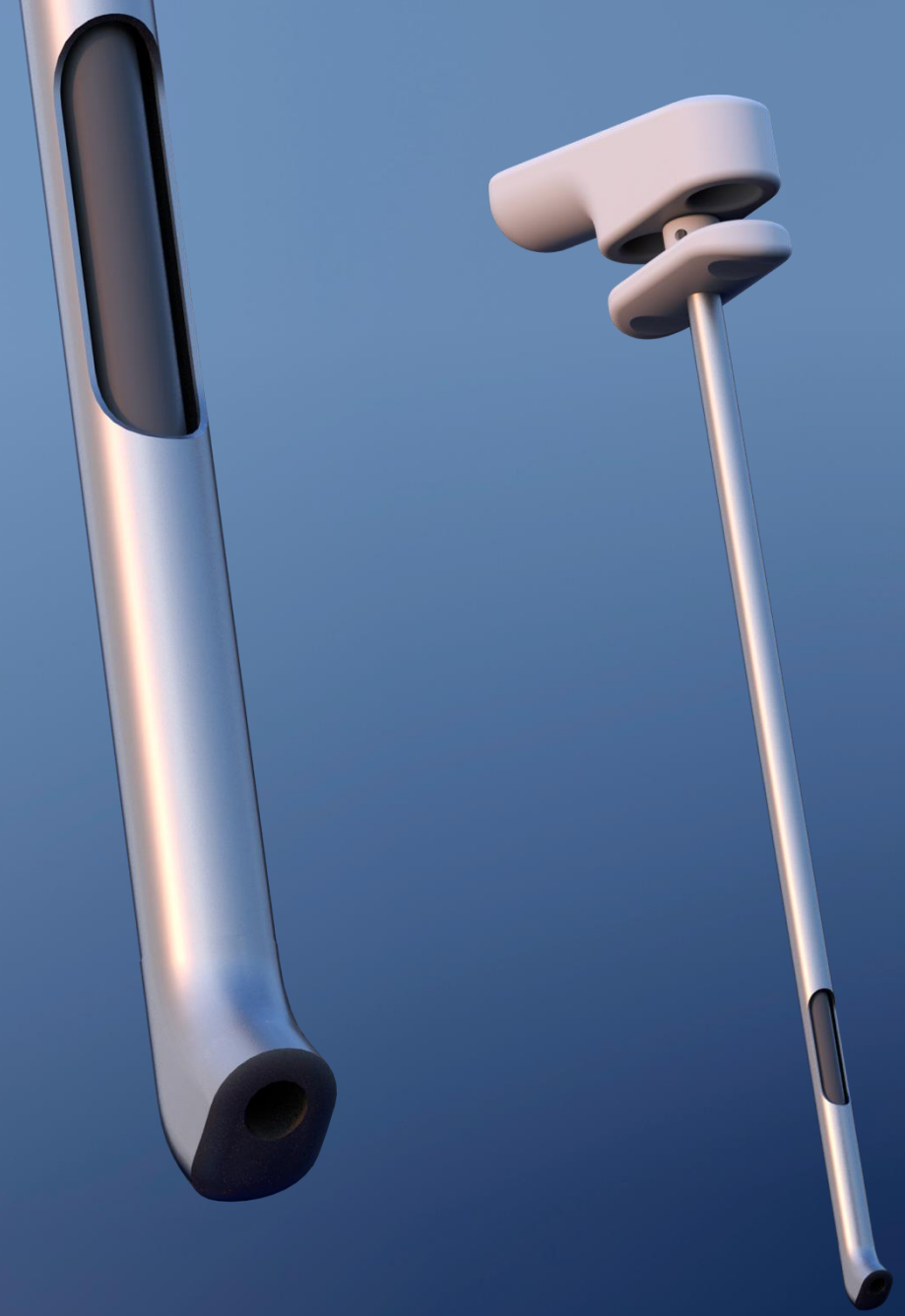
BONE WAX DISPENSER

A syringe-type instrument to dispense small amount of bone wax at the tip and apply it to bleeding bone.

Unique bone conforming tip.



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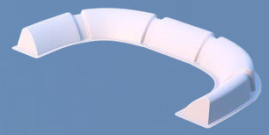

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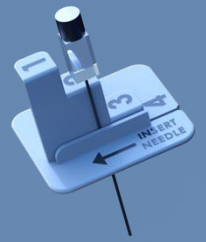

DEPTH GAGE

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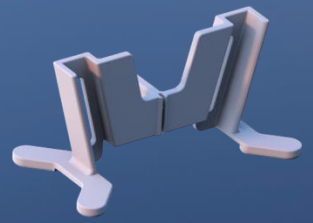

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