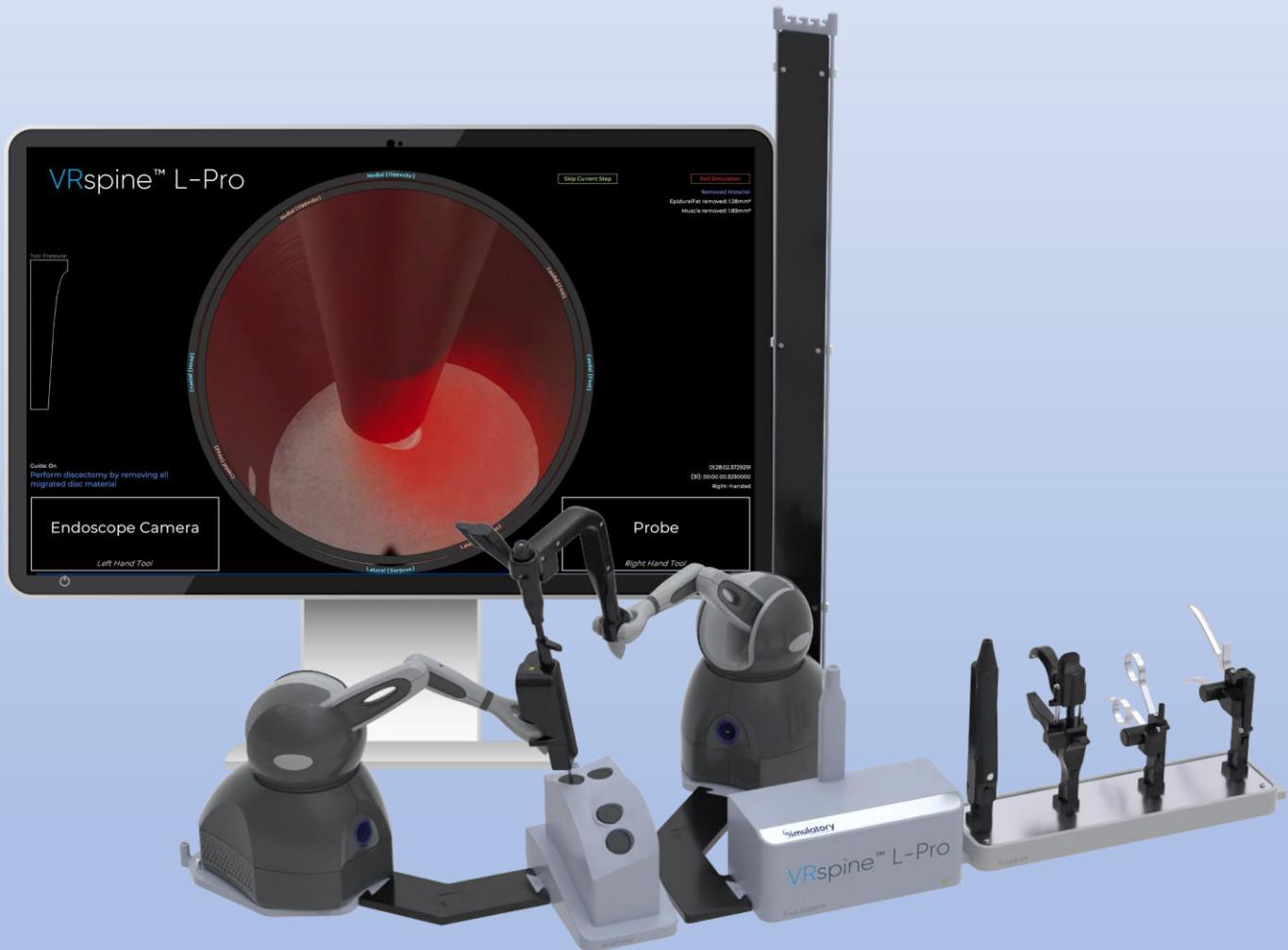


# VRspine™ L-Pro

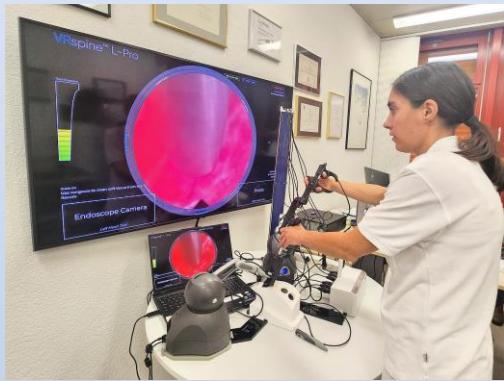
## The Smart Digital Simulator for Lumbar Spine Endoscopy



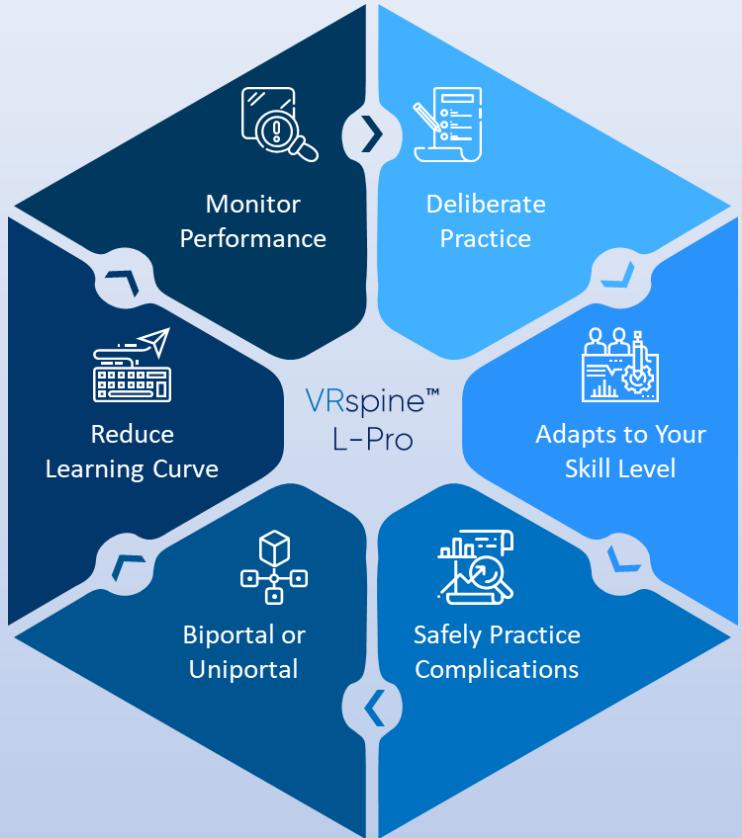
# Digital Learning Experience

VRspine™ L-Pro is a professional high-fidelity digital simulator for Lumbar Spine Endoscopy built on Simulatory's Smart Simulation Platform.

VRspine™ L-Pro provides advanced digital training for spine surgeons looking to learn or perfect endoscopic spine surgery using either a biportal or uniportal approach.



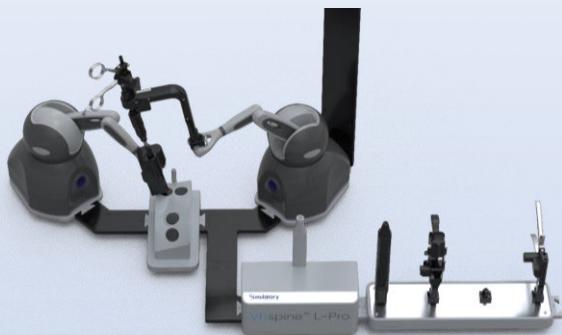
Focused, deliberate practice can help reduce the learning curve thanks to realistic visualization, realistic surgical instrument handling and realistic 3D haptic feedback that mimic the operating room experience.



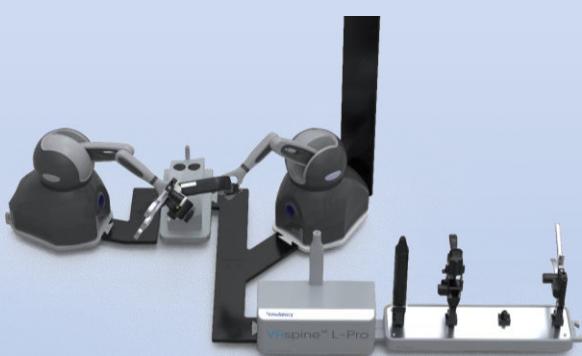
# Modular Setup Extends Functionality

Practice with realistic surgical instruments to reduce the learning curve.

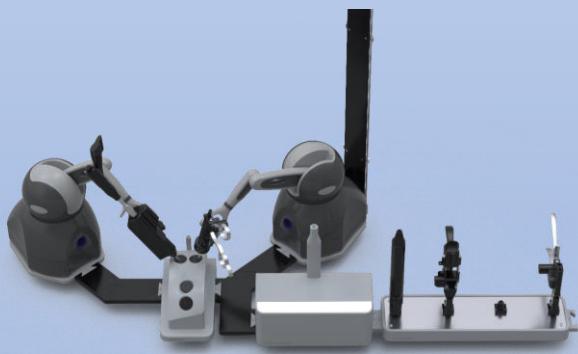
Modular puzzle pieces can be arranged in biportal or uniportal configurations.



## Uniportal Interlaminar Approach



## Uniportal Transforaminal Approach



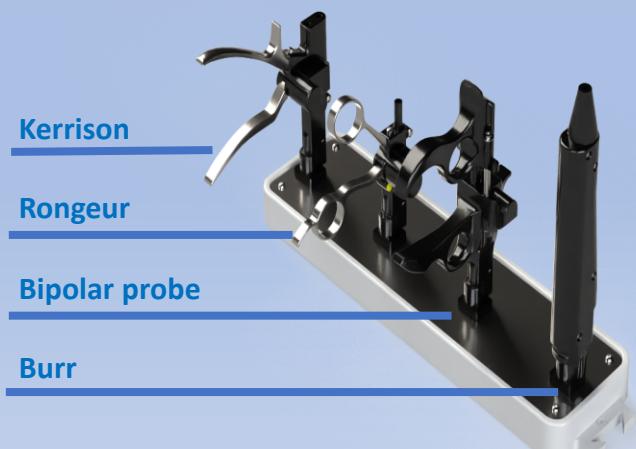
## Biportal Approach

- Automatic instrument detection technology senses which instrument has been selected and tracks its movement.
- One-handed operation of surgical instruments frees the other hand to hold the endoscope/sleeve.
- Choice of Kerrison, rongeur, bipolar probe or burr.
- Allows for quick switch between instruments.
- VRspine™ L-Pro can be set-up for left-handed or right-handed surgeons.
- No need for consumables.



Endoscope

Sleeve



Kerrison

Rongeur

Bipolar probe

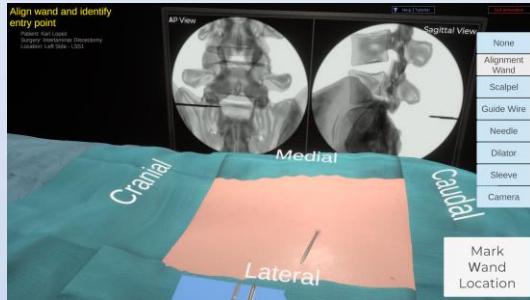
Burr

# Perfect Your Skills in Safe Environment

Whether starting to learn or already at an advanced level VRspine™ L-Pro provides flexible training anytime, anywhere.

## Practice Navigation

Simulated X-ray navigation helps locate the correct incision point without exposure to radiation.



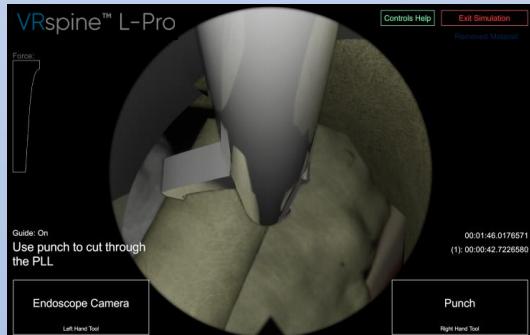
## Build Competence

Training on advanced endoscopic lumbar spine procedures builds competence and confidence.



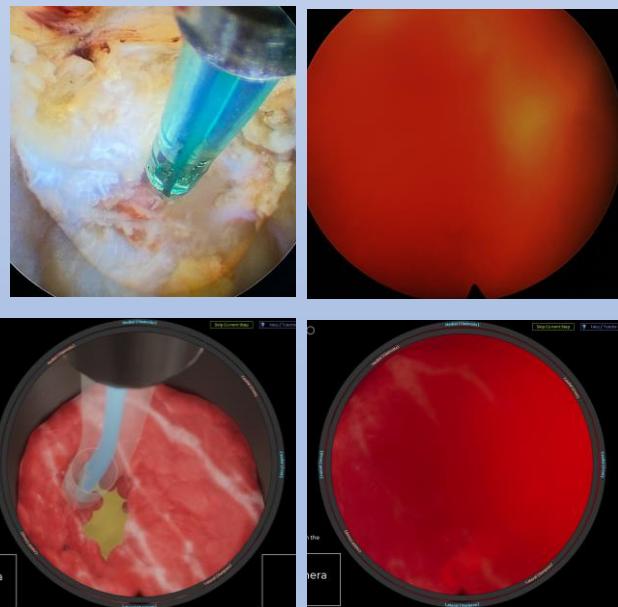
## Follow Guidance

The AI Mentor walks you through each step providing instructions on what to do and helpful hints.



## Train Visualization

The endoscopic view helps you visualize key anatomic landmarks and handle realistic surgical instruments in the restricted surgical space.



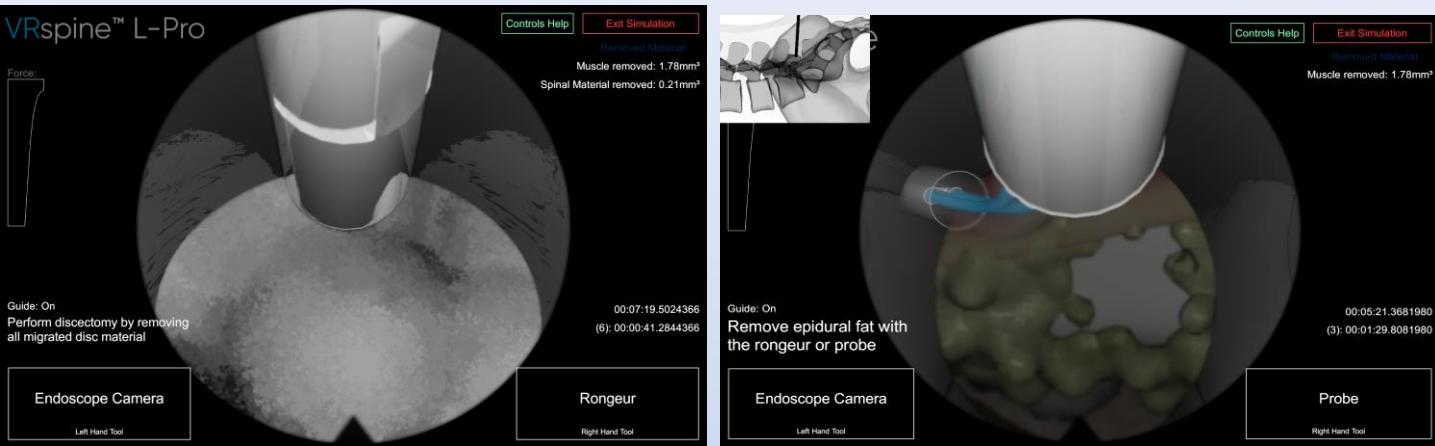
## Manage Complications

Practice complications like uncontrolled bleeding which mimic real scenarios but in a safe environment

# Train on Multiple Modules

Choice of different modules for interlaminar, transforaminal or spinal stenosis based on patient history and X-rays.

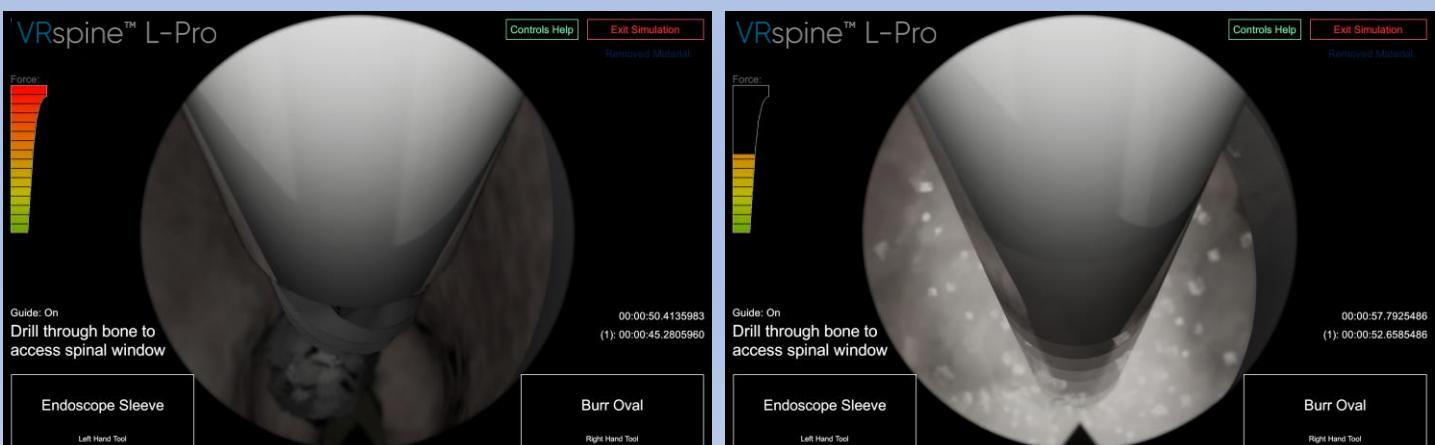
## Interlaminar Endoscopic Spine Surgery



## Transforaminal Endoscopic Spine Surgery



## Spinal Stenosis



# Adaptive Training & Deliberate Practice

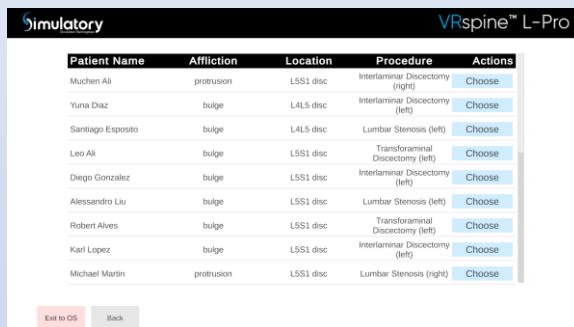
VRspine™ L-Pro offers unlimited training opportunities with realistic visuals, realistic surgical instruments and realistic haptic feedback.

## Unlimited Training

A vast library of over 700 patient cases with varying degrees of difficulty simulate unique scenarios to keep you challenged and engaged.

## Focused Training

VRspine™ L-Pro lets you focus on specific tasks before progressing to the next step with each scenario adjusted to your skill level.

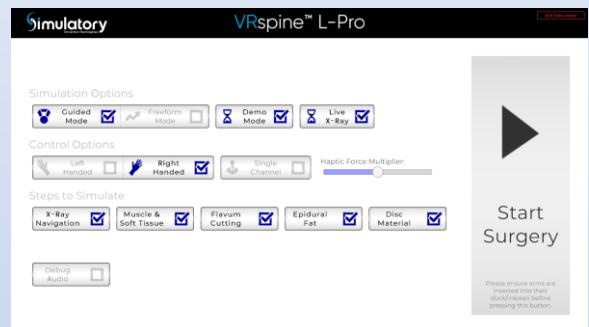


The screenshot shows a table of patient cases with columns for Patient Name, Affliction, Location, Procedure, and Actions. Each row has a 'Choose' button. At the bottom are 'Exit to OS' and 'Back' buttons.

Patient Name	Affliction	Location	Procedure	Actions
Muchen Ali	protrusion	L5S1 disc	Interlaminar Discectomy (left)	Choose
Yuna Diaz	bulge	L4L5 disc	Interlaminar Discectomy	Choose
Santiago Esposito	bulge	L4L5 disc	Lumbar Stenosis (left)	Choose
Leo Ali	bulge	L5S1 disc	Transforaminal Discectomy (left)	Choose
Diego Gonzalez	bulge	L5S1 disc	Interlaminar Discectomy (left)	Choose
Alessandro Liu	bulge	L5S1 disc	Lumbar Stenosis (left)	Choose
Robert Alves	bulge	L5S1 disc	Transforaminal Discectomy (left)	Choose
Karl Lopez	bulge	L5S1 disc	Interlaminar Discectomy (left)	Choose
Michael Martin	protrusion	L5S1 disc	Lumbar Stenosis (right)	Choose

## Immediate Feedback

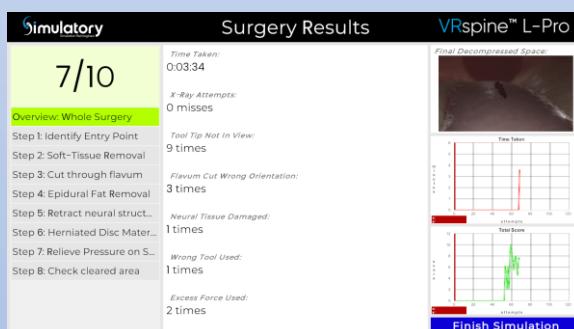
Intelligent performance metrics track your progress and provide feedback reports after every trial.



The screenshot shows the 'Simulation Options' screen with checkboxes for Guided Mode, Demo Mode, and Live X-Ray. It also shows 'Control Options' for Left Handed, Right Handed, and Single Channel. Below are 'Steps to Simulate' checkboxes for X-Ray Navigation, Muscle & Soft Tissue, Plasm Cutting, Epidural Fat, and Disc Material. At the bottom is a 'Start Surgery' button with a warning message: 'Please ensure gloves are inserted into their glove boxes before pressing this button.'

## Unguided Approach

For advanced learning, train on patient cases without any guidance or helpful hints.



The screenshot shows a 'Surgery Results' summary with a score of 7/10. It includes an 'Overview: Whole Surgery' section with a timeline of steps: Step 1: Identify Entry Point, Step 2: Soft-Tissue Removal, Step 3: Cut through flavum, Step 4: Epidural Fat Removal, Step 5: Retract neural struct., Step 6: Herniated Disc Mater., Step 7: Relieve Pressure on S., Step 8: Check cleared area. It also shows 'X-Ray Attempts: 0 misses', 'Total Tip Not In View: 9 times', 'Flavum Cut Wrong Orientation: 3 times', 'Neural Tissue Damaged: 1 times', 'Wrong Tool Used: 1 times', and 'Excess Force Used: 2 times'. To the right is a 'Final Decompressed Space' image and a performance graph showing 'Time Taken' and 'Total Score' over 10 attempts. A 'Finish Simulation' button is at the bottom.



**“VRspine™ L-Pro has the potential to significantly reduce the learning curve of endoscopic spine surgery and will become essential in the training of spine surgeons.”**

**Dr. Ralf Wagner**  
**Ligamenta Spine Center**  
**Frankfurt, Germany**

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