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Advances in Robotic Technology

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Disclosure

No Financial Relationships With Any of the Companies and Their Products

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Do I Love of Intuitive?

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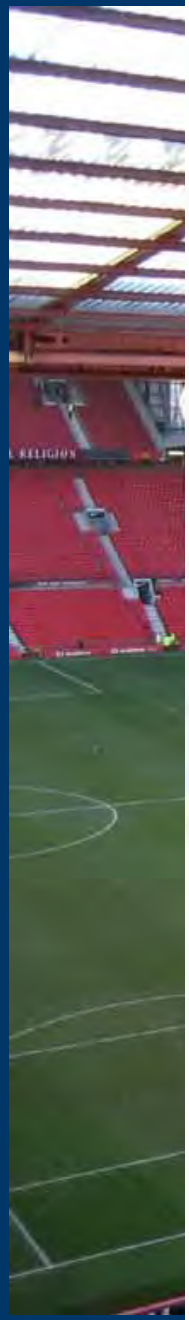

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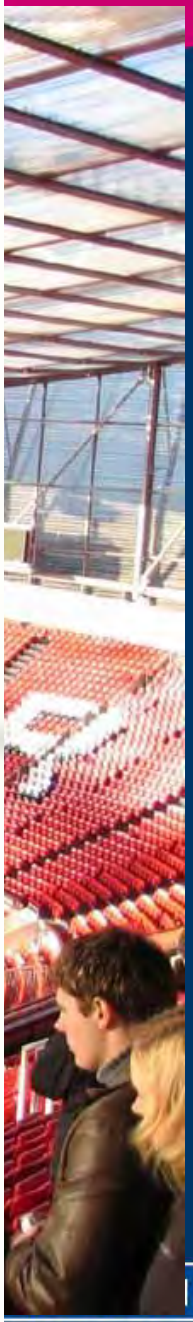

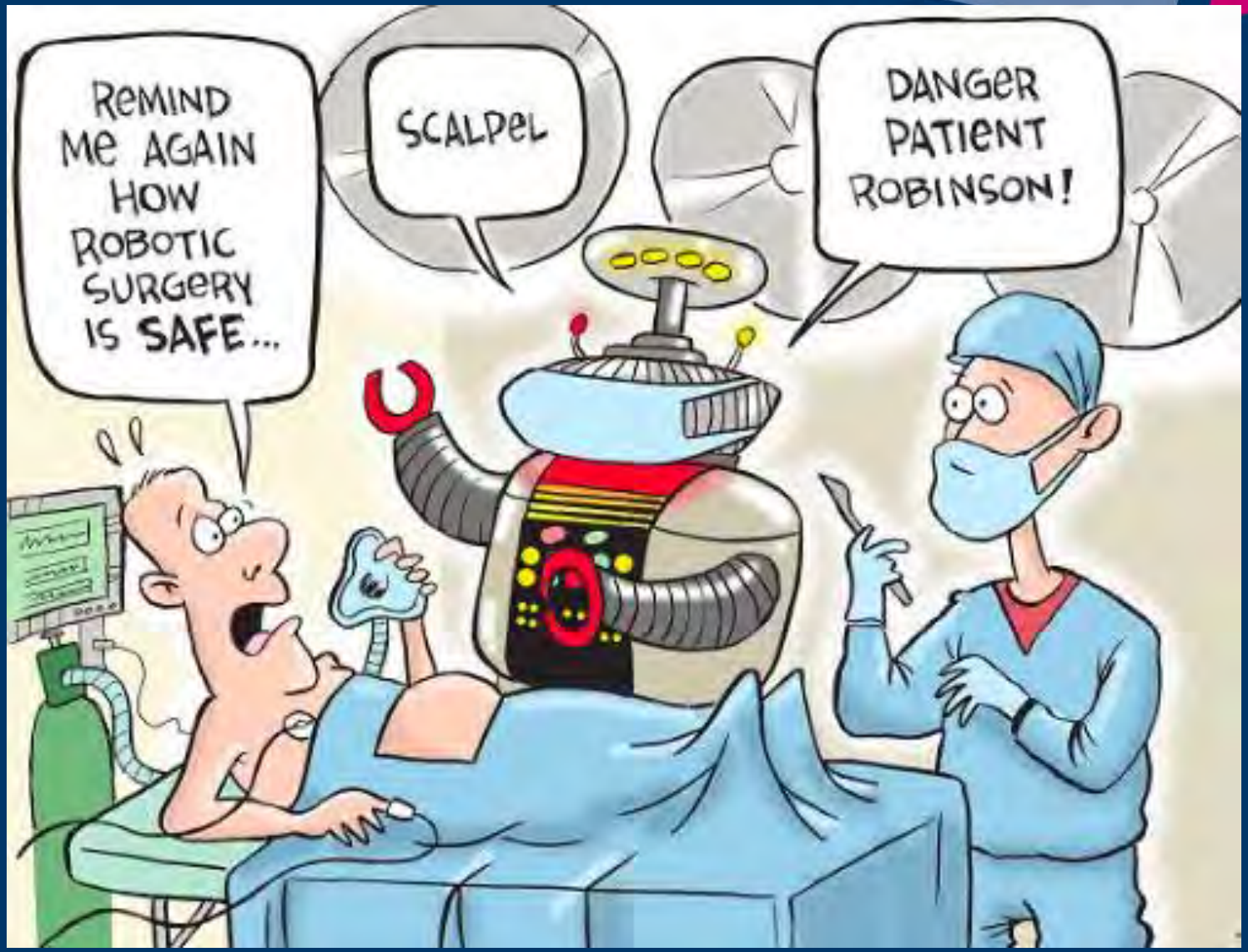

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Why Robotics

- Less pain
- Faster recovery
- Less wound complications
- Less infections
- Less Blood loss and transfusions
- Shorter Hospital Stay

Technology Components

- Hardware, size
- Ergonomics
- Imagery
- Simulation
- Analytic Feedback on Learning Curve
- Cost

Clearly not there yet !


da Vinci S

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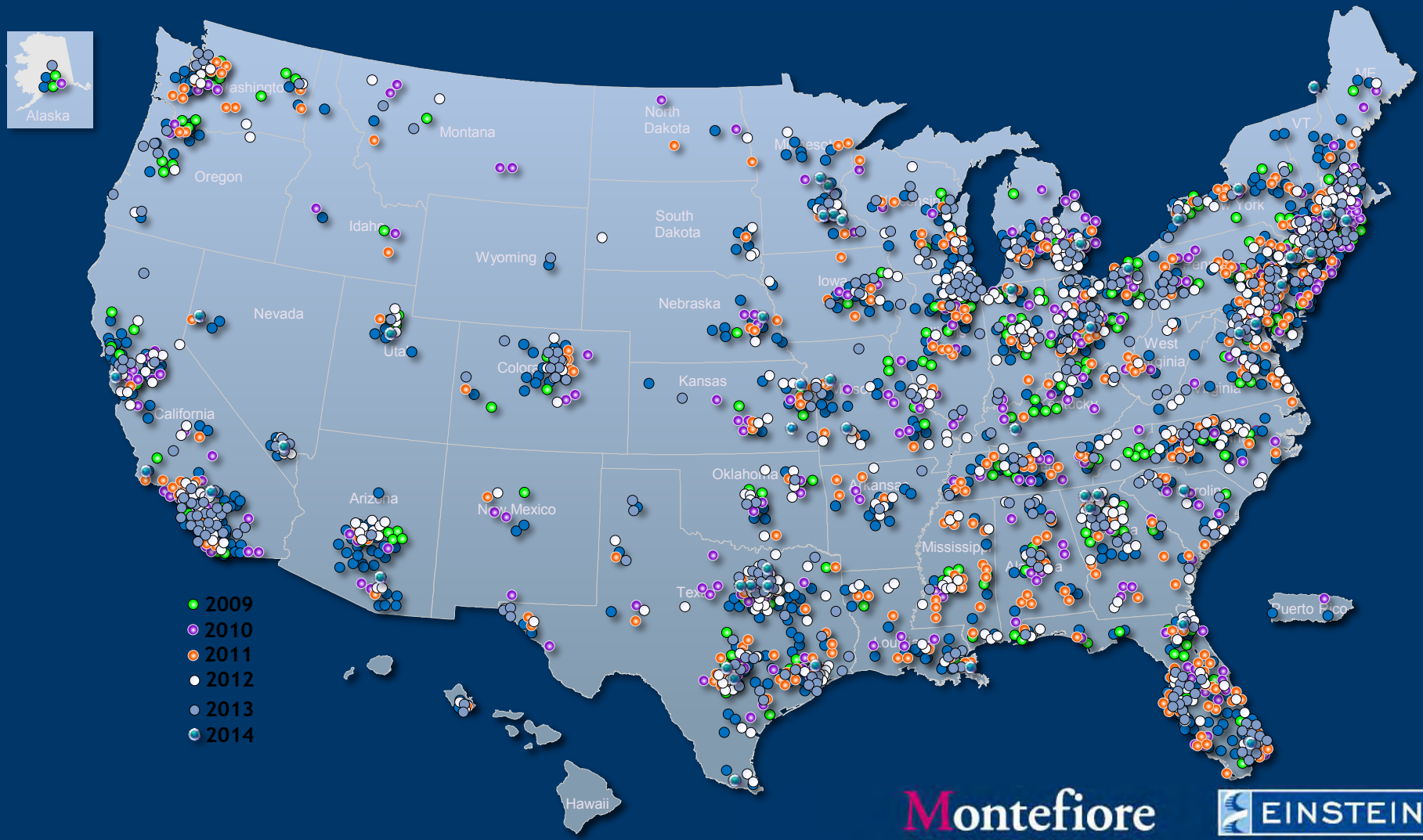
DA VINCI® SURGICAL SYSTEM U.S. CUMULATIVE INSTALLS
2009–2014



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PN 1010819 Rev A 07/14

Specialties

- Urology
- Gynecology
- Otorhinolaryngology
- General Surgery
- Cardiac and Thoracic Surgery

da Vinci Surgery

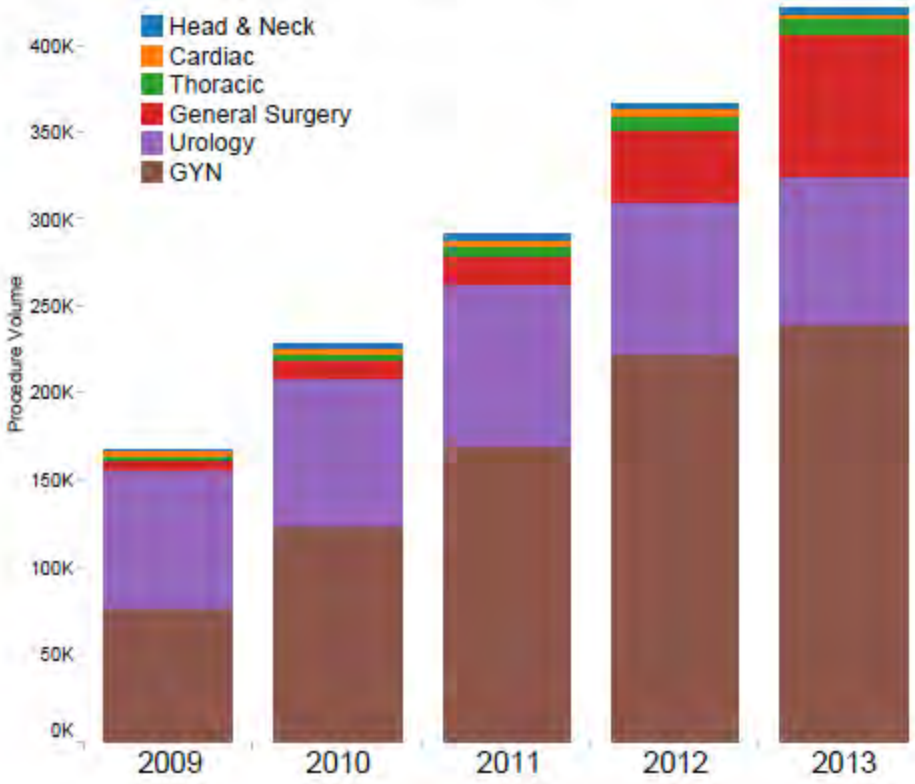
da Vinci Procedure Volume Growth Rates**

** Growth Rates are calculated as a Compound Annual Growth Rate (CAGR).

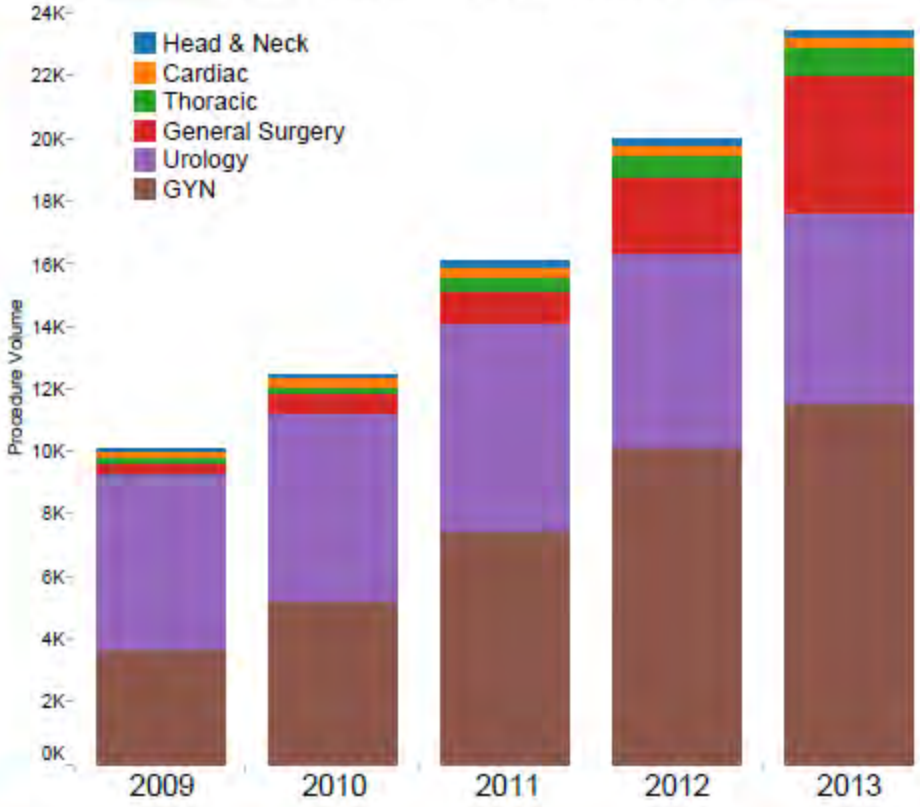
24%

NY da Vinci Procedure Growth 2009-2013

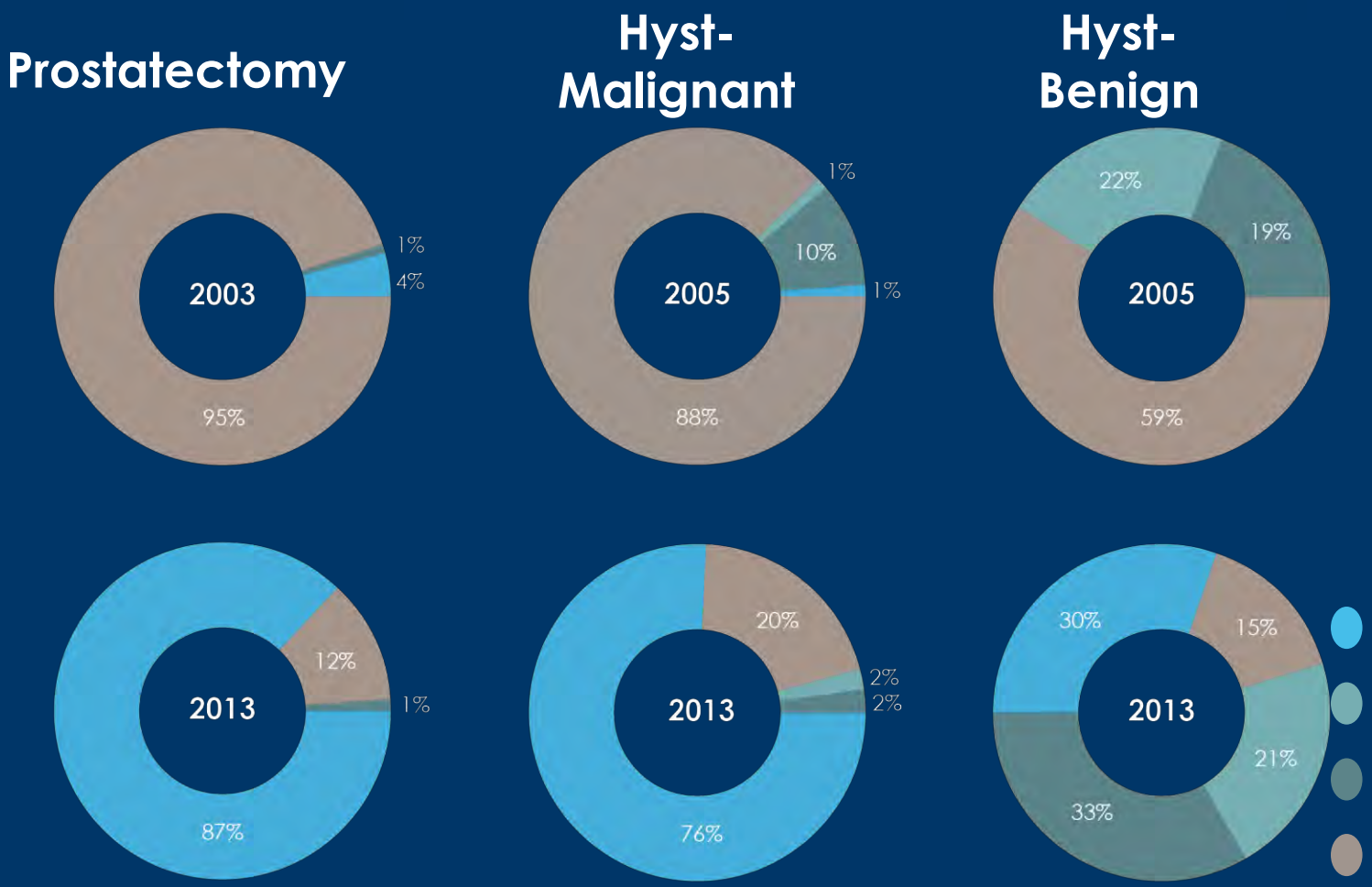
All US daVinci Procedure Volume 2009-2013



NY da Vinci Procedure Volume 2009-2013



DaVinci Surgery Has Enabled Minimally Invasive Surgery[1] in Traditionally Open Procedures



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- da Vinci is undeniably a powerful technology
- NOT PERFECT !
- There are several improvements and innovations that competitors could offer down the line that stand to greatly advance the field of robotic surgery.
- Cost of the da Vinci system a problem
- Imperative for improving value and reducing cost in accountable care

Competition

- Healthy
- Allows for more innovation
- Ultimately drives cost down

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Competitors

- Titan's Amadeus
- Titan Medical's new *SPORT* system (Single Port Orifice Robotic Technology)
- SOFAR'S Telelap ALF-X (Now Transentereix)
- The Surgibot system (Transenterix)

Titan Medical Amadeus Prototype

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Titan's *SPORT*™ Surgical System (Single Port Orifice Robotic Technology)

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Titan's *Sport* ™ Surgical System

- a surgeon-controlled single incision robotic platform that includes a 3D vision system and interactive instruments through a single incision.

- a surgeon workstation provides the surgeon with an interface to the robotic platform and also provides a 3D endoscopic view

- The design contemplates a collapsible device that, when collapsed, would be capable of being inserted into the patient's body cavity through a skin incision of approximately 25mm.

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Titan's *SPORT* ™ System

- Once inserted, the device is configured to deploy into a working configuration wherein the 3D high definition vision system and interactive multi-articulating instruments would be capable of being controlled by a surgeon at the workstation.

- Cost ~ $800,000 vs $2.1 Mil for da Vinci

Mobile Unit !

Titan Medical SPORT™

Intuitive Surgical da Vinci®

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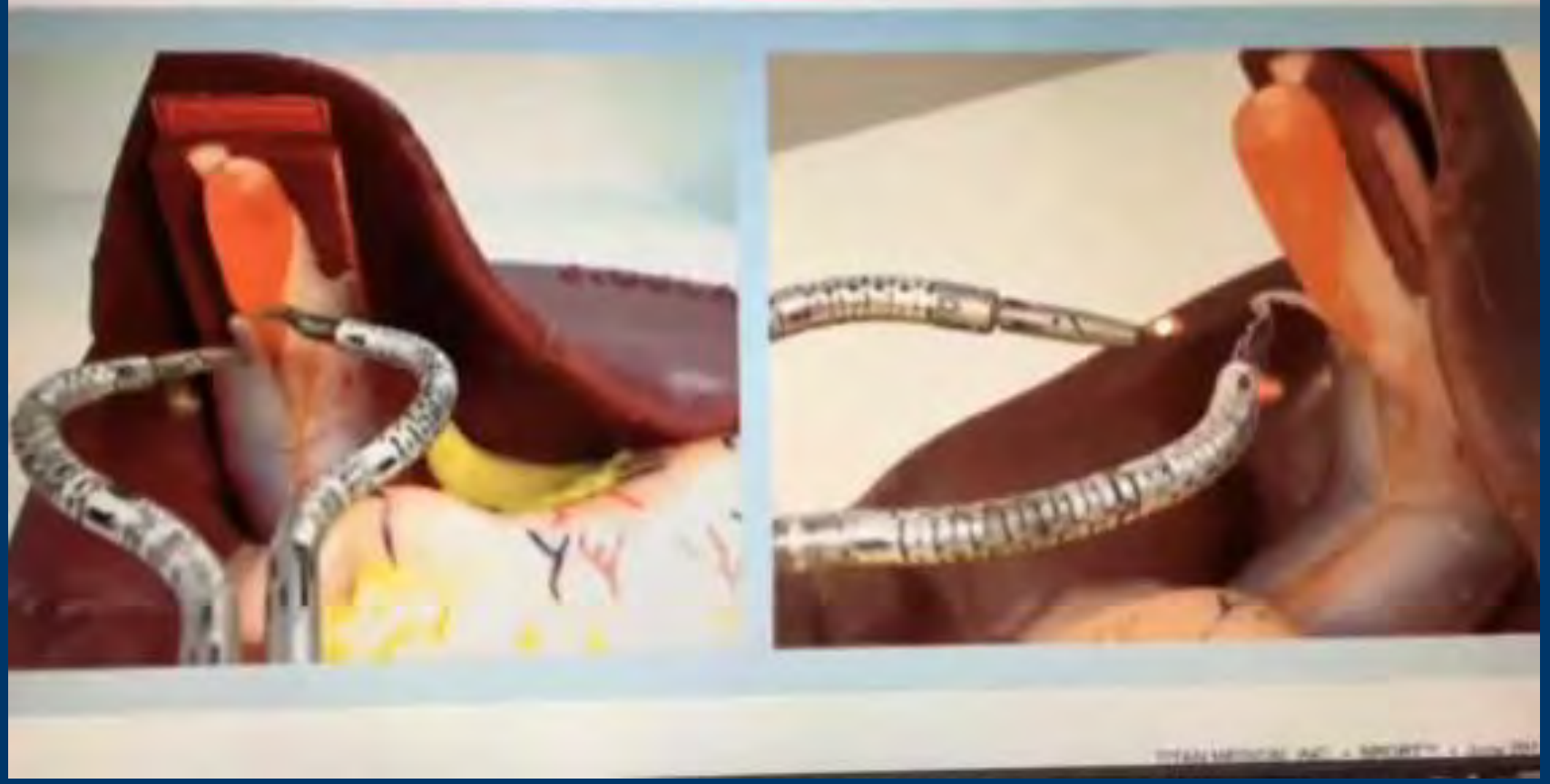
INSTRUMENTS • Workspace & Dexterity



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SURGEON CONTROLS

Enabled user to control robotic instruments through one-to-one movements of the surgeon controllers

Controls system requires minimal learning curve and is a natural extension of the users' arms

Developed simulation and training system

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Telelap ALF-X

Telelap ALF-X

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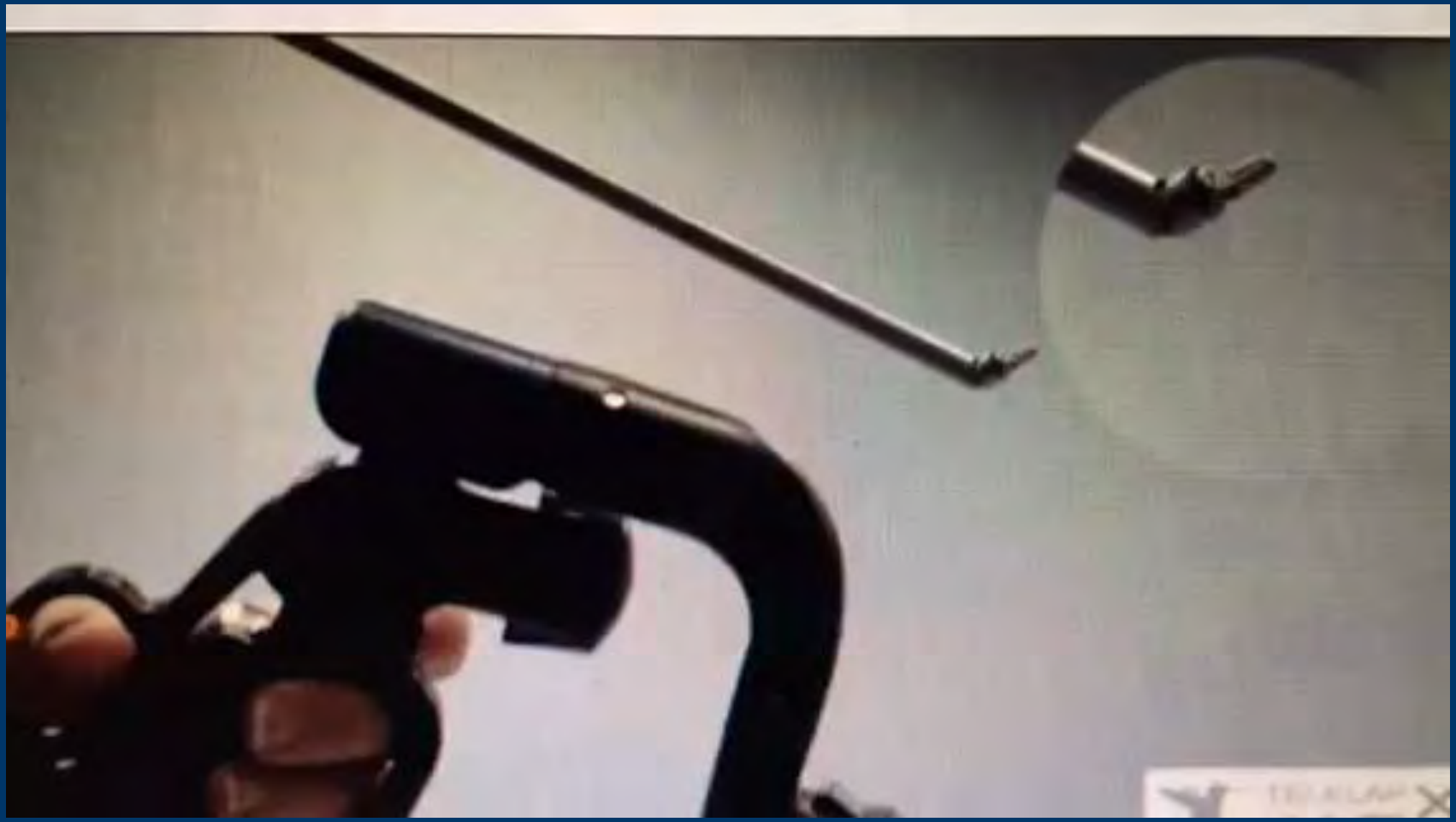
Telelap ALF-X

- Flexible platform for different specialties
- Up to 4 manipulating arms
- Tactile feedback
- 3D-HD eye-tracking system
- Ease of use to the surgeon and the whole team
- Shorter surgical procedures
- Reusable instruments
- **Therefore more accessible and less costly**

Telelap ALF-X

- Each manipulating arm is universal and interchangeable
- It can maneuver the endoscope (or any other surgical instrument) and has an interface for any type of surgical instrument, whether single- or multi-purpose.
- This modularity and adaptability, coupled with the low cost of its instrumentation make it attractive for all surgical disciplines



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Telelap ALF-X

- TELELAP ALF-X gives the surgeon the possibility to maneuver as if using standard laparoscopic handles which naturally
- Speeds up familiarization and initial training
- Does not alter the movements of the traditional laparoscopic surgery, but increases its efficacy, precision and quality.
- Allows sharing the 3D view and hence enhances communication with the other surgeons present in the operating room.

SurgiBot System (Transenterix)
1st Patient Side Robotic Platform

SurgiBot System (Transenterix)

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SurgiBot System (Transenterix)

- NC based Research Park Triangle (RPT) company
- Robotically enhanced laparoscopy
- 1st surgical platform designed to address economic and clinical challenges associated with current laparoscopic and robotic options.
- A market-expanding technology with a compelling value for a wide variety of surgical facilities

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SurgiBot (Transenterix)

- Currently in process of FDA clearance
- Recently acquired Telelap ALF-X from Italian company SOFAR for reported $100M
- This combination accelerates the commercialization timeline and revenue ramp as can immediately begin selling the ALF-X in many markets globally.

Issue of Learning Curve

- Competitor's aim at long LC associated with da Vinci

Two problems:

- Longer ORT drives up the cost of surgery
- Inexperienced surgeons likely to have worse outcomes

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Overcoming The Learning Curve

- Increasing flexibility and accuracy of the instruments
- Incorporating haptic feedback
- Improving visualization with superimposed imagery
- Virtual Reality surgery
- Improving surgical simulation with real life surgical simulation modules

(We are not there yet!)

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Improving Visualization

Titan's *SPORT*

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Improving the Learning Curve

- eye-tracking technology allows surgeons to activate instruments, manipulate endoscopes, and control visualization by simply directing their gaze to various parts of the screen.

- This feature also has a safety component: the eye-tracking technology would halt an operation automatically whenever the surgeon's gaze moves away from the surgical field.

Reducing The Cost Impact

- We need a cheaper alternative.

- Initially Amadeus system < $600K,
- Titan's *SPORT* $800,000
- Telelap between $1M and $1.3M,

- The Telelap even features reusable instrumentation, which eliminates some of the ongoing costs that can add up to thousands of dollars per case.

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Advances in Imaging and Virtual Surgical Planning for Robotic Partial Nephrectomy

Dilemma

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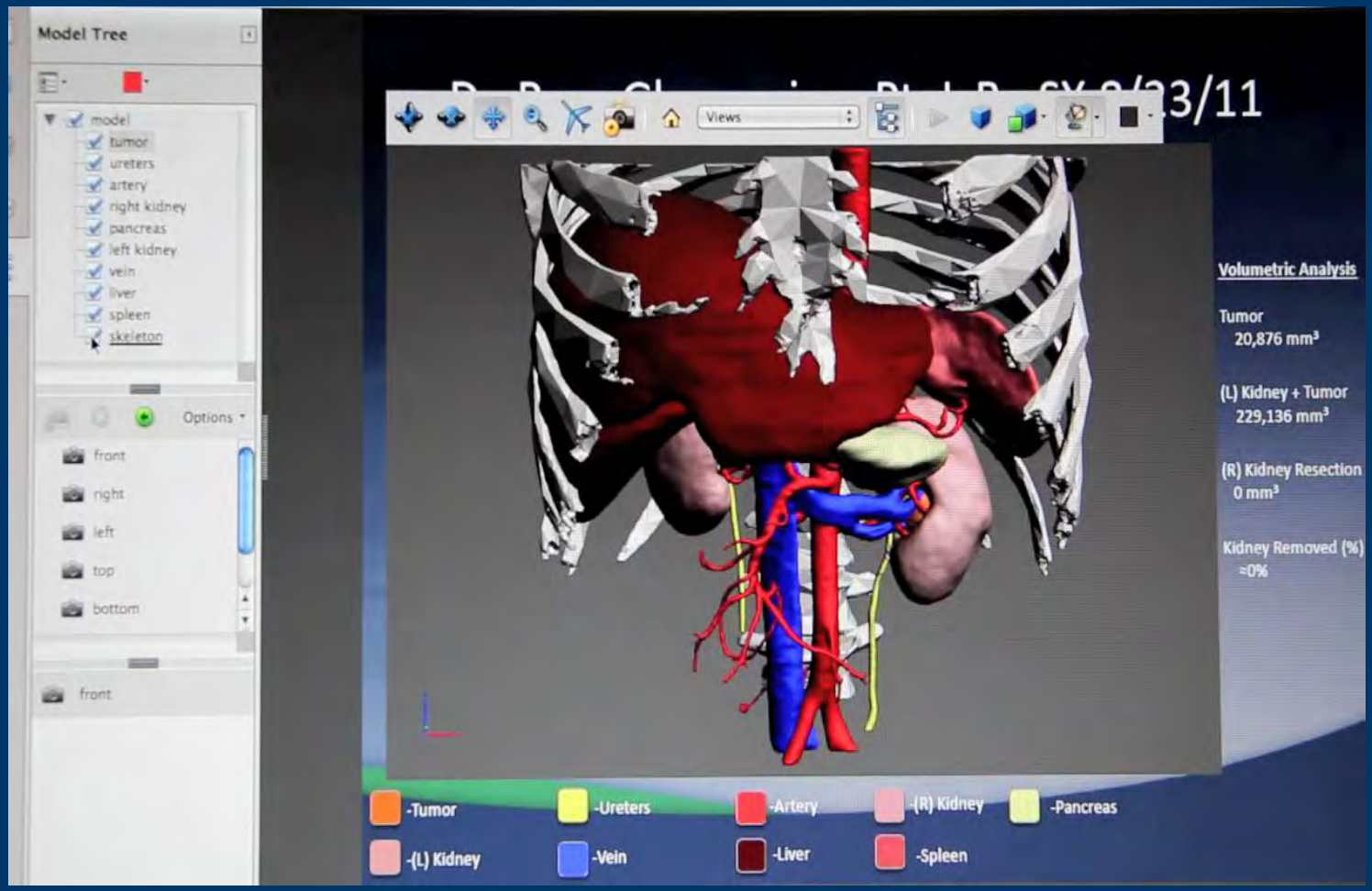

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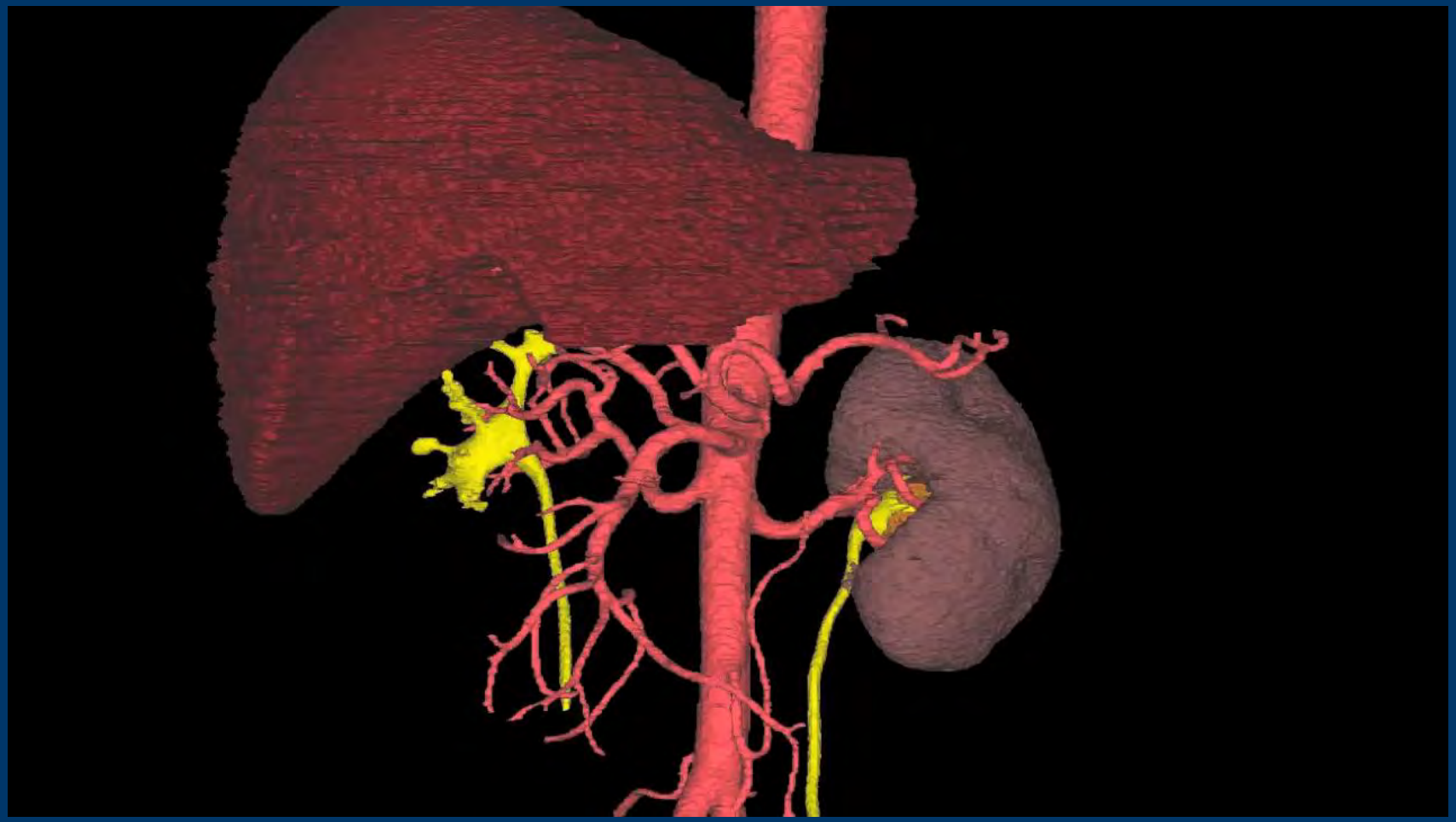
Resection Planning



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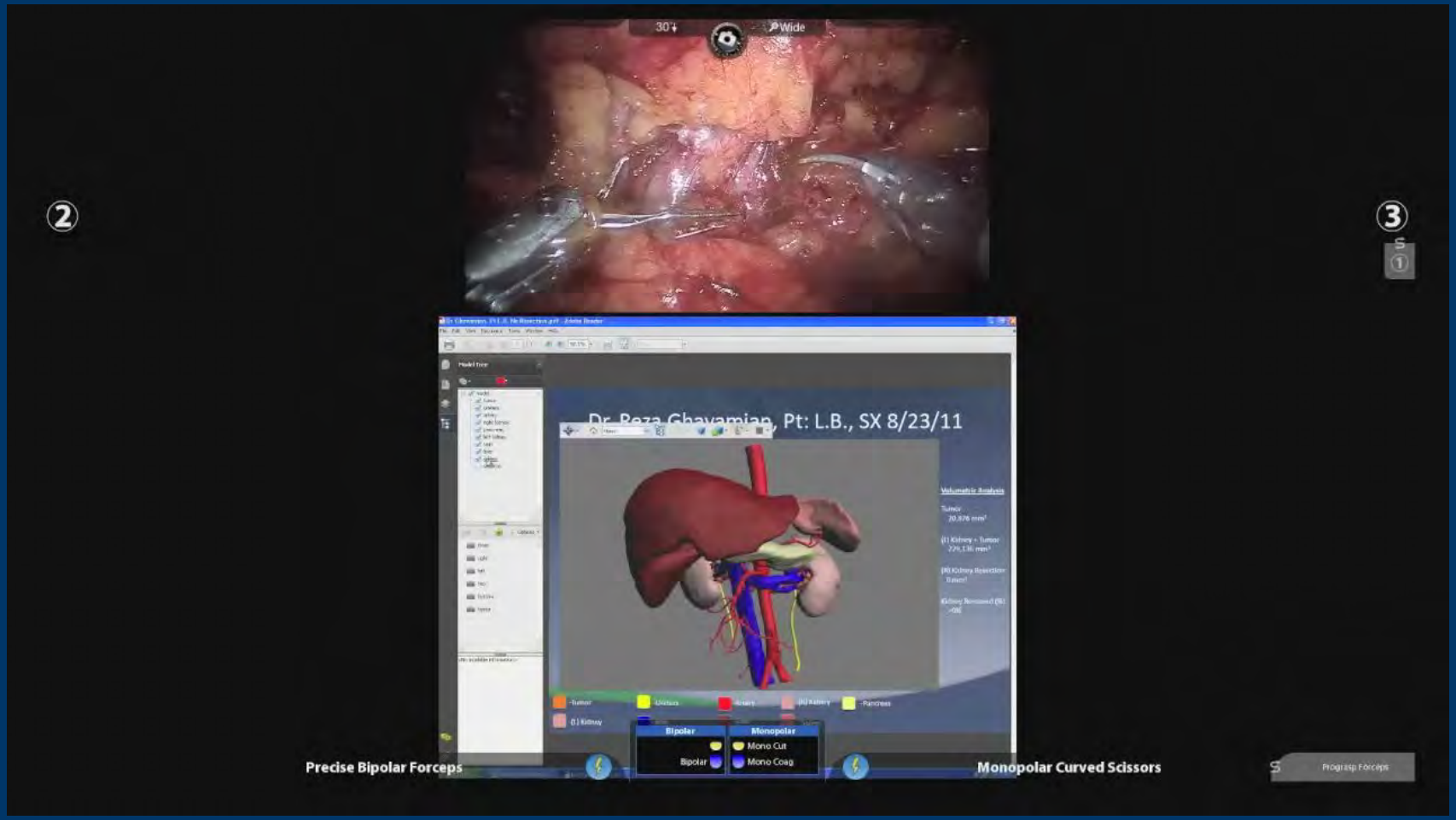

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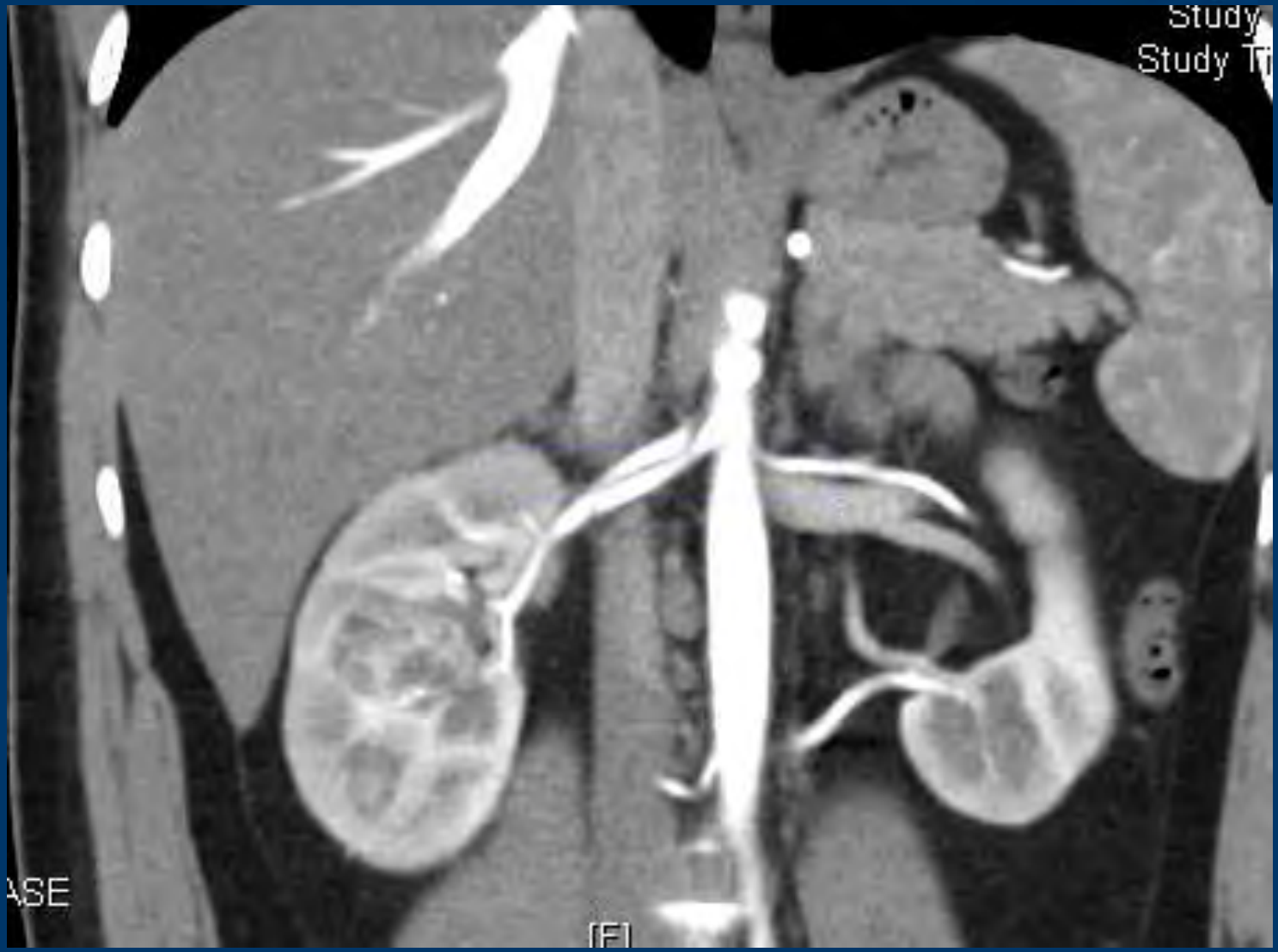

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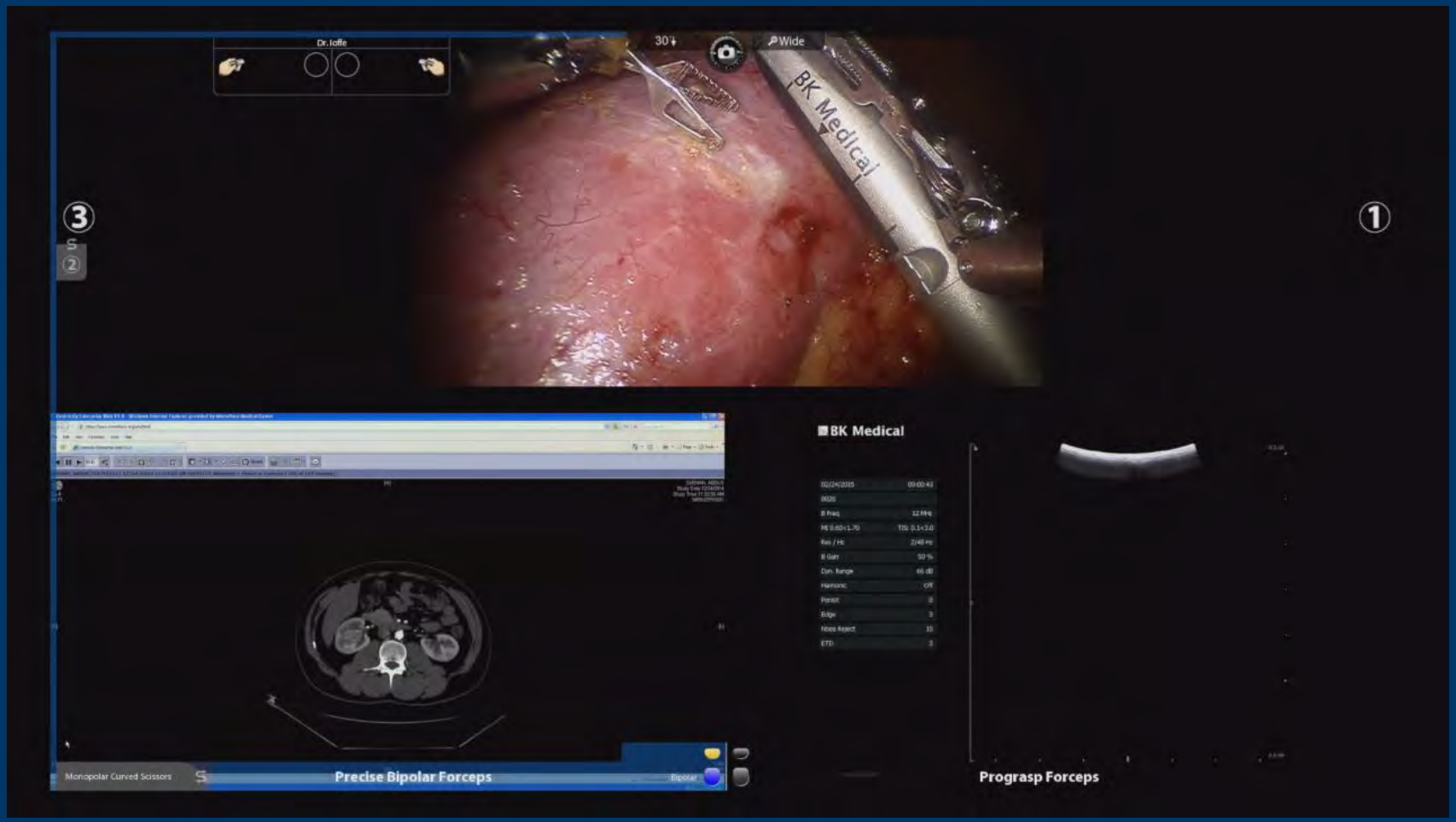

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Robotic Ileal Conduit

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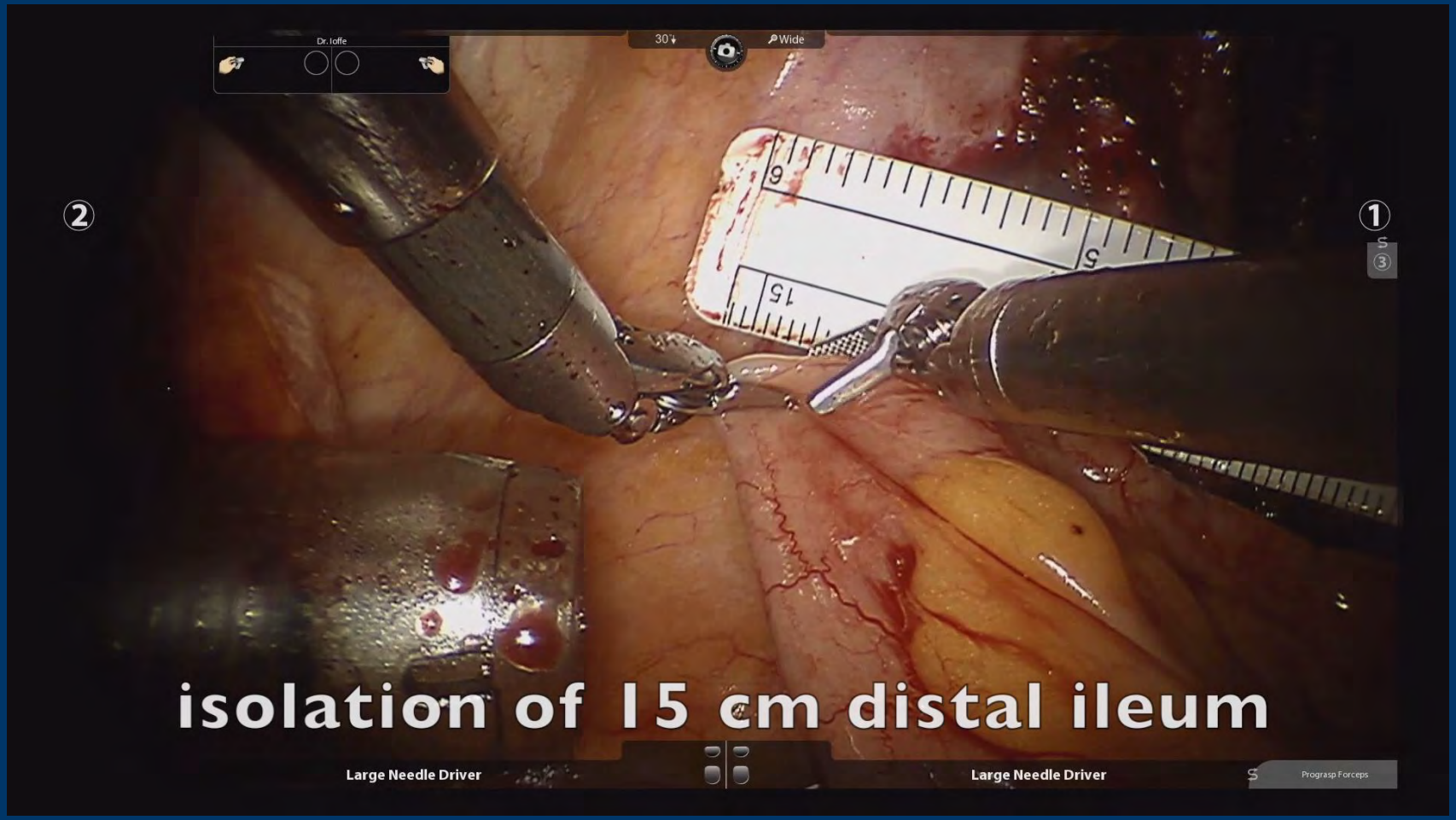

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Technology Components

- Hardware, size
- Ergonomics
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- Cost

Clearly not there yet !