The Future of Robotic Surgery and Ottava Update

Erik B. Wilson, MD, FACS

Professor of Surgery

Vice Chair of Surgery

Bariatric Surgery Medical Director Memorial Hermann Hospital

Division Chief, Minimally Invasive and Elective General Surgery

University of Texas Medical School at Houston

MIST
MINIMALLY INVASIVE SURGEONS OF TEXAS

UTHealth
The University of Texas Health Science Center at Houston

McGovern Medical School

Disclosures

Johnson&Johnson-Teaching/Research
Medtronic-Teaching/Research
Intuitive-Teaching/Research
Gore-Teaching
Activ Surgical-Research
Boston Scientific-Teaching/Research
Endogenex-Research
CMR-Research
DistalMotion-Research
GI Windows-Chief Medical Officer

What Is the Goal of Minimally Invasive Surgery?

Better minimally invasive surgery

1. More precise and accurate
2. More reproducible and consistent
3. Easier on the surgeon physically and mentally
4. More efficient--quicker

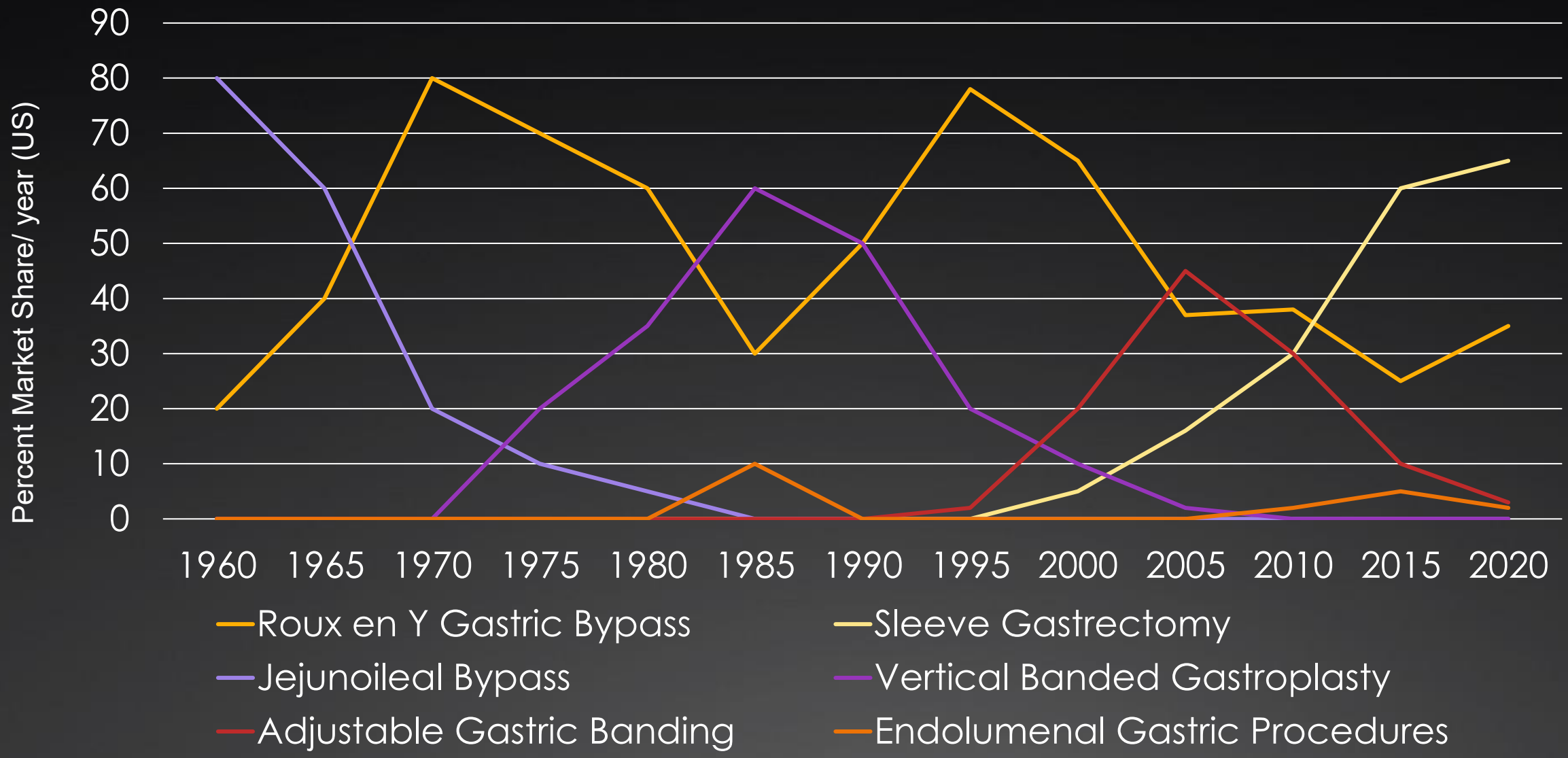
More minimally invasive surgery

1. Stop open surgery
2. Optimize the procedure to the patient
3. Fewer incisions
4. No incisions

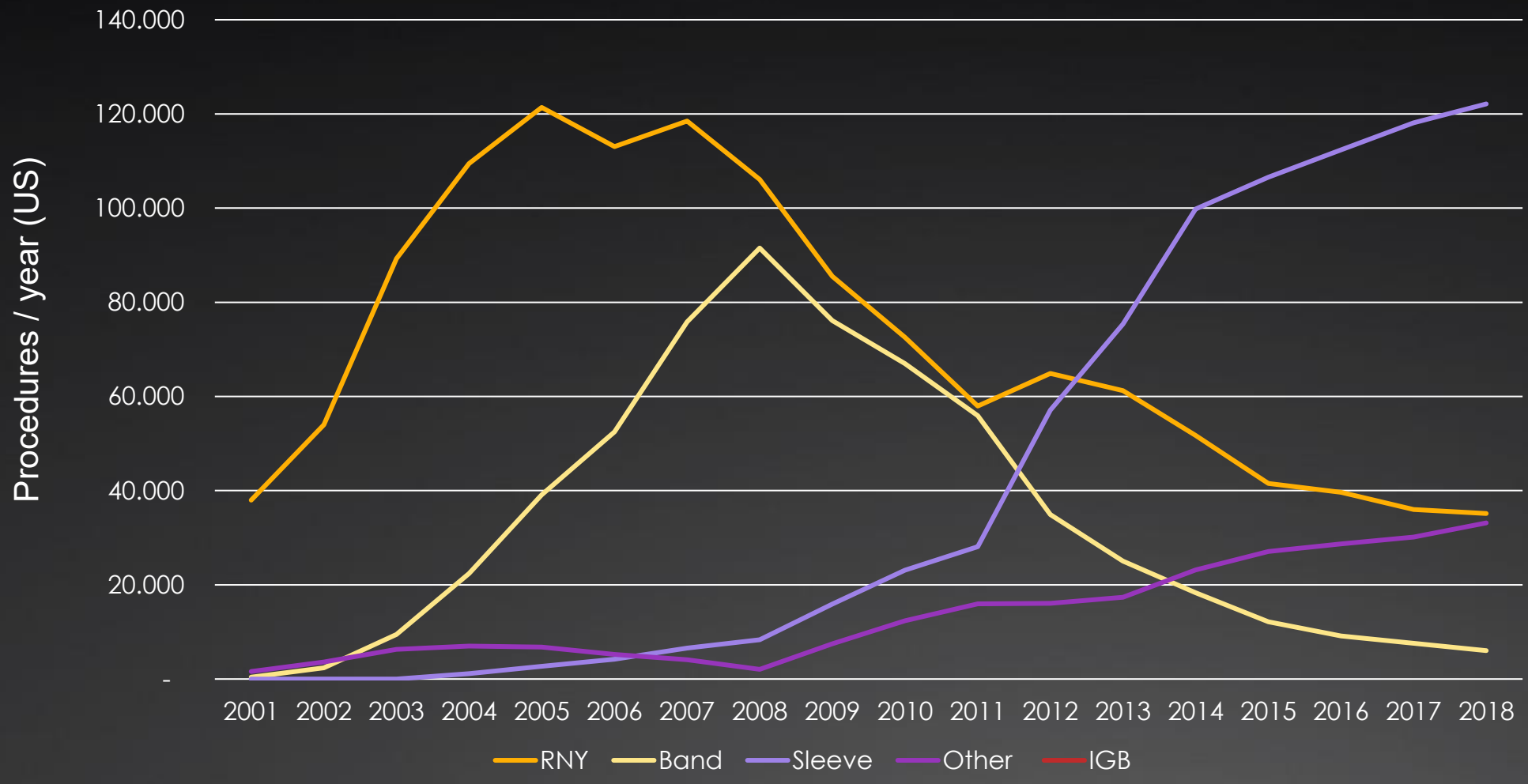
Surgeons want to operate at a high level and talk to patients about operating at a high level and that's it!

Digital is Driving the Process:
Robots, Telesurgery, Endolumenal, AI & Automation

Bariatrics are Driven to One Leading Procedure



Bariatric Procedures Should Balance with Better Understanding of the Disease and Treatment Incentives



Sleeve easier but doesn't make it better for each patient

Bypass wakes you up in the middle of the night

Bariatric surgeon growth was tied to band growth and now sleeve growth

One surgery all day long is good business

Democratizing Surgery and Bariatric Surgery with Robotic Platforms

Laparoscopic Trends

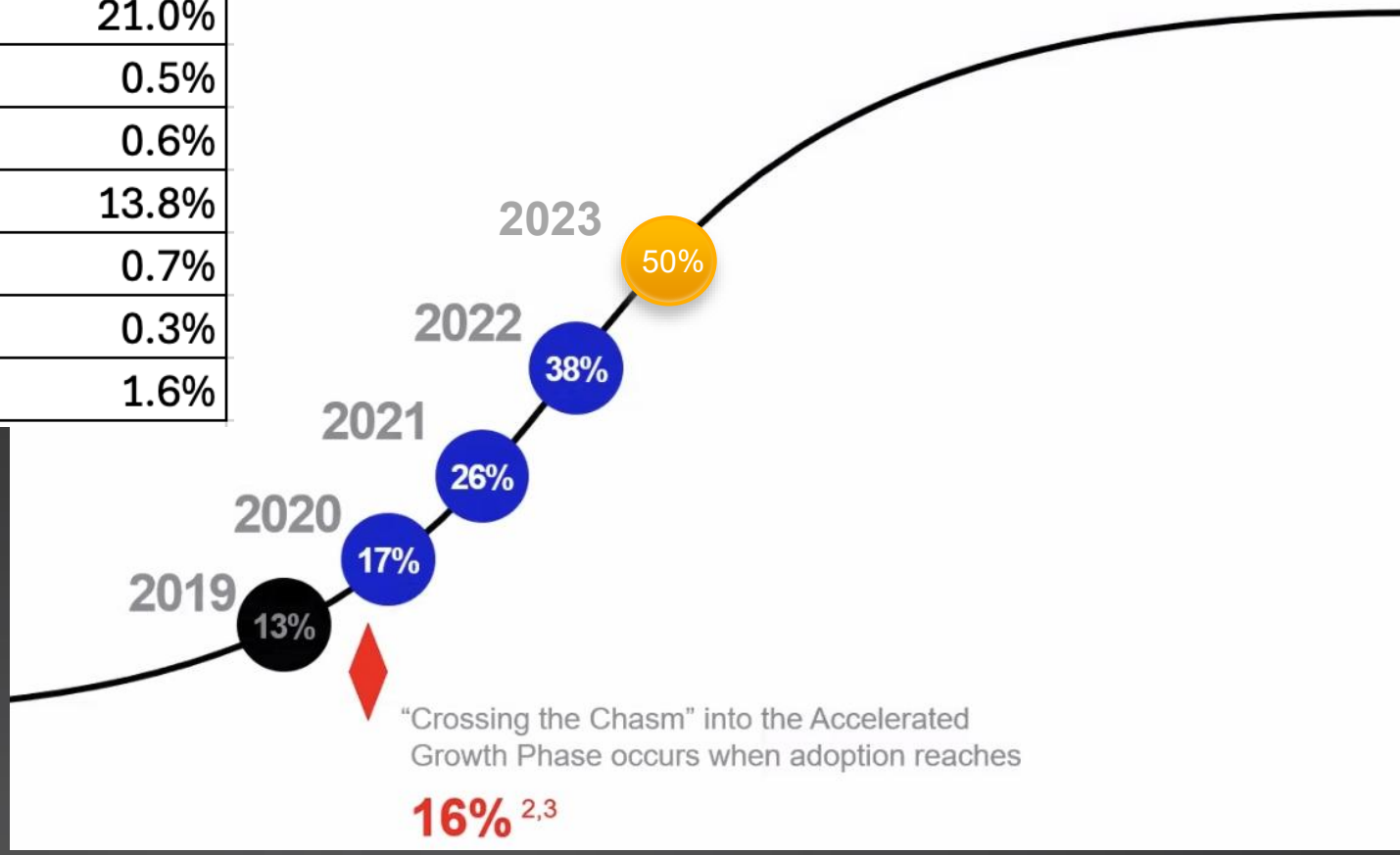
	2020	2021	2022	2023
Sleeve	63.2%	59.2%	59.5%	61.5%
RYGB	19.4%	19.8%	19.9%	21.0%
Band	1.1%	0.5%	1.3%	0.5%
BPD-DS	1.4%	1.7%	1.9%	0.6%
Revision	12.9%	14.0%	13.1%	13.8%
SADI	0.3%	0.5%	0.7%	0.7%
OAGB	0.9%	0.6%	0.5%	0.3%
Other	0.8%	3.8%	3.1%	1.6%

Robotic Increasing Anastomotic Cases:

Less sleeves more Bypass and Switch from 2020 to 2025 from Robotic Bari Surgeons

Thank You Intuitive!

Growing Robotic Bariatric Surgery with Increasing Complexity

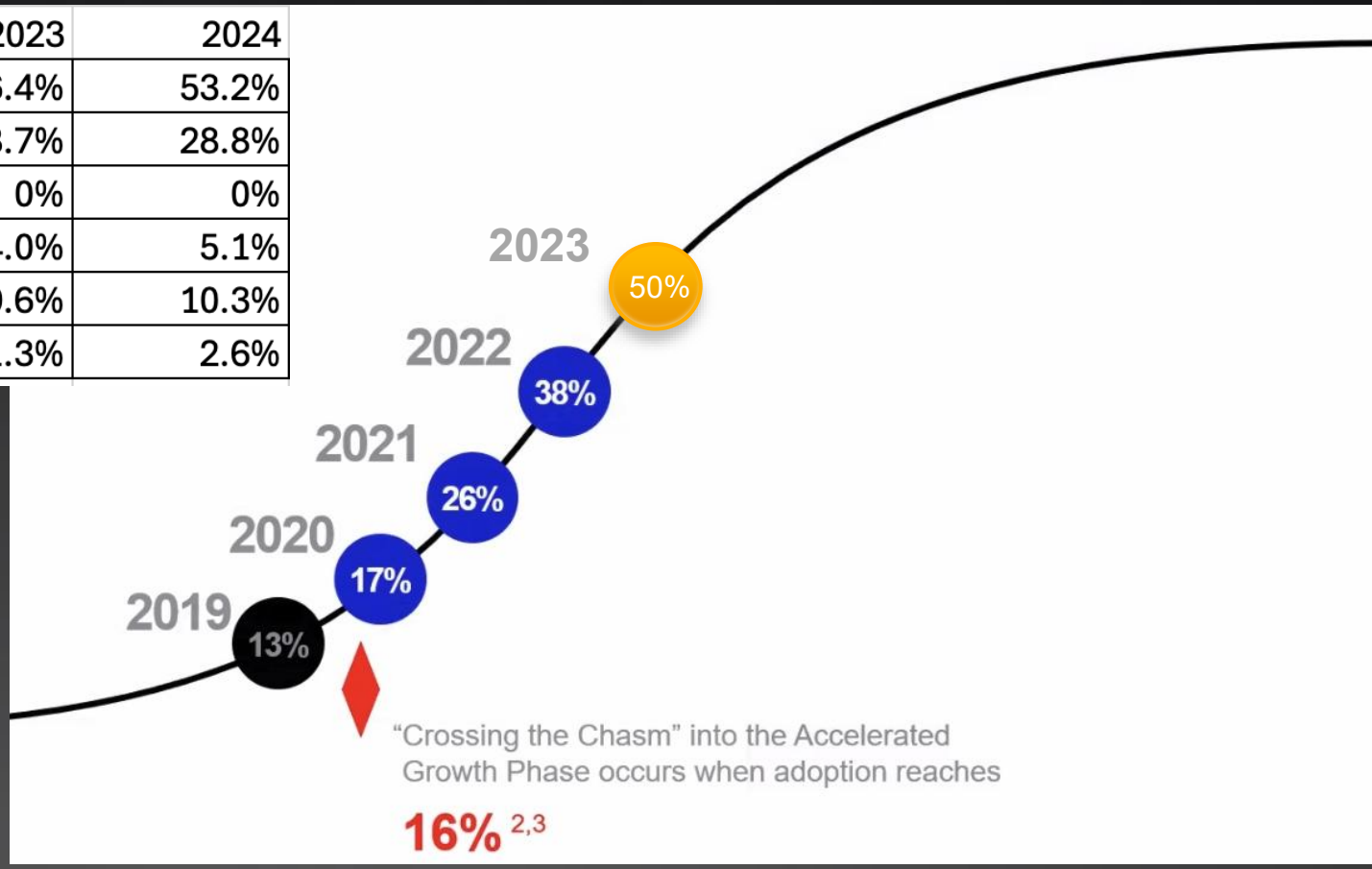


Democratizing Surgery and Bariatric Surgery with Robotic Platforms

Growing Robotic Bariatric Surgery with Increasing Complexity

Robotic Trends

	2020	2021	2022	2023	2024
Sleeve	61.0%	60.7%	58.7%	56.4%	53.2%
RYGB	29.0%	29.3%	29.6%	28.7%	28.8%
Band	0%	0%	0%	0%	0%
BPD-DS / SADI	6.5%	6.5%	3.5%	4.0%	5.1%
Revision	3.5%	3.5%	7.9%	9.6%	10.3%
Other	0.0%	0.0%	0.5%	1.3%	2.6%



Robotic Increasing Anastomotic Cases:

Less sleeves more Bypass and Switch from 2020 to 2025 from Robotic Bari Surgeons

Thank You Intuitive!

Democratizing Robotic Platforms with Bariatric Surgical Cases

5 generations of DaVinci and where are we?

A large boom arm system that has marginally changed in function
Stronger instruments, Task autonomous staplers, Advanced energy
Very few changes in scaling and movement and articulation
Few changes in visualization:
Improved stability but questionable need for force feedback/Haptics

Cameras from 12 mm to 8 mm, no articulating cameras except with SP
Instruments from 8 mm to 5 mm and back to 8 mm
Mediocre ergonomics
Very few digital analysis tools

Slower times with basic cases compared to laparoscopy at higher cost

Doesn’t the 5 take us to the Next Level??

These decisions are made in an environment of constant risk mitigation to prevent losing what’s been gained.

So its more about careful growth than taking risk when in a monopolized space

Haptic Feedback-another recruitment tool? I feel with my vision now.

Improved Ergonomics: Finally but still not enough and way late

More Integrated and Efficient:
Basic level insufflation- no heated humified, no continuous flow
Entry camera-oh yeah, not integrated.
In console moves- Yay, oh wait I can’t practice them because the simulator modules aren’t out

Modern High Level Processing Power-Great, and what’s that doing now? Little so far

High Performance Robotics?

VS

Intuitive: High Performance Robotics?

Intuitive's culture of converting open surgery to laparoscopy with robotics

Raising the Floor: Recruiting surgeons into robotics

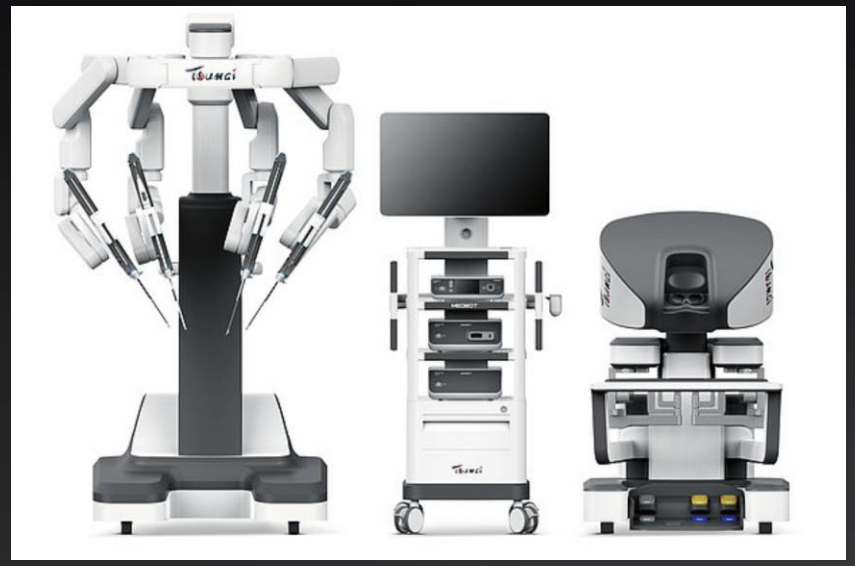
Not Always Raising the Ceiling: Making good robotic surgeons better

True High Performance Robotics

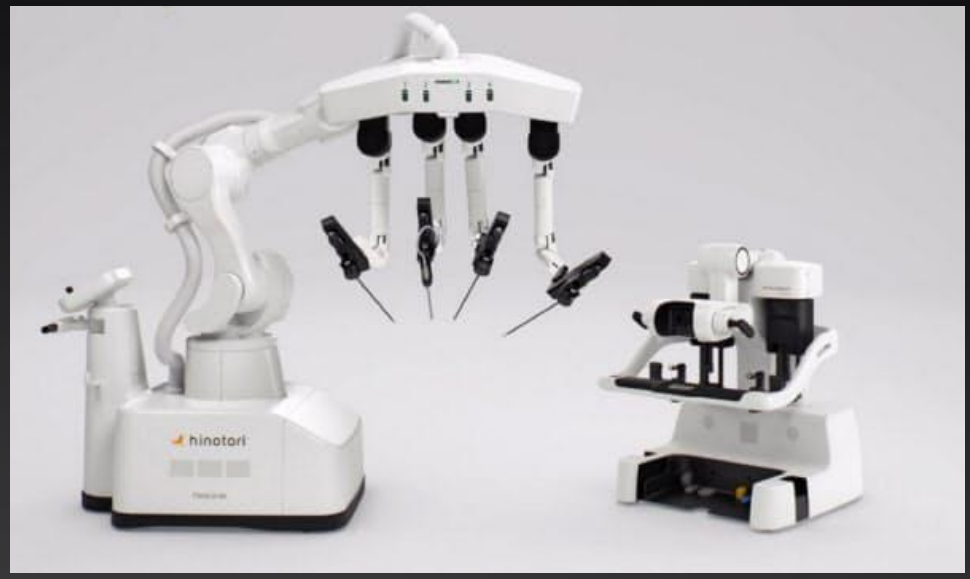
Eliminate the carts
Truly integrate laparoscopy and robotics
Faster scaling and rotational scaling
Faster instrument exchanges
Right size the tech for the procedure
Flexible cameras
More port position options and arms: true 2 surgeon
More multiuse instruments
Combined endolumenal and laparoscopy at one console
Integrated sealing and stapling that supports the latest best in class devices
Telesurgery

DaVinci Me Too Boom Mounted Systems

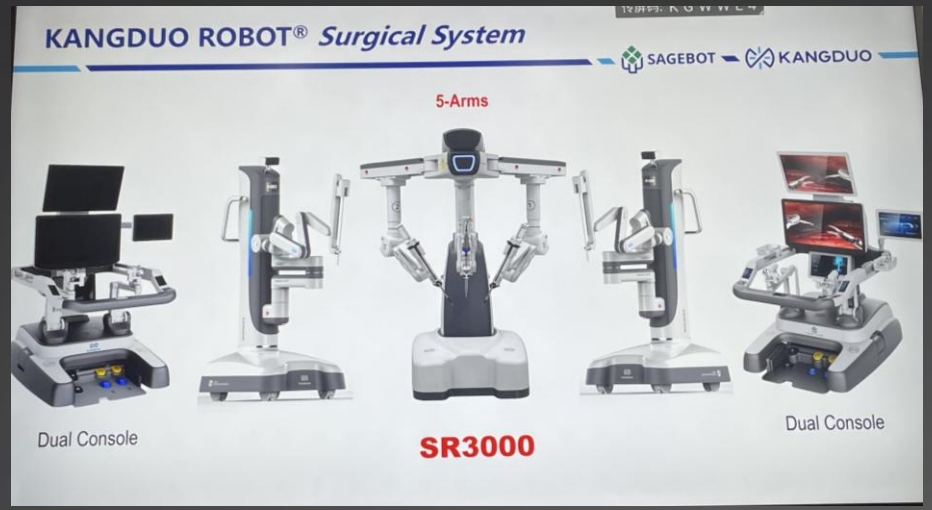
Microport Toumai--No US Plan



Medicaroid: Hinotori—No US Plan



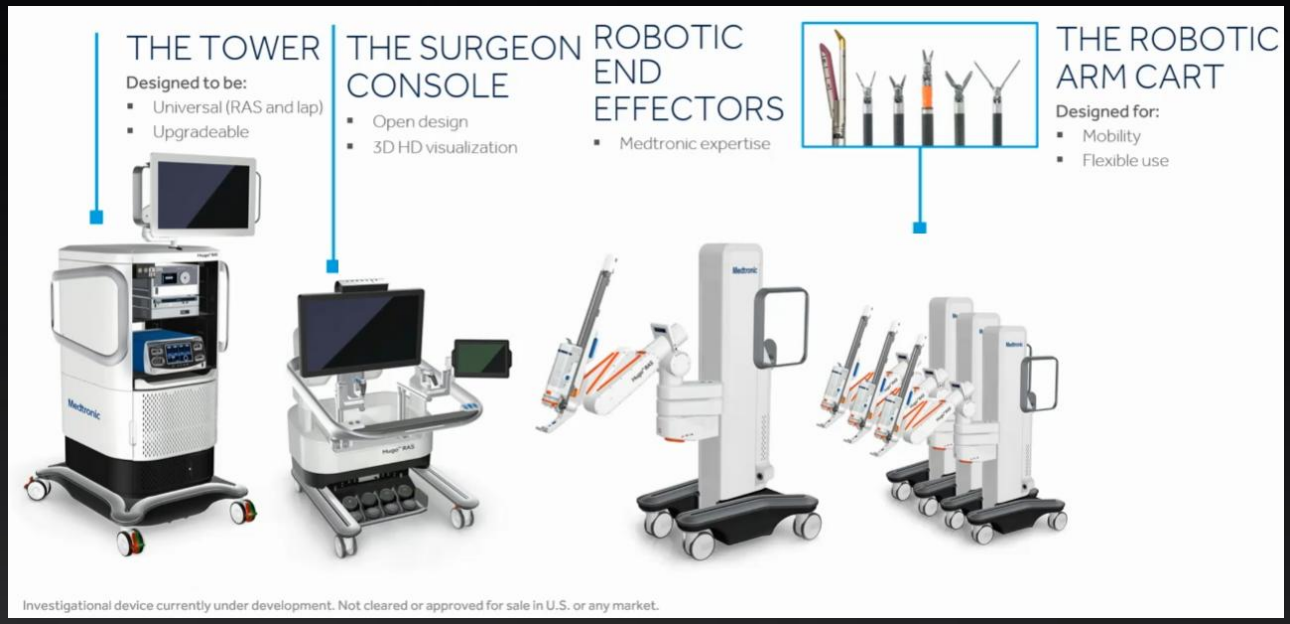
Sagebot Kangduo--No US Plan



DaVinci Xi and DV5 10 million cases

Modular Arms Systems

SSI Mantra—
US 2027-2028



Medtronic Hugo 2026 FDA Cleared—Urology
~30000 cases

Renovo Harmony-No US Plan

CMR Versius 2026 FDA Cleared—
Cholecystectomy
General Surgery
45,000+ cases

versius plus

2014
First prototype developed

The **next-generation surgical robot**
CE marked 2019

First globally
to commercialise open console

First compact, modular design
for soft tissue robotics

First fully articulated instruments
compatible with traditional laparoscopic ports.

150+ different procedure types
across 7 surgical specialties

FDA De Novo
U.S. FDA marketing authorization in 2024

2024

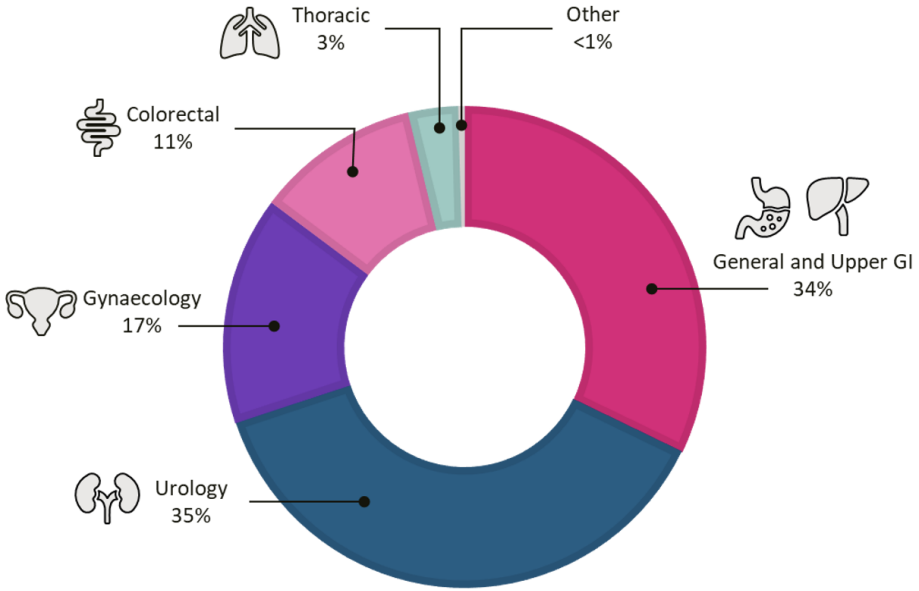
FDA 510k pending
Versius Plus is now 510(k) pending with the FDA

2025

38,000+ patient lives changed with Versius

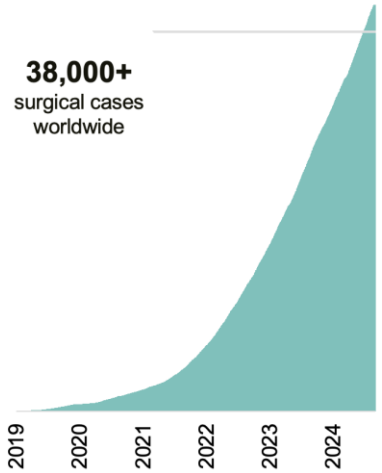
CMR SURGICAL

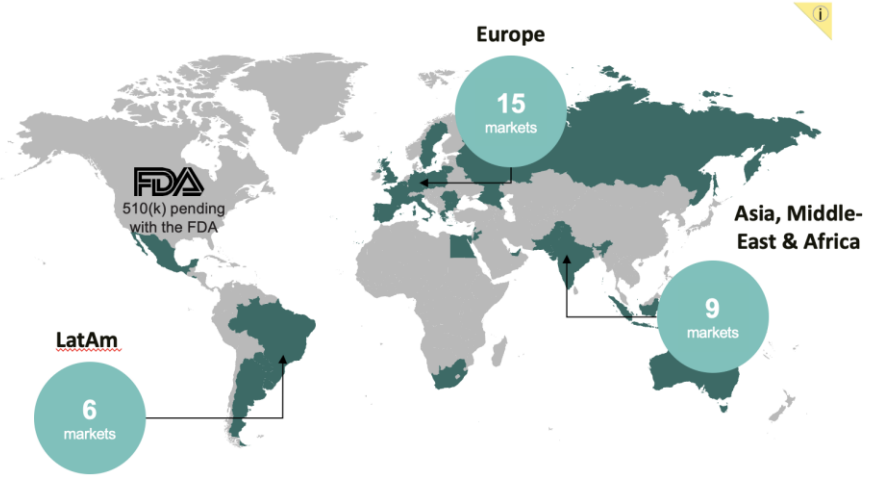
Transforming surgery.
For good.



The Second Most Utilized Soft Tissue Robot In The World

Rapid procedure growth across 5 continents, surpassing 38k cases worldwide.





CMR SURGICAL Total active markets in 2025

Medtronic Hugo—FDA Clearance for Urology and Trial General Surgery –TMC or others

THE TOWER

Designed to be:

- Universal (RAS and lap)
- Upgradeable

THE SURGEON CONSOLE

- Open design
- 3D HD visualization

ROBOTIC END EFFECTORS

- Medtronic expertise

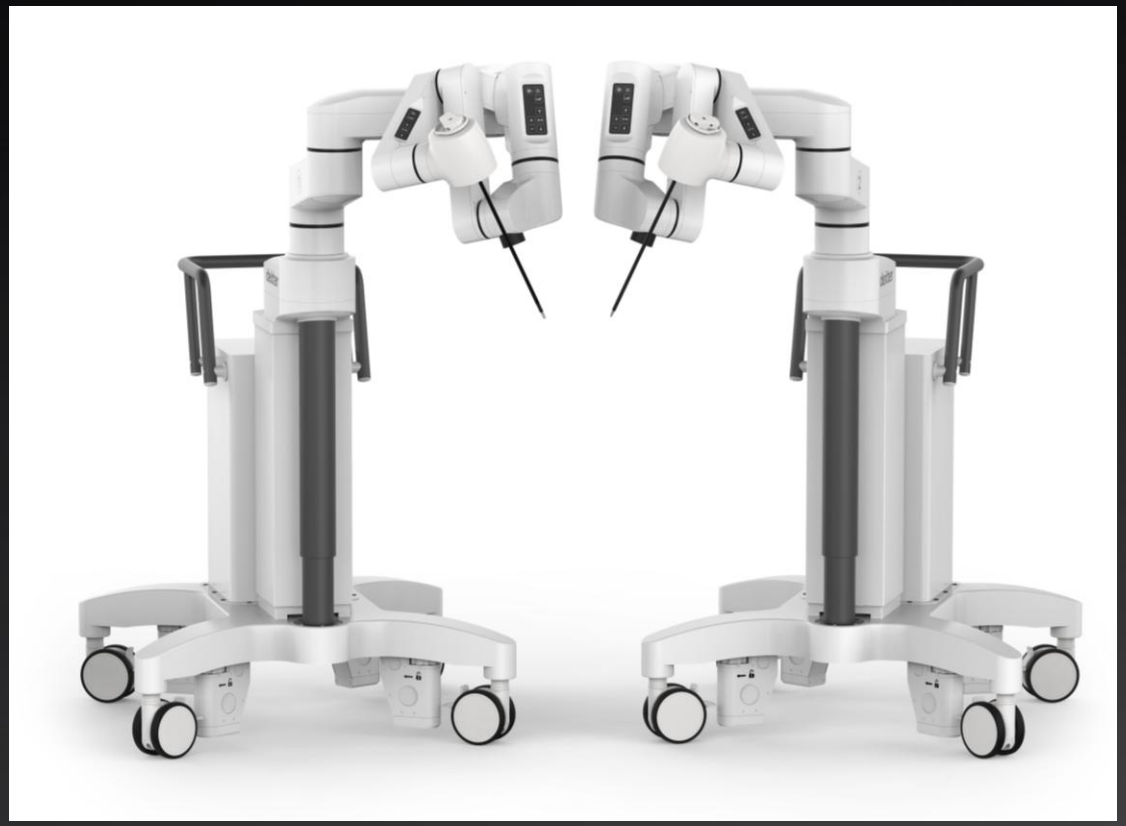
THE ROBOTIC ARM CART

Designed for:

- Mobility
- Flexible use

Investigational device currently under development. Not cleared or approved for sale in U.S. or any market.

Smaller Module Systems: Make Margin on Simpler Cases



Distalmotion Dexter
FDA Cleared 2025
Basic General Surgery and Gynecology
Uses lap cameras
1/3 cost of DV
Moves from room to room

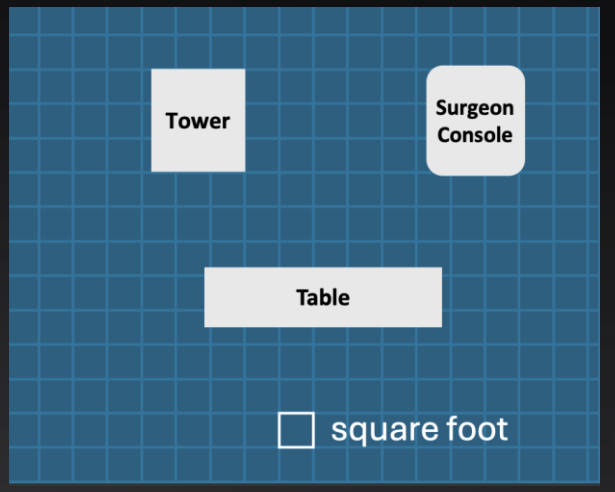
Smaller Module Systems: Robotic Surgical Assistant

Moon FDA Cleared 2025
Memorial City Discussions
All Specialties
AI camera tracking
Uses standard lap instruments and cameras

Designed for efficiency in outpatient procedures and driving surgeon autonomy

¼ to 1/5 cost of DV

Table Integrated Arms: Modular Access Points without the Carts--Ottava



March 2025

- I have been part of the OTTAVA program since its inception.
- Table integrated arms—no modules no booms
- What most surgeons will comment on is the architecture – the arms stowed underneath the bed until deployed.
- FDA Clearance NOW—General Surgery
- Performance matching DV

OTTAVA Robotic Surgical System

Study Design

Objective	Evaluate safety and performance of Roux-en-Y gastric bypass (RYGB) using OTTAVA, through 30 days post-op
Study Design	Prospective, multi-center, single-arm clinical trial 30 RYGB procedures, at least 10 by mid-to-low-volume surgeons *≤200 robotic cases in past 2 years* 8 hours of surgeon training, no roll-in cases
Primary Endpoints	Safety: Subjects with device- or procedure-related complications Effectiveness: Procedure completion without conversion
Key Secondary Endpoints	Procedure time, estimated blood loss, length of stay, anastomotic leak, anastomotic stricture, mortality

Key Eligibility Criteria

Inclusion Criteria

- Adult patients scheduled to undergo primary elective RYGB surgery
- ASA class I, II, or III
- BMI at least 35, or obesity with health risk meeting ASMBS/IFSO guidelines for bariatric surgery

Exclusion Criteria

- Medical condition that makes robotic surgery risky, including intraoperative finding before ports placed
- Concomitant procedure, other than repair of hiatal hernia up to 5 cm and adhesiolysis
- Enrolled in another study that may confound results

Methods

Baseline Visit

Informed consent before any data collection

Demographics

Medical/surgical history

Physical examination

Procedure Visit

Investigational robot installed in OR

Patient admitted morning of surgery

Roux-en-Y gastric bypass procedure using standard technique

Procedure detail and any adverse events recorded during case

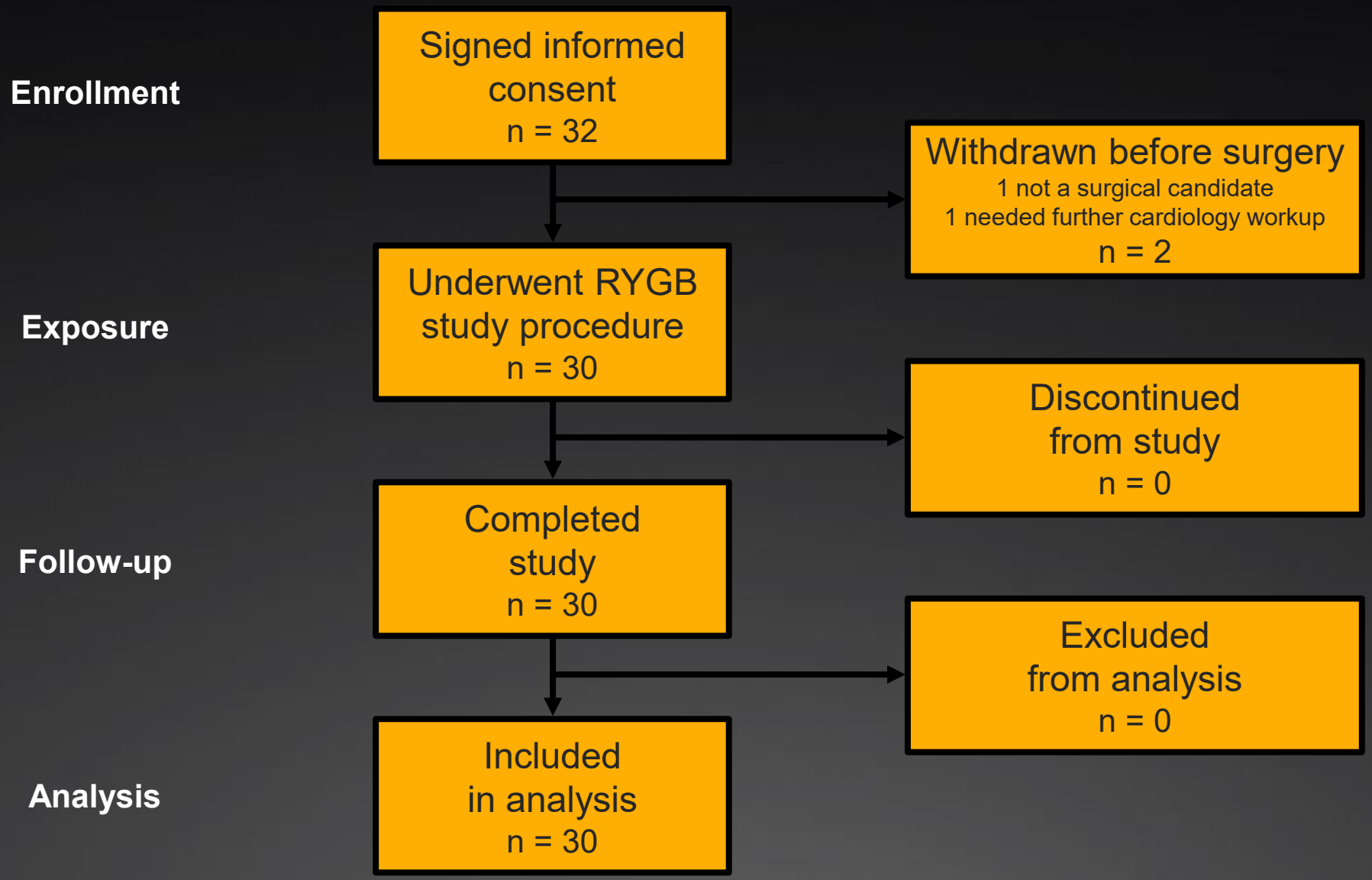
Follow-up Visit

30 ± 7 days after surgery

All adverse events recorded, followed until resolved or stabilized

Safety data adjudicated by Safety Management Team with two surgeons

Consort Diagram



Baseline Characteristics (N = 30)

Demographics

Age	41.8 ± 9.2 years
Female	22 (73.3%)
Black or African American Hispanic or Latino White	10 (33.3%) 7 (23.3%) 13 (43.3%)

Physical Examination

Height	168.0 ± 8.2 cm
Weight	134.3 ± 29.1 kg
BMI	47.4 ± 9.2 kg/m^2
Blood Pressure Systolic Diastolic	134.8 ± 12.8 mm Hg 83.5 ± 8.5 mm Hg
Heart Rate	82.4 ± 13.2 bpm
Oxygen Saturation	97.0 ± 2.2 %
ASA Classification II III	2 (6.7%) 28 (93.3%)

Comorbidities

Metabolic	Hyperlipidemia	9 (30.0%)
	Impaired fasting glucose	9 (30.0%)
	Diabetes mellitus	5 (16.7%)
	Nutrient deficiency	3 (10.0%)
Vascular	Hypertension	17 (56.7%)
	Deep vein thrombosis	2 (6.7%)
Respiratory	Obstructive sleep apnea	8 (26.7%)
	Asthma	7 (23.3%)
	Dyspnea	2 (6.7%)
Psychiatric	Depression	11 (36.7%)
	Anxiety	9 (30.0%)
	ADHD	4 (13.3%)
Gastrointestinal	GERD	9 (30.0%)
	Constipation	2 (6.7%)

Procedure Details

Table positioned in reverse Trendelenburg (13.3 ± 4.6°, range 7-30°)

- Adjusted intraoperatively in 8/30 (tilt 6, trend 4, translation 3, height 1)

Adhesions in 13/30 (upper abdominal 10, mid-abdominal 3, pelvic 1)

- Taken down robotically in 3, manual lap in 8, both in 1

2 robotic hiatal hernia repairs also performed

Hand-sewn gastrojejunal anastomosis in 24/30, stapling with suture closure in 6/30

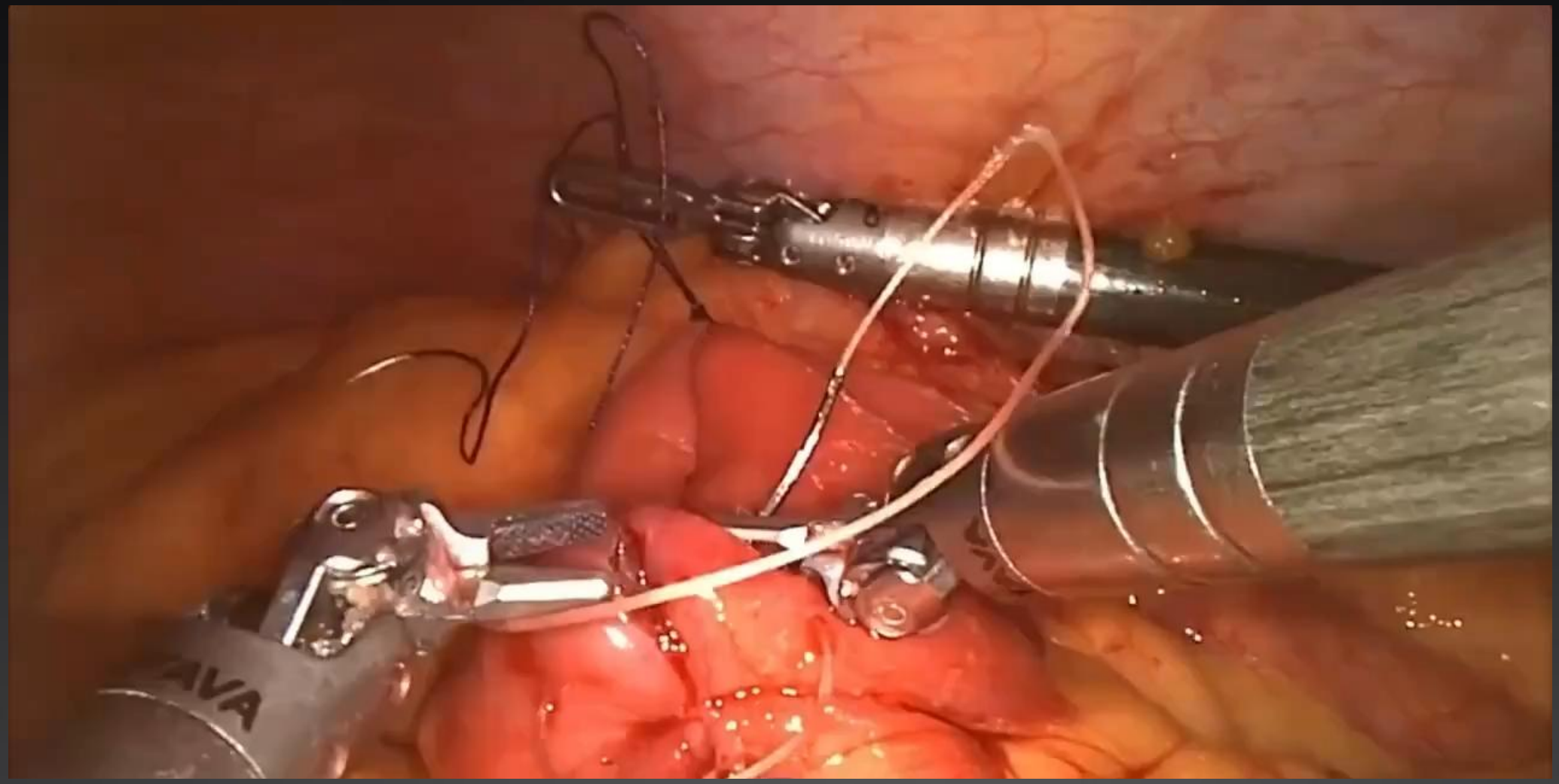
Jejunojejunal anastomosis used stapling with suture closure in 17/30, fully stapled in 13/30

Leak test using gas endoscopy in 19/30, methylene blue in 11/30

- No clinically significant leaks detected

Port Placement

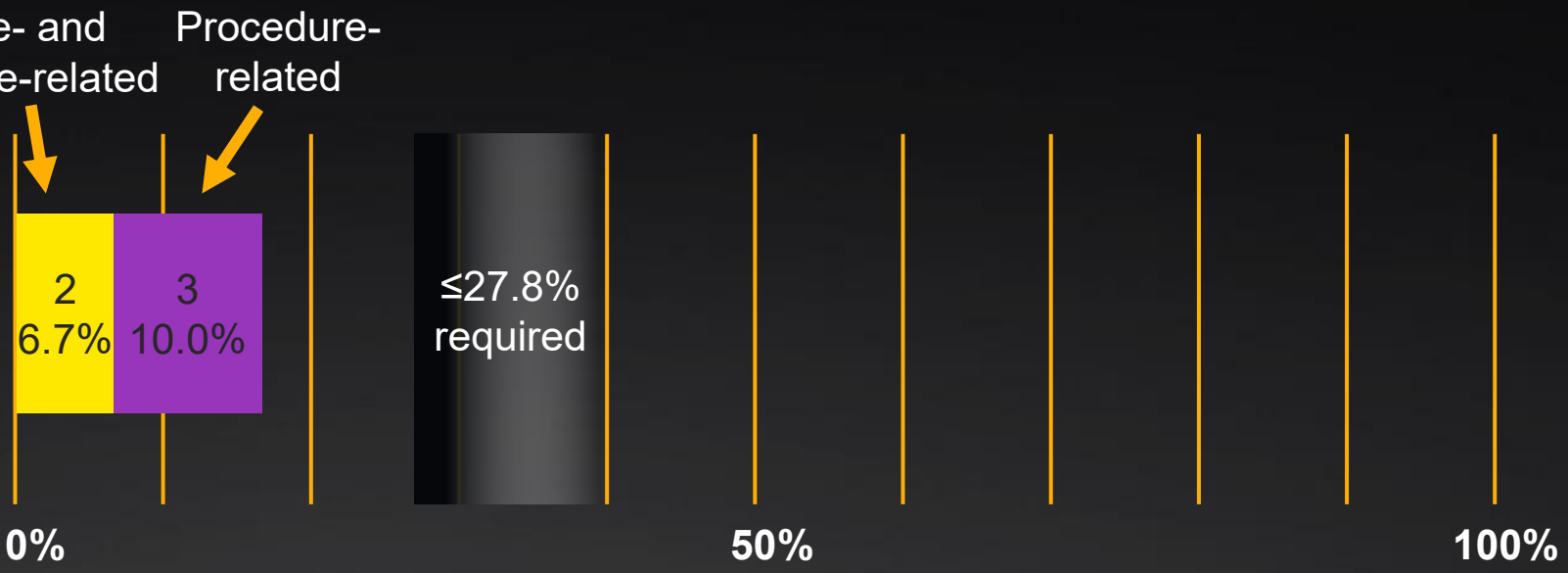
Endoscope Video: Suturing



Results: Primary Endpoints

Primary Safety Endpoint

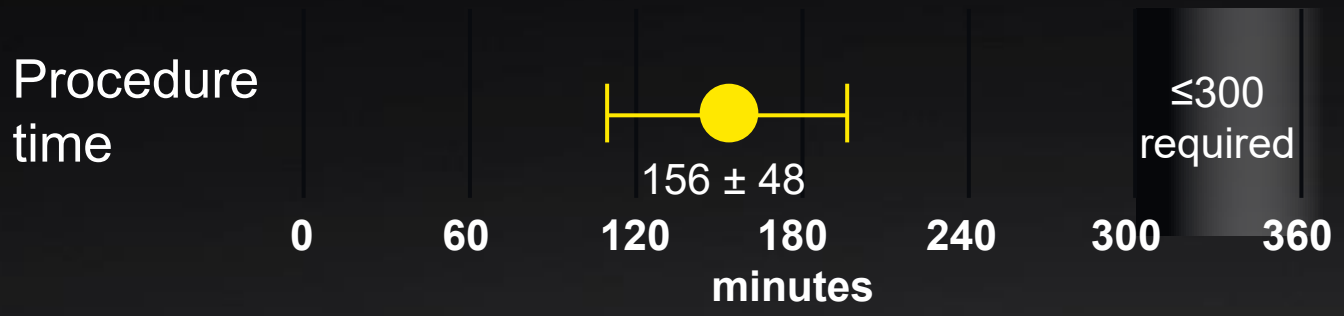
Subjects with device- or procedure-related complications

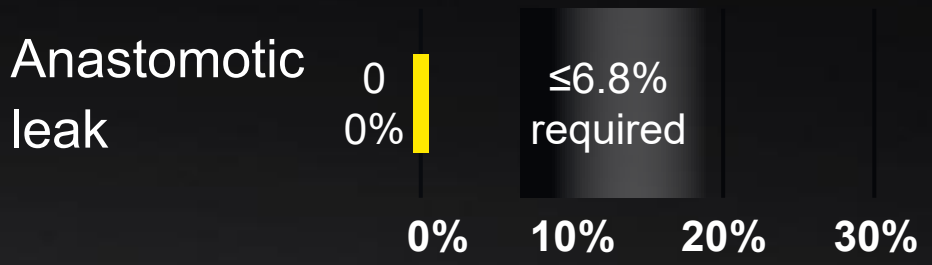


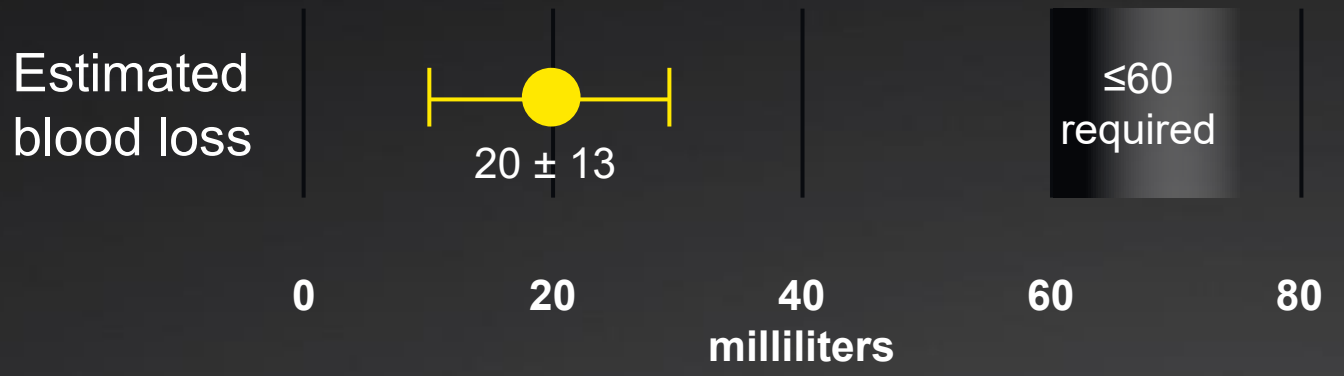
Primary Effectiveness Endpoint

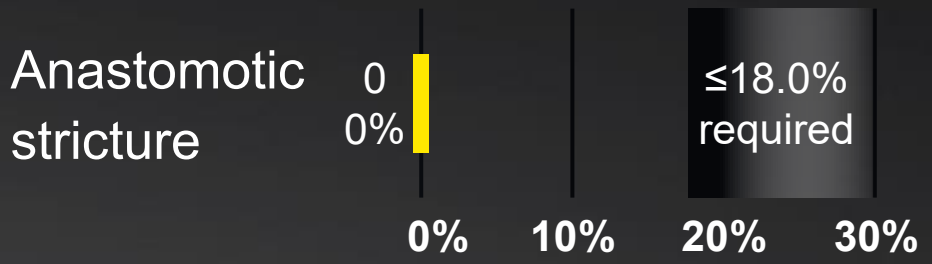
Procedure completion without conversion

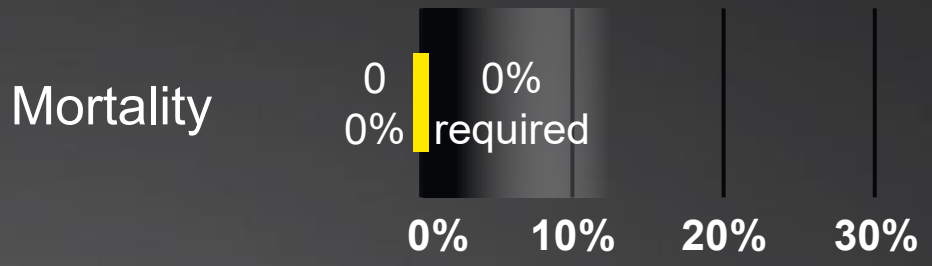
Results: Secondary Endpoints











Results: Safety Data

5 Serious Adverse Events (SAEs):

Device- and procedure-related	**Serosal tear** while grasping tissue, repaired with suture
	Tissue burn from unintentional energy delivery, repaired with suture
Procedure-related	**Bowel perforation** during initial optical port placement, repaired with suture
	Vomiting which led to 5-day stay in hospital
	Intra-abdominal fluid collection drained, serous, straw color, negative culture

3 intraop SAEs
Clavien-Dindo 3b

Clavien-Dindo 1

Clavien-Dindo 3a

Non-serious AEs included:

Abdominal pain in 28 of 30 patients
Nausea in 17 patients
Vomiting in 7 patients
Constipation in 5 patients
Tachycardia in 3 patients

Implications of Early Experience

OTTAVA was installed in a non-robotic OR in our hospital

We mostly performed 1 study procedure per day, sometimes 2 procedures/day

- Engineers did system check and data download after each procedure

We had surgeons at various points in their career, including a recent fellow

Rotating surgical staff, including some who were very experienced and others newer to robotic surgery

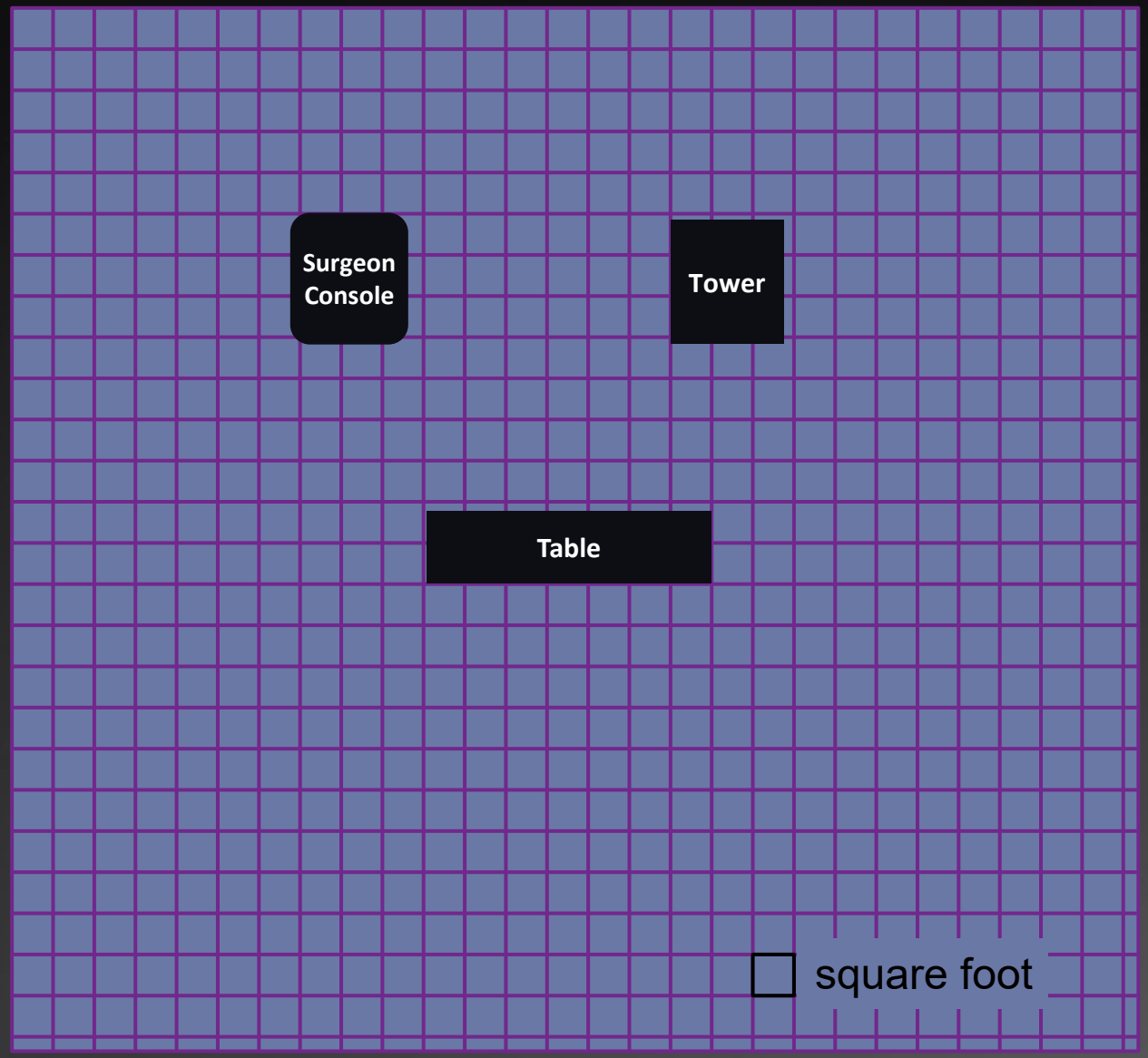
Imagining a mixed fleet of surgical robots

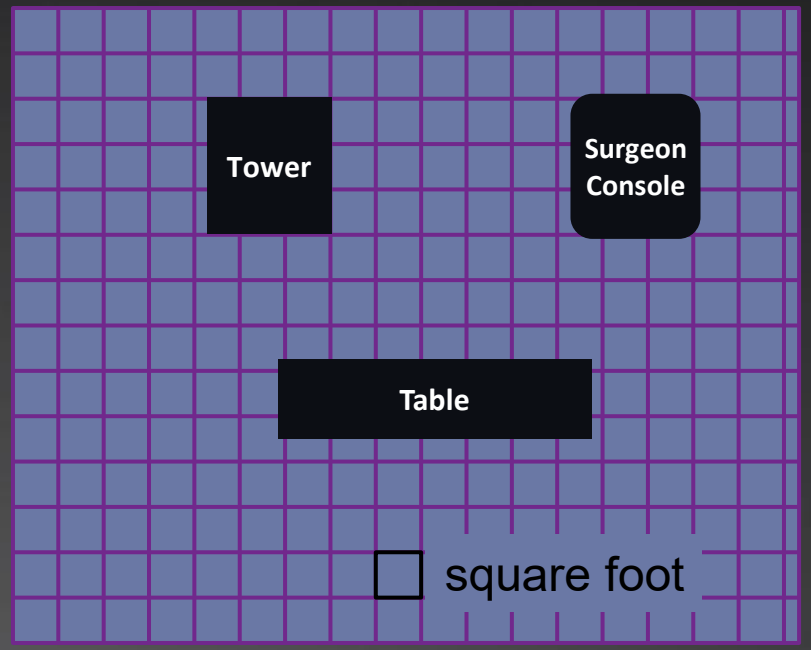
Footprint in Operating Room

5 of 6 sites used non-robotic ORs for study procedures

Largest OR:
694 sq. ft. (64.5 m^2)

Smallest OR:
243 sq. ft. (22.5 m^2)





Conclusions

First clinical use of OTTAVA Robotic Surgical System

5 of 6 sites used non-robotic ORs

All endpoints met pre-established success criteria

Procedure completed in all 30 subjects; no conversions or unexpected use of manual laparoscopy

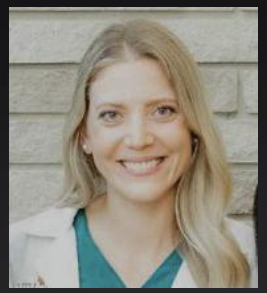
Two adverse events related to the investigational device, both resolved by placing a suture and continuing the procedure

First clinical trial of OTTAVA evaluated ability to complete the RYGB procedure, and all endpoints met pre-established success criteria

Team Effort

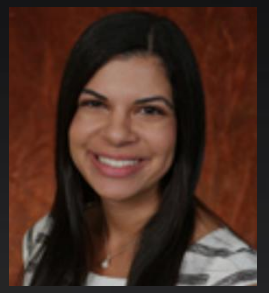
Erik B. Wilson, MD

Oscar O. Olavarria, MD



Melissa Felinski, DO

Andre F. Teixeira, MD



Estela Abich, MD

Collin E.M. Brathwaite, MD

Ranjan Sudan, MD

Shaina Eckhouse, MD

Dimitrios Stefanidis, MD

Tarik Yuce, MD

Christopher DuCoin, MD

MEMORIAL HERMANN Texas Medical Center

Duke Regional Hospital

HEALTH Indiana University Health North Hospital

Orlando Regional Medical Center Orlando Health

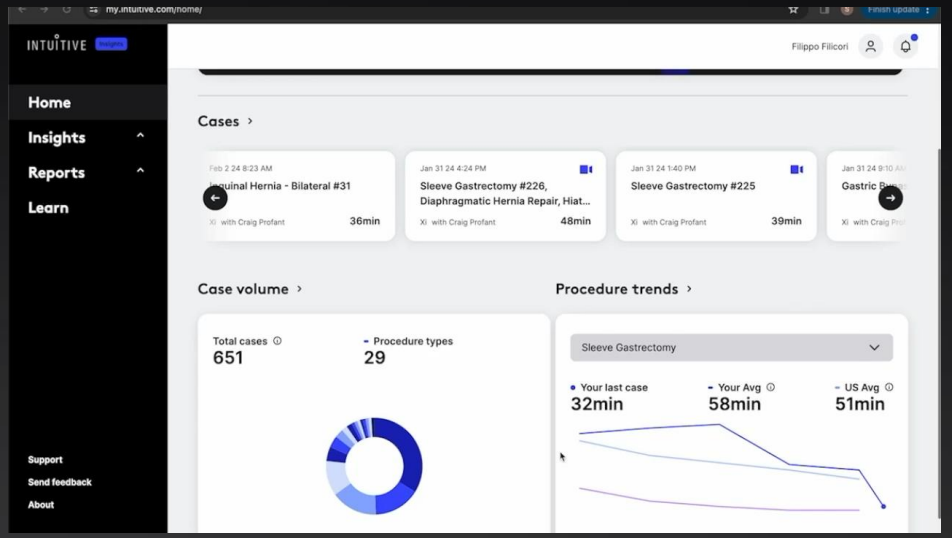
TGH Tampa General Hospital

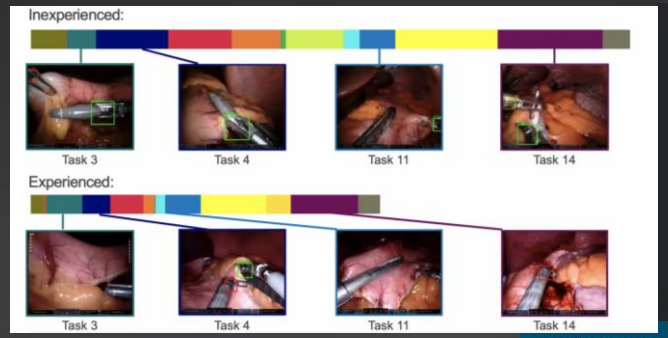
NYU Langone Health Long Island

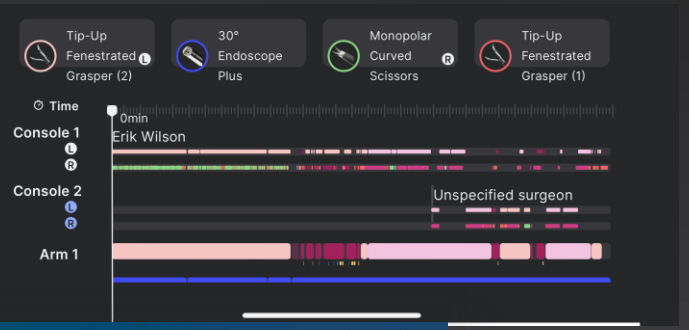
AI in Bariatric Surgery

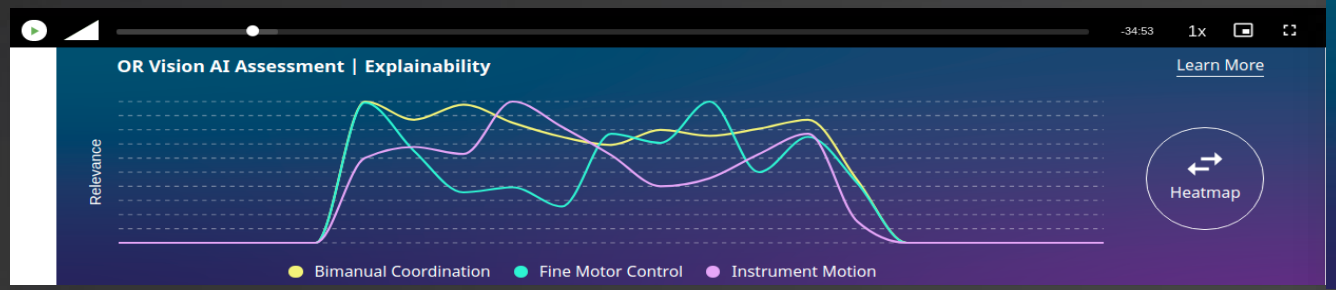
Video, Room, Kinematic, Ergonomic and EMR data

OR Black Box-Surgery Video, Room Video, EMR
Proximie-Surgery Video
Theator-Surgery Video, EMR
Touch Surgery-Surgery Video
C-SATS-Surgery Video
Activsight-Surgery Video
Versius-Surgery Video, Kinematic
Orpheus/Hub-Surgery Video, Kinematic
Apella-Room Video
Artisight-Room Video
CareSyntax-EMR
Qventus-EMR
Moon-Field and Surgeon Video

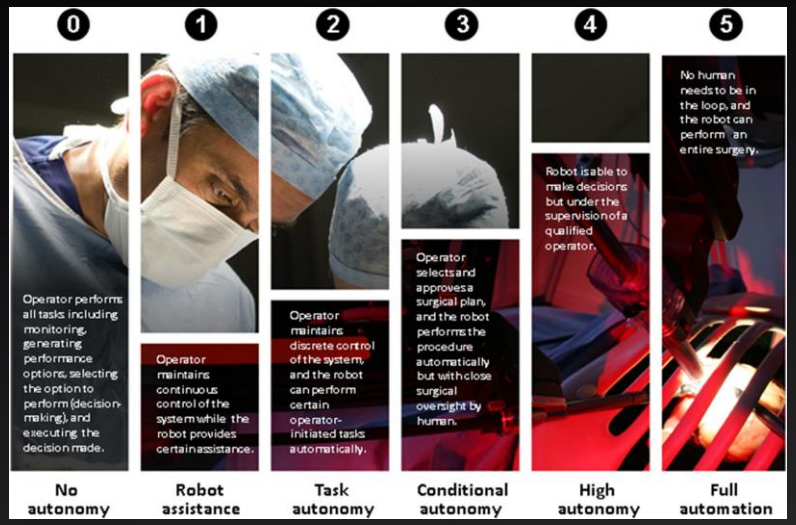


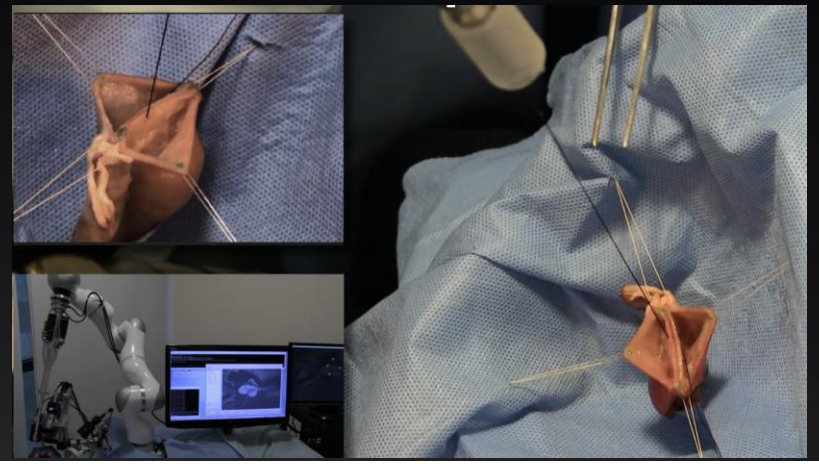


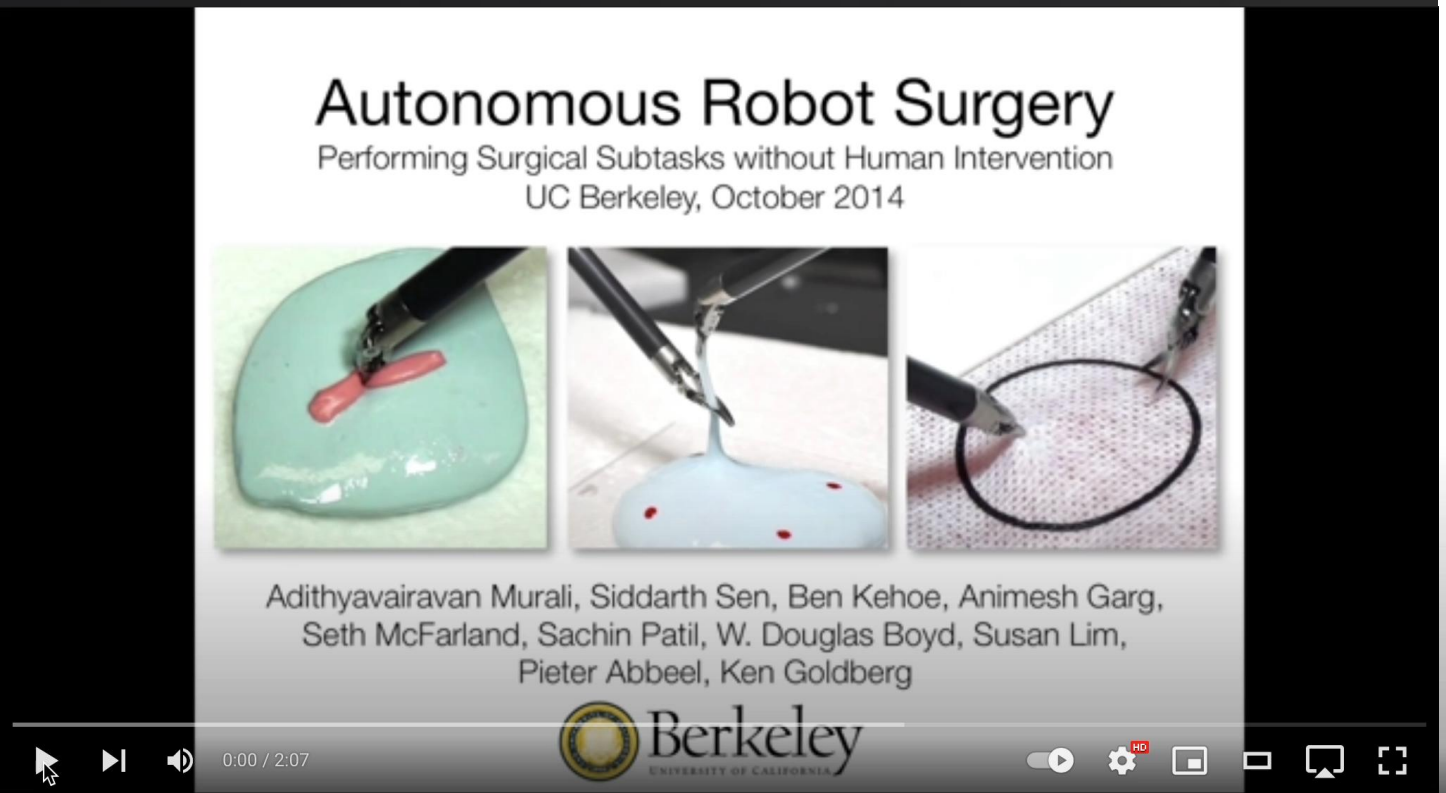




Task Autonomy







High Performance Robotics

We are still 20 minutes slower on average cases

Reduced Latency
Reverse Scaling
Rotational Scaling
Very fast instrument exchanges
More ports and arms
Multiuse instruments
Combined endolumenal and laparoscopy at one console

Telesurgery

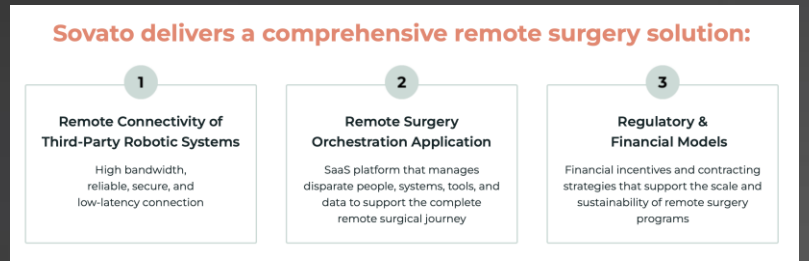
What Is the Goal of Telesurgery?

Get the skill set to the patient

Within a hospital-one surgeon available for certain tasks

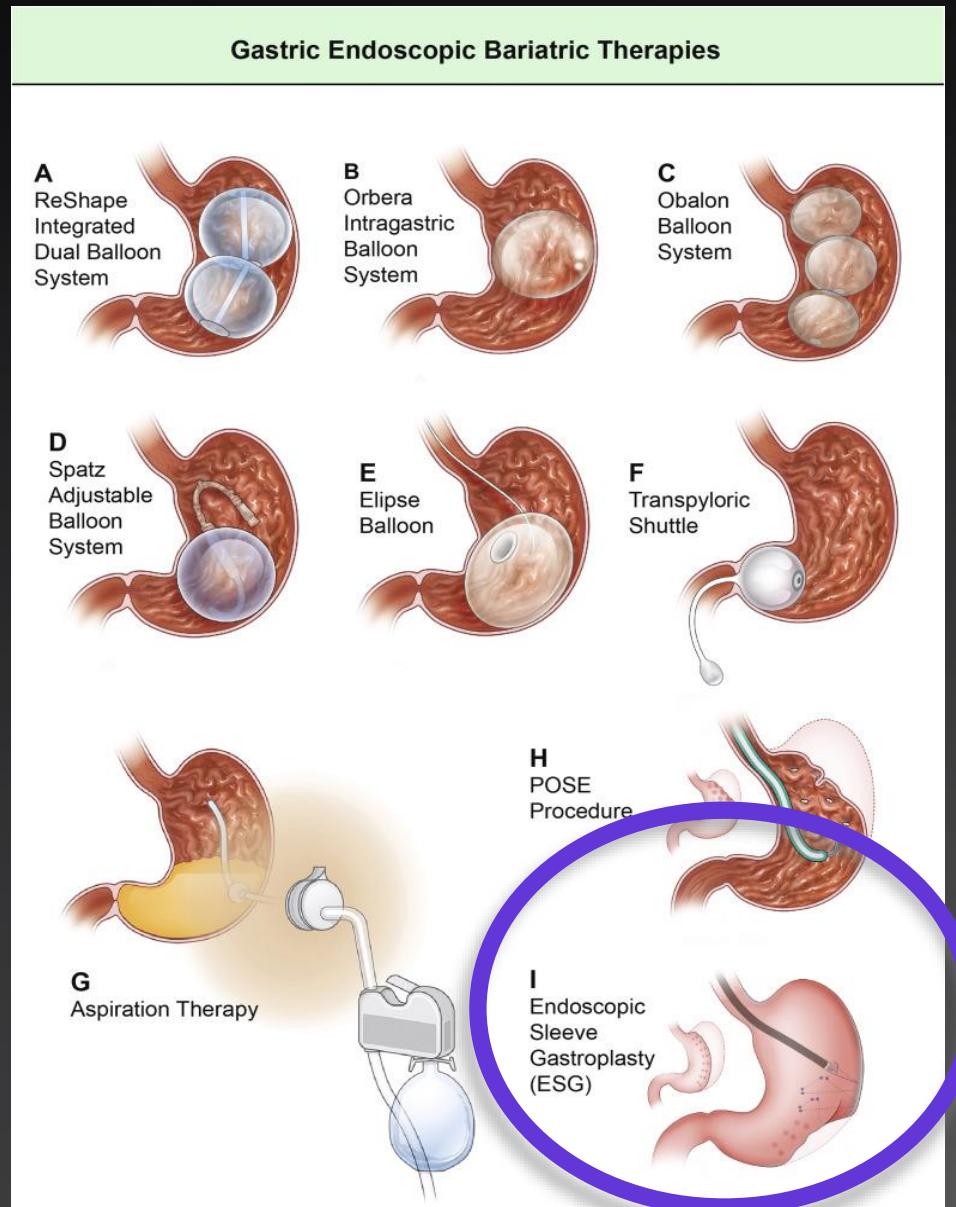
Within a hospital system-one surgeon for complex case support

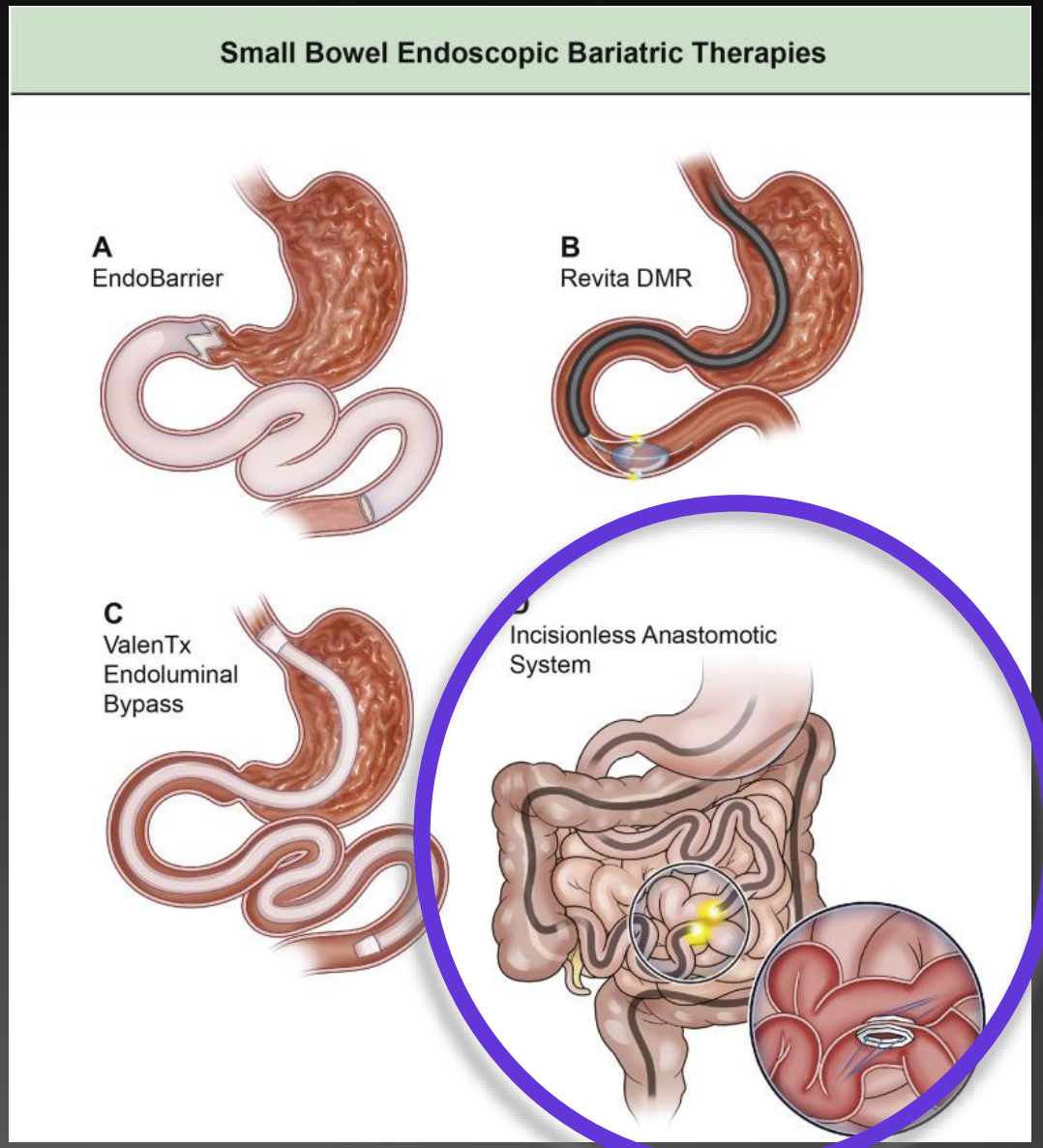
Within a region/country/global-surgeon for remote complete surgery



SOVATO

Where Are We With Endobariatrics?





Endoscopic Sleeve Gastroplasty

Endoscopic sleeve gastroplasty for treatment of class 1 and 2 obesity (MERIT): a prospective, multicentre, randomised trial

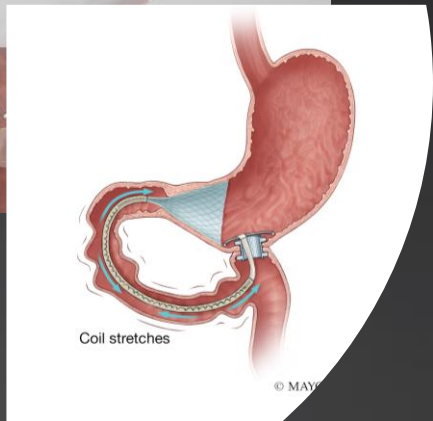
Barham K Abu Dayyeh, Fateh Bazerbachi, Eric J Vargas, Reem Z Sharaiha, Christopher C Thompson, Bradley C Thaemert, Andre F Teixeira, Christopher G Chapman, Vivek Kumbhari, Michael B Ujiki, Jeanette Ahrens, Courtney Day, the MERIT Study Group, Manoel Galvao Neto, Natan Zundel, Erik B Wilson

THE LANCET

FDA **MARKET AUTHORIZATION**

AMA CPT Category 1 Code Jan 2026

USGI POSE, Endomina, Nitinotes



MERIT Study: Excess Body Weight Loss

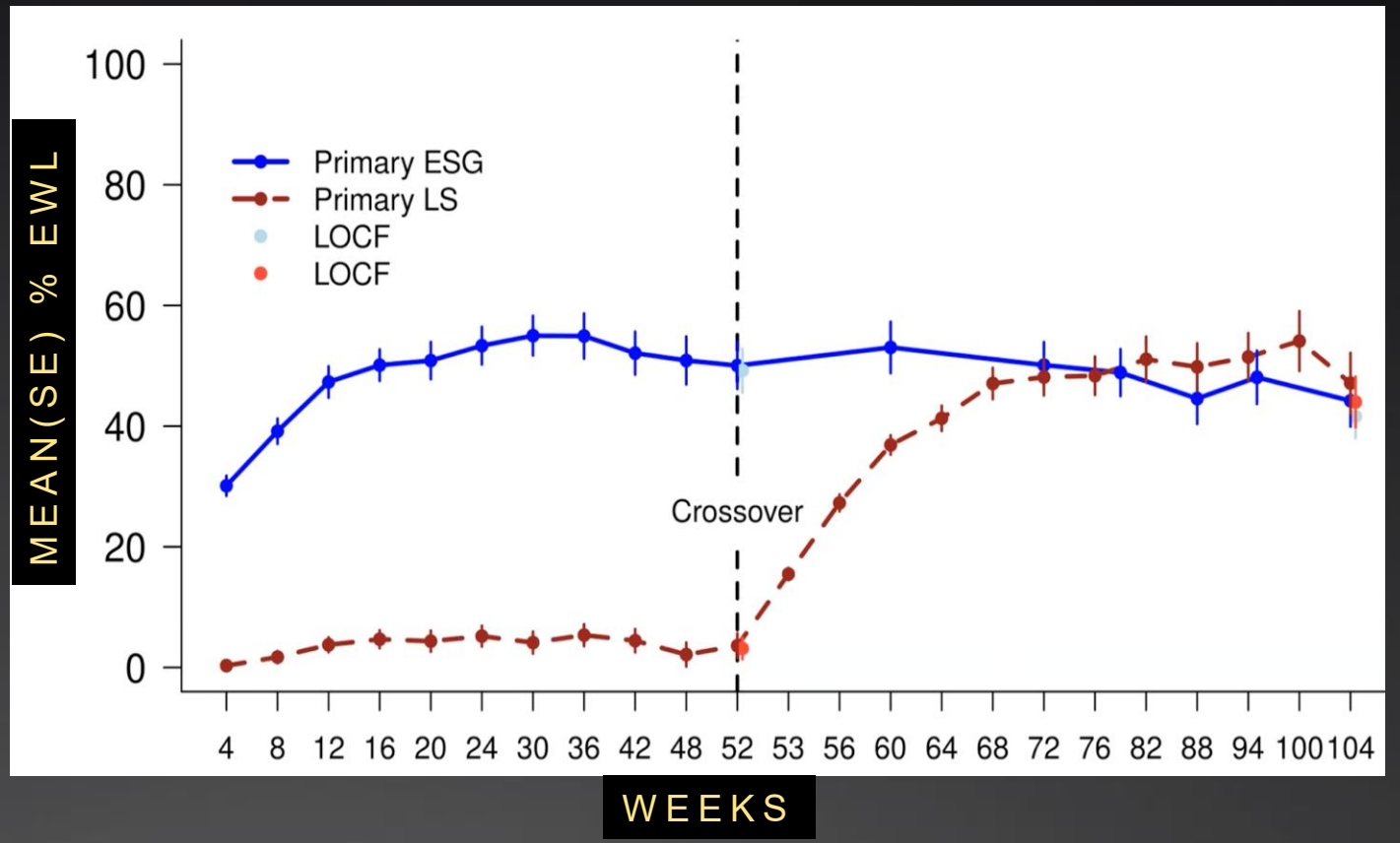
✓ Met primary efficacy endpoint

49% EBWL (±32%) demonstrated by ESG patients at 12 months; target 25%

45% Difference % EWL compared to LS patients; target minimum of 15% EWL

77% of subjects undergoing ESG achieved at least 25% EBWL

16% TBWL for responder group (±7%)



MERIT Study: Safety

✓ Met primary safety endpoint

2%

SAE rate among all ESG completers n=150
All recovered

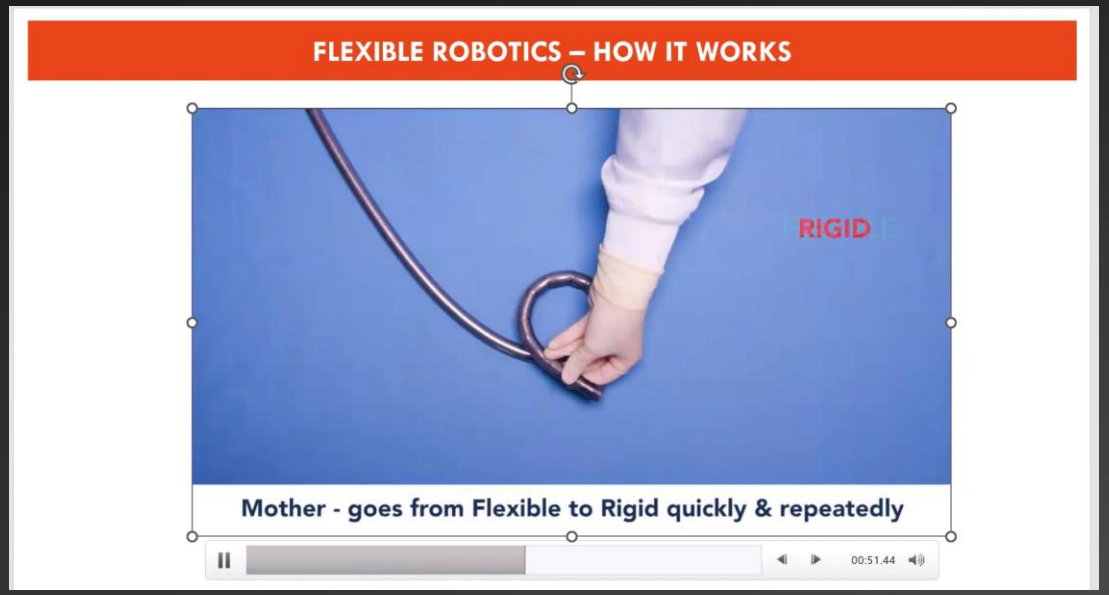
SAE Grade III Clavien-Dindo, ZERO grade IV or V

Peri-Gastric Abscess	**Upper GI Bleed**	**Malnutrition**
Endoscopy	Endoscopy	Endoscopic Reversal
Antibiotics	No transfusion	

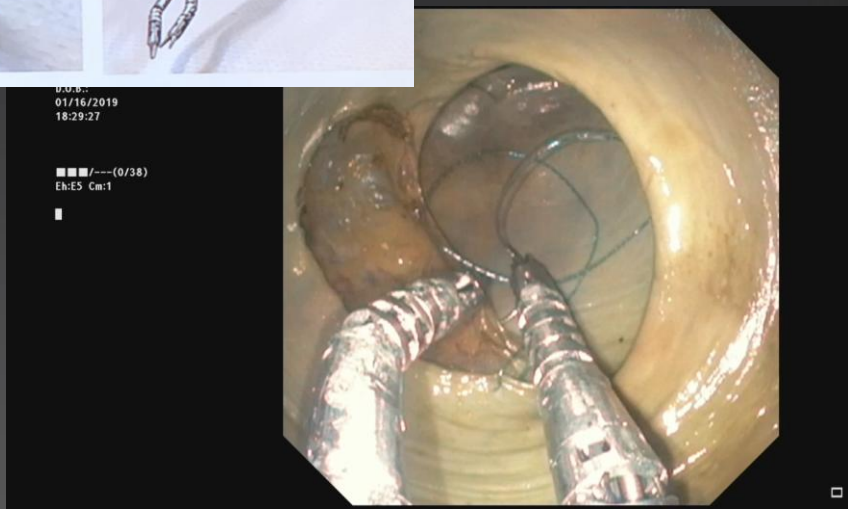
6 patients (4%) hospitalized for conservative management of accommodative symptoms

Endolumenal Robotics-Access and Actuation

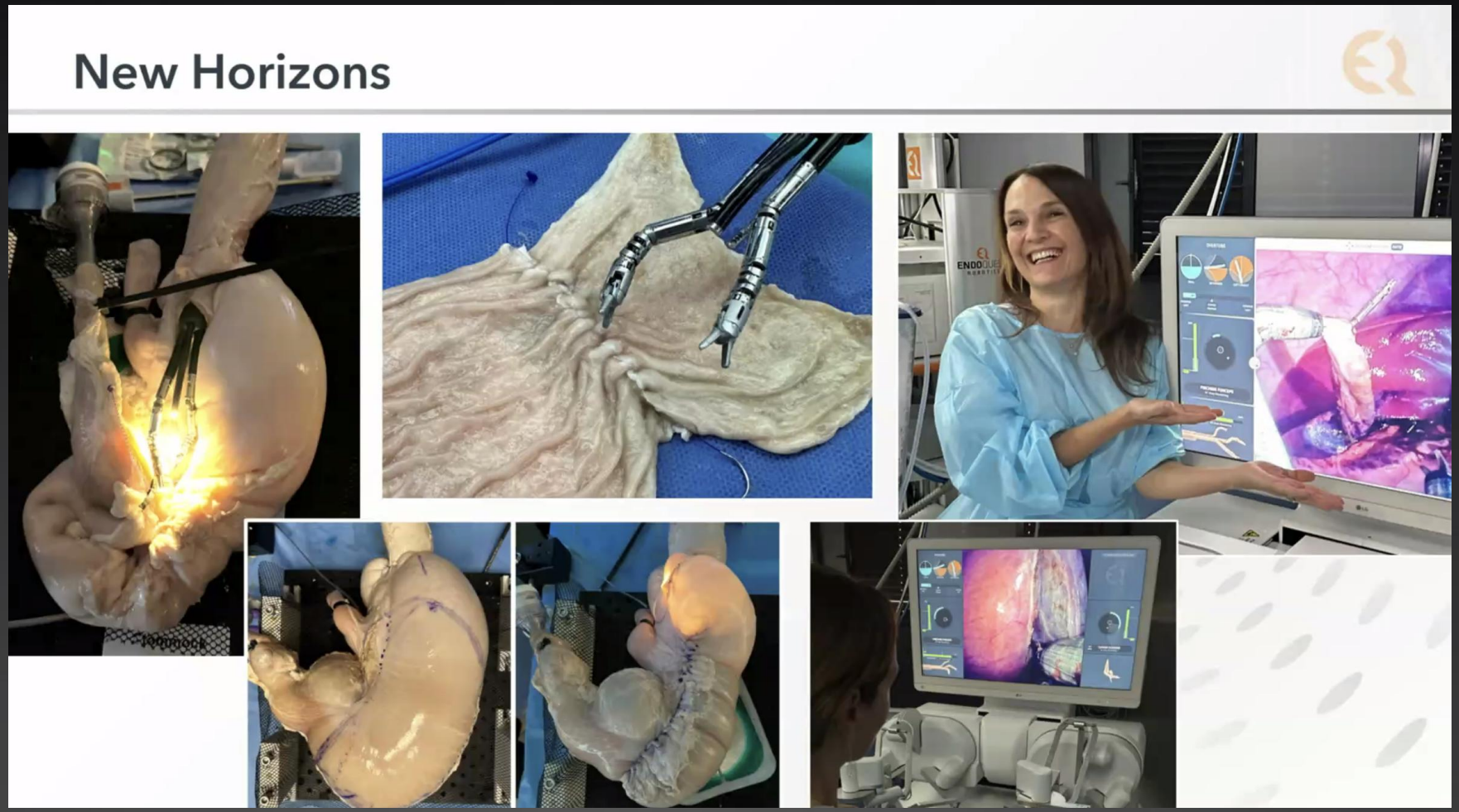
Neptune-
Digital Flexible shafted transoral or transanal with robotic driven camera



Endoquest
3 arms in 1 flexible port
-Open surgeon console
-Limited excursion of arms
-Goal towards 15mm diameter and gastric length



Endoquest Robotics



Endolumenal Robotics

Medtronic

fortimedix SURGICAL

Fortimedix develops proprietary articulating instrument technology that it says “challenges conventional methods.” The company aims to set a new standard for robotic and non-robotic endoscopic therapeutic intervention and minimally invasive surgery.

SWAN ENDOSURGICAL ROBOTICS

Olympus and Revival Healthcare Capital have co-founded a new company, Swan EndoSurgical, to develop an innovative endolumenal robotic system focused on advancing gastrointestinal (GI) care. The collaboration involves an initial investment of at least $65 million, with the total funding potentially reaching up to $458 million if certain milestones are achieved.

Endolumenal Robotics

Bladder access,dissection and reconstruction robot but has multiple other potential options for lumens
Not FDA cleared

GI Ion

new FDA clearance
Non clinical use
Upper GI focus

Self Forming Magnetic Technology Evolution

- Fully Laparoscopic Delivery and Immediate lumen

UTHealth
The University of Texas
Health Science Center at Houston

Surgery vs Endoscopy? No Surgery and Endoscopy

Currently bariatric surgery is uniquely capable of efficient and reliable resectional and anastomotic techniques that aren't manageable exclusively with endoscopy-–yet

"Organ sparing" interventions are attractive to patients

Reduced or no incisions are attractive to patients so endoscopic and laparoscopic approaches should progress together

Laparoscopic surgery is not disappearing but will continue to evolve with combined approaches with endoscopic hybridization—ultimately CELRS!

Magnets make sense through multiple access sites and have the potential to make anastomoses safer and more efficient for both surgeons and endoscopists at varying skill levels.

The Big Ideas

- The last 25 years robots hasn't changed dramatically in its form and function—Until NOW
- Digitization of the OR—engaging visual, kinematic, autonomy, telesurgery
- Endolumenal growth—just pick up the scope, it will become increasingly important in bariatric surgery and also robotic
- Combined laparoscopic and endoscopic approaches—surgeons have the advantage
- Ergonomics—ignoring our own health hurts our patients
- Higher performance robotic systems with more choices-Raising the ceiling and not just the floor
- Innovation is still occurring in GI and bariatric surgery

Telesurgery, Magnets, New Robots

SURGICAL DISRUPTIVE TECHNOLOGY SUMMIT

www.surgicaldisruptivetechsummit.org

Erik B. Wilson, MD, FACS
Professor and Vice Chair of Surgery
Division Chief, Minimally Invasive Surgeons of Texas
University of Texas Health Science Center at Houston

The 11th Annual Surgical Disruptive Technology Summit is the preeminent forum for innovation in general minimally invasive surgery bringing together entrepreneurs, venture capitalists, surgeons, and medical device companies all in one place to showcase new ideas, products and procedures. There will be multiple in depth panels in surgical robotics, endolumenal surgery, artificial intelligence, surgical training and many more.

THANK YOU
February 17-21, 2027
Houston Texas

MIST Minimally Invasive Surgeons of Texas | UTHealth The University of Texas Health Science Center at Houston | McGovern Medical School