



# Advancements in Colorectal Surgery: The Art of Robotic Surgery

Kellie E. Cunningham, MD, FACS, FASCRS

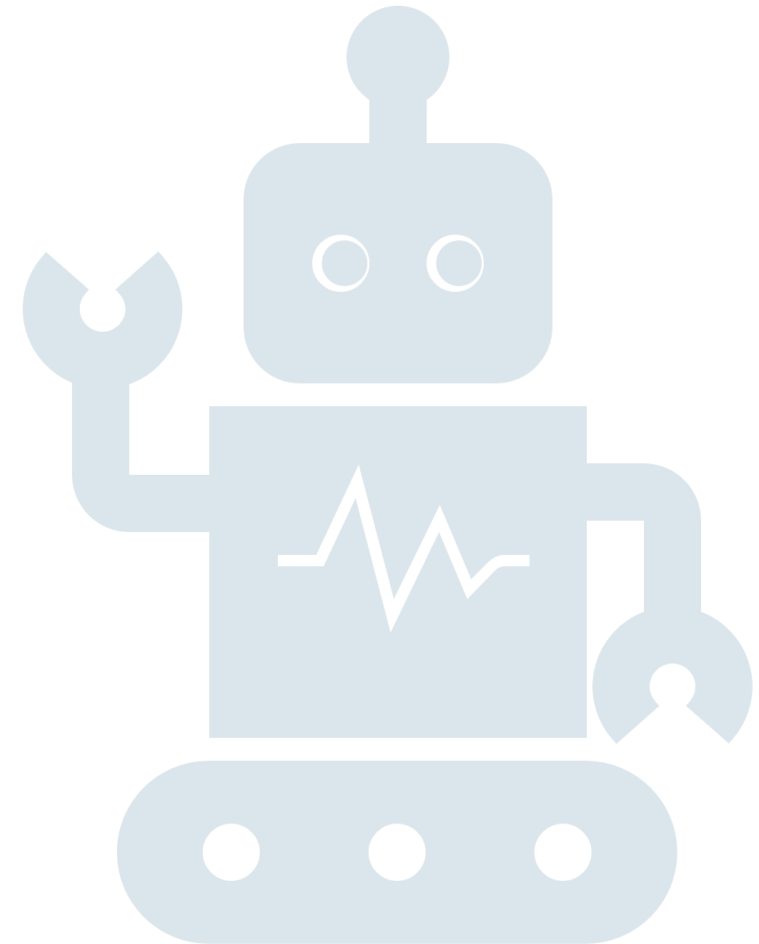
Assistant Professor

Division of Colon & Rectal Surgery

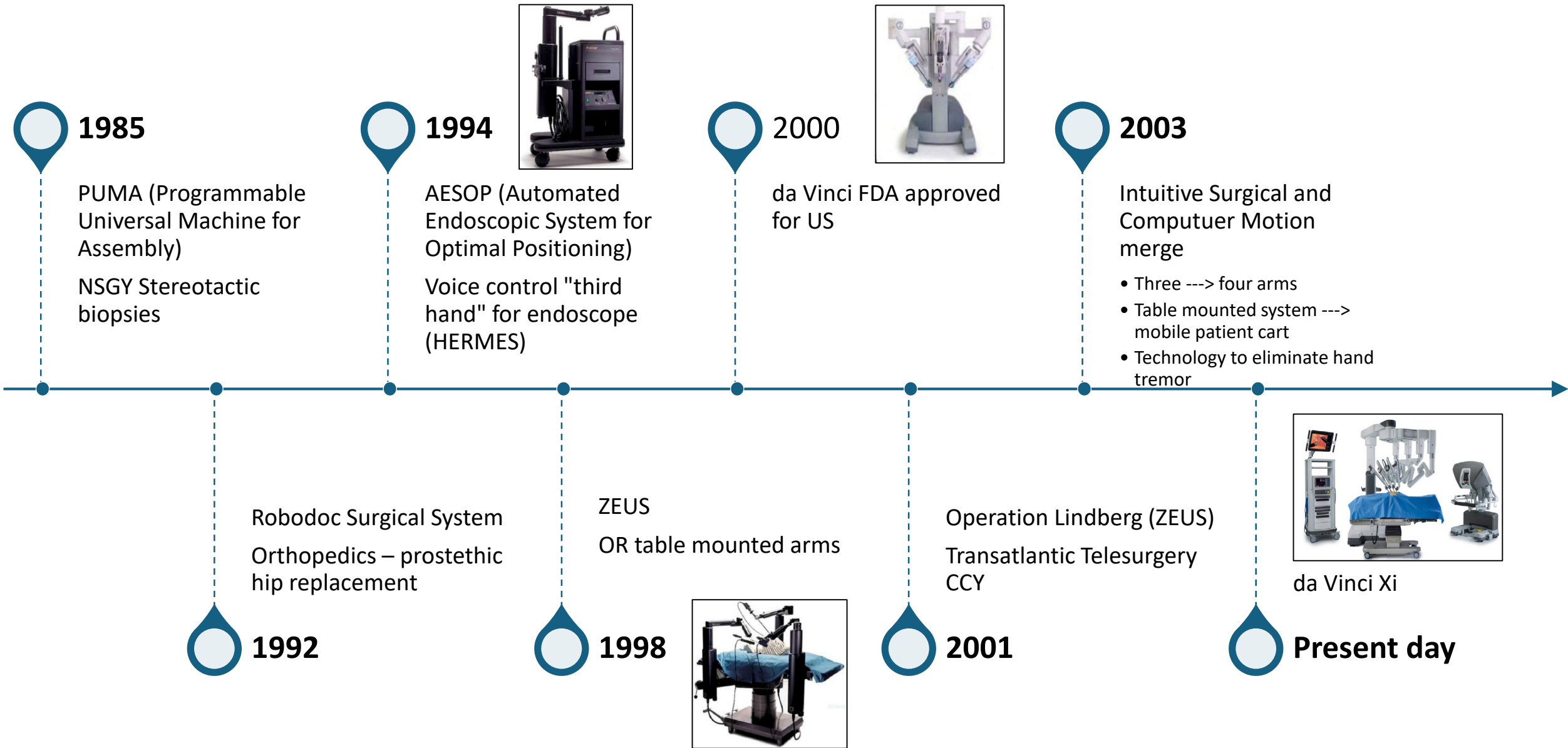
University of Pittsburgh Medical Center

# What is a Robot?

A machine resembling a human being and able to replicate certain human movements and functions automatically.



# Evolution of Surgical Robotics





# Advantages of Robotic Surgery

- Traditionally, CRS is performed via an open approach
- Many surgeons have transitioned to do this laparoscopically
  - Instruments open/close/rotate, but are fixed onto the straight stick
  - Two hand control
- Robotic surgery IS laparoscopic surgery
  - The instruments and camera are mounted to the robot. The robot is then controlled by the surgeon at the console
  - Instruments are wristed – 70 degrees freedom of motion – excellent dexterity
  - Hi-def 3D camera – excellent visualization
  - Three hand control – not dependant on assistant
  - Surgeon is seated at console – good ergonomics, prevents fatigue





# Surgical Robot Inquiries & Myths

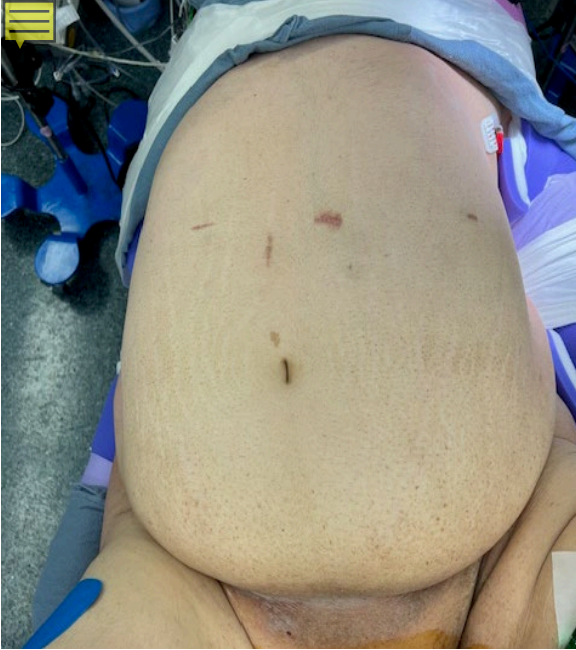
- Who is doing the surgery – the surgeon or the robot?
  - The technology translates my hand movements at the consol into fine movements at the robot.
- Is the surgeon in the room?
  - The surgeon console is 5ft from the patient on the OR table
  - The surgical assist (resident/fellow) is scrubbed at the bedside
- What if a malfunction occurs?
  - The robot has multiple safety checks and failsafes to ensure it is functioning properly.
- The patient is not a candidate for minimally invasive surgery due to history of laparotomy or several abdominal operations.
  - Fake news!



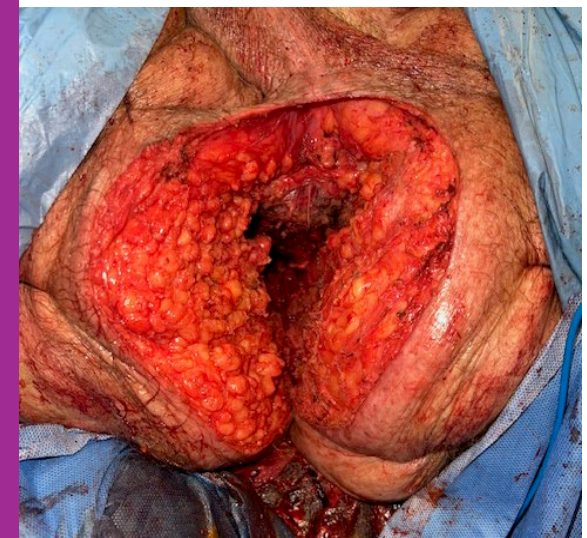
# Shining Moments

- APR/completion proctectomy
- Intracorporeal anastomosis
  - Right
  - Left
- End stoma reversals

# APR/Completion Proctectomy



- Ideal approach for morbidly obese patients
  - Narrow, deep pelvis
- Eliminates abdominal extraction incision
  - Specimen is removed via perineal incision
  - Virtually eliminates hernia risk
  - Hastens recovery





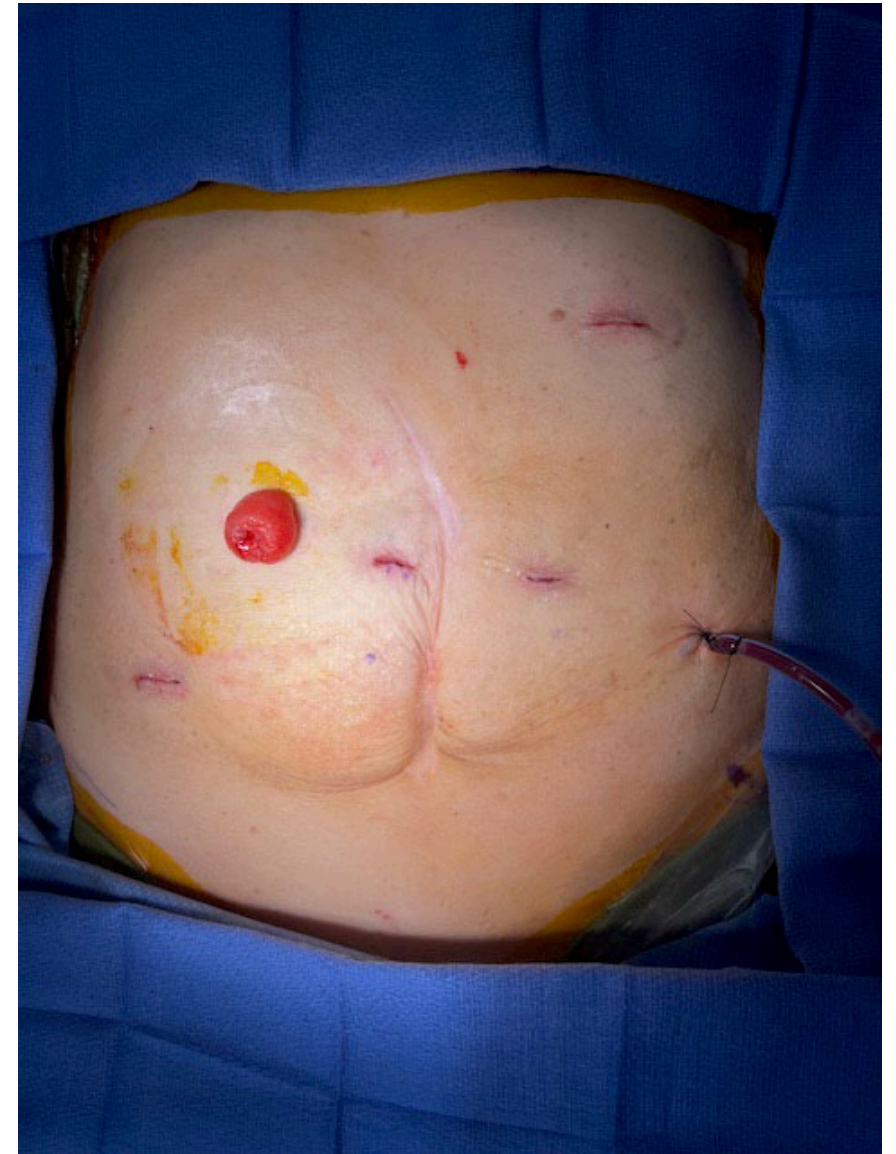






1 TIP-UP FENESTRATED GRASPER      2 CARTON WIPER      3      4 MONOPOLAR CURVED SCISSOR

- Ideal approach if history of complex hernia repair/abdominal wall closures
- Eliminates abdominal extraction incision
  - Specimen is removed via perineal incision
  - Virtually eliminates hernia risk
  - Hastens recovery





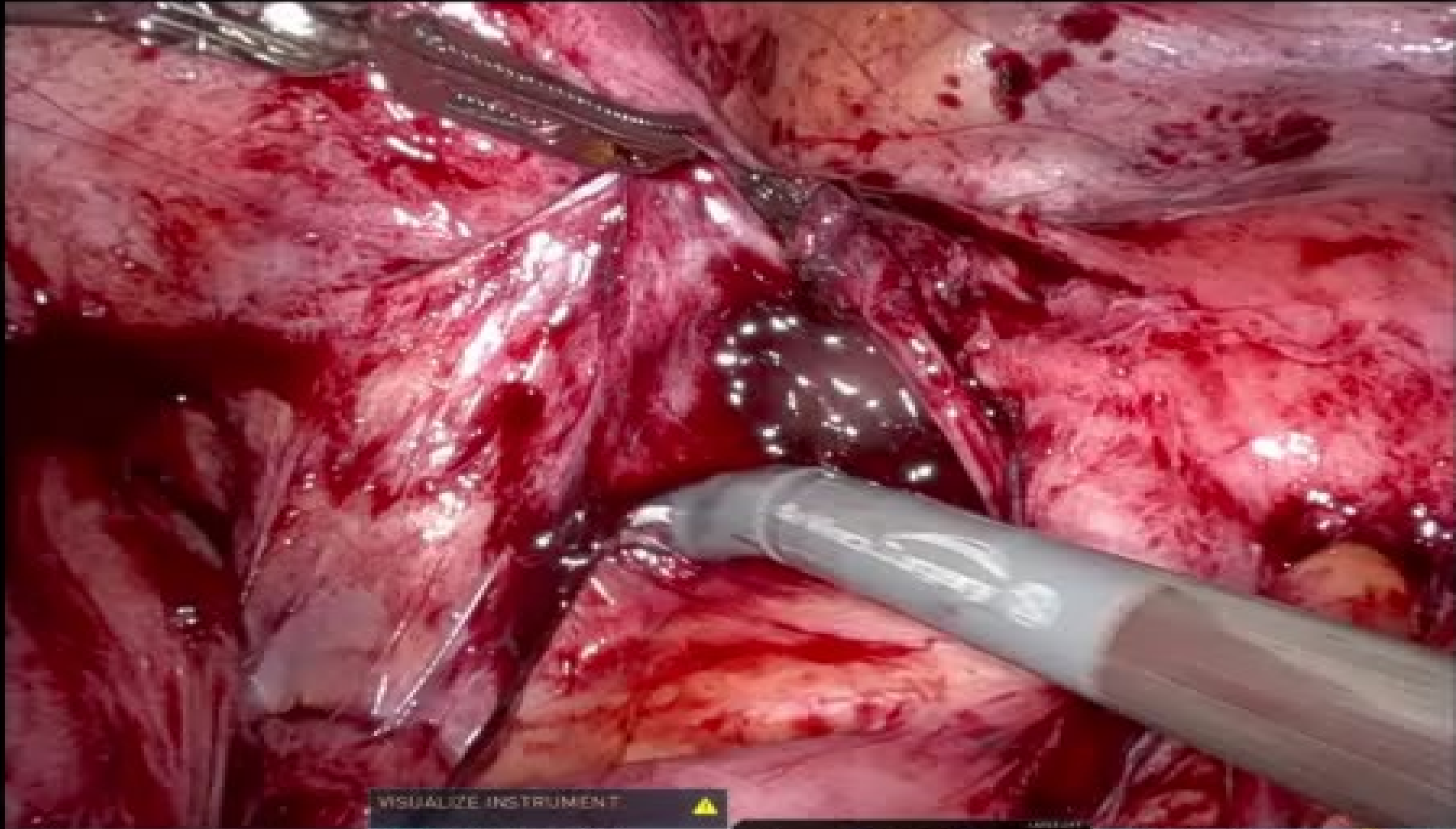
1 TIP-UP FENESTRATED GRASPER


2 FENESTRATED BIPOLAR FORCEPS

3

4 MONOPOLAR CURVED SCISSORS






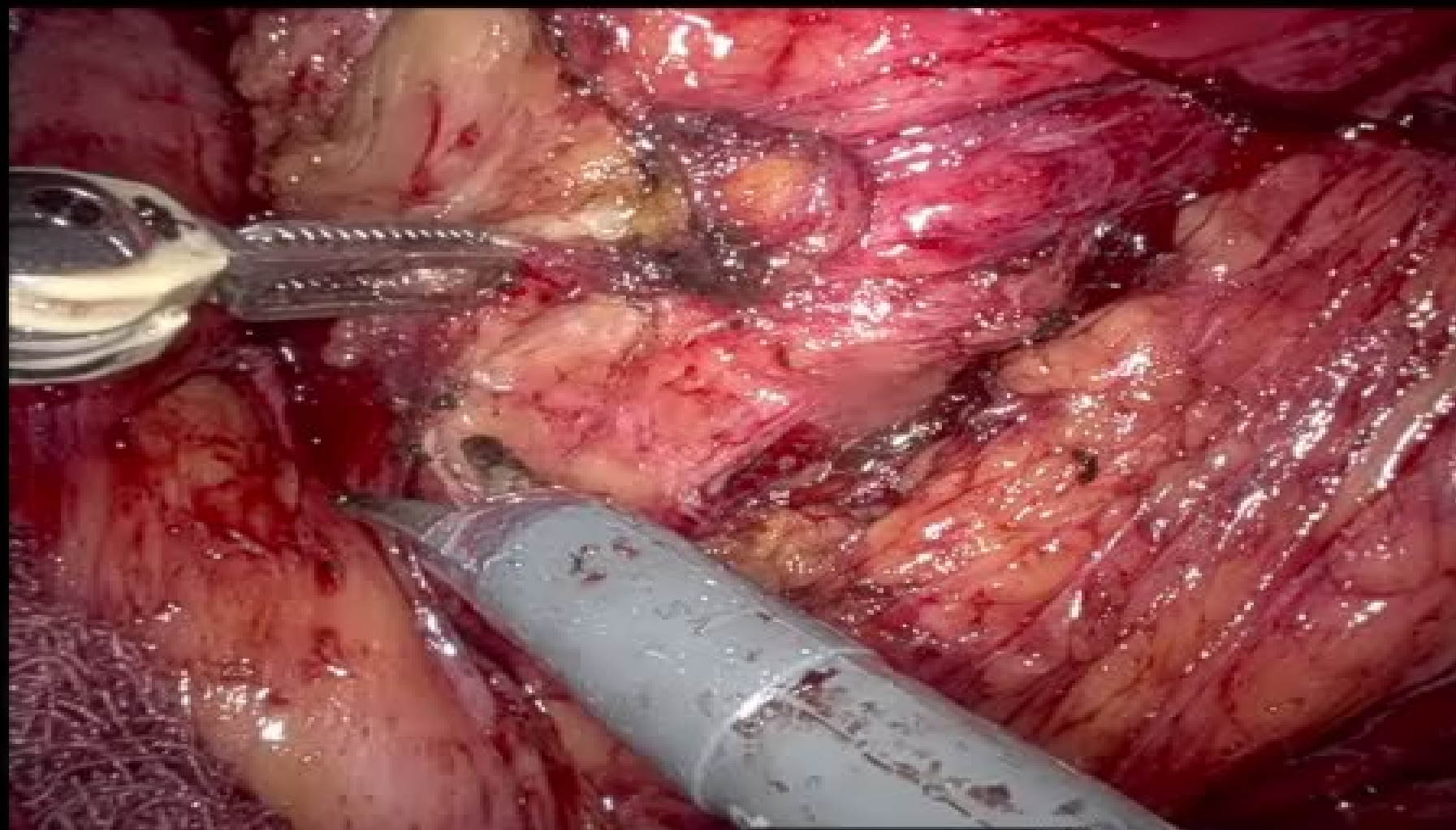
VISUALIZE INSTRUMENT 

1 TIP-UP FENESTRATED GRASPER

2 FENESTRATED BIPOLAR FORCEPS

3  IN 3.0"

4 MONOPOLAR CURVED SCISSORS 



1 TIP-UP FENESTRATED GRASPER

2 FENESTRATED BIPOLAR FORCEPS

3

4 MONOPOLAR CURVED DISSECTOR



1 TIP-UP FENESTRATED GRASPER

2 FENESTRATED BIPOLAR PERCEPT

3

4 MONOPOLAR CURVED SCISSORS





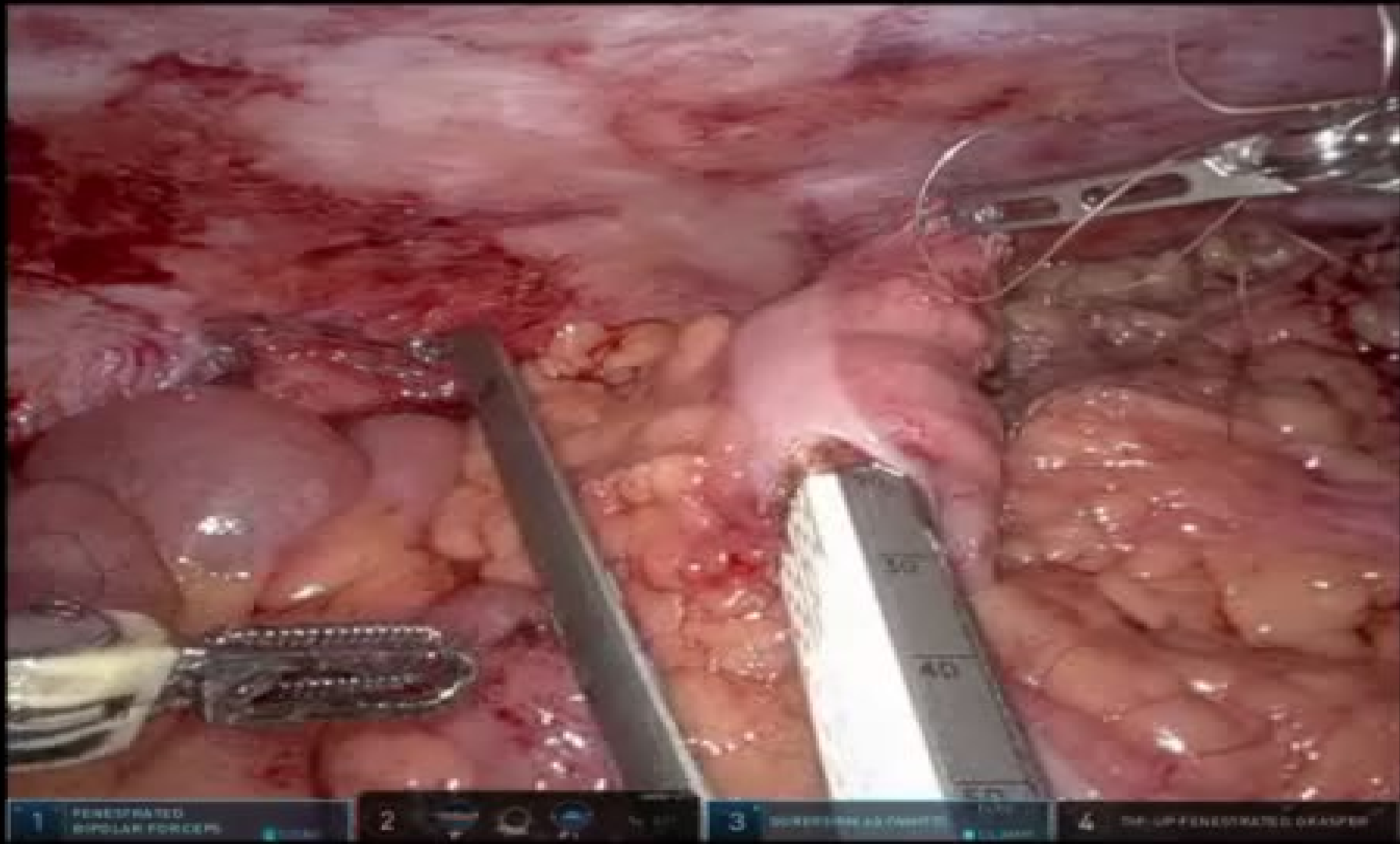
# Intracorporeal Anastomosis

- Increases efficiency of procedure
- Prevents the need to undock/redock (particularly for left sided resections)
- Less mobilization needed
- Off-midline extraction





# Intracorporeal Anastomosis – Right Colon

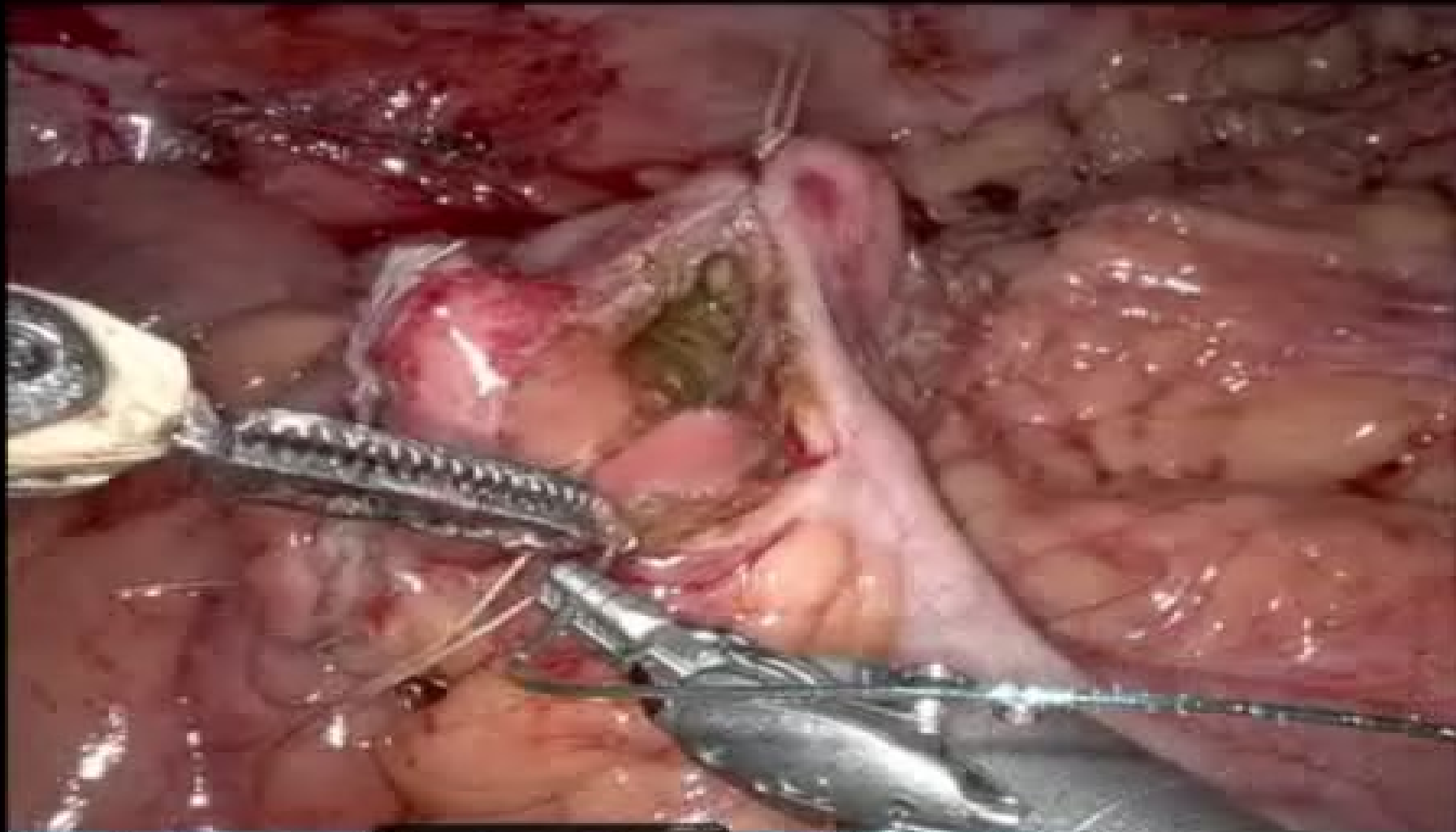


1 PERFORATED BIPOLAR FORCEPS

2 [Icon]

3 PERFORATOR

4 THE UP-PERFORATED GRASPER



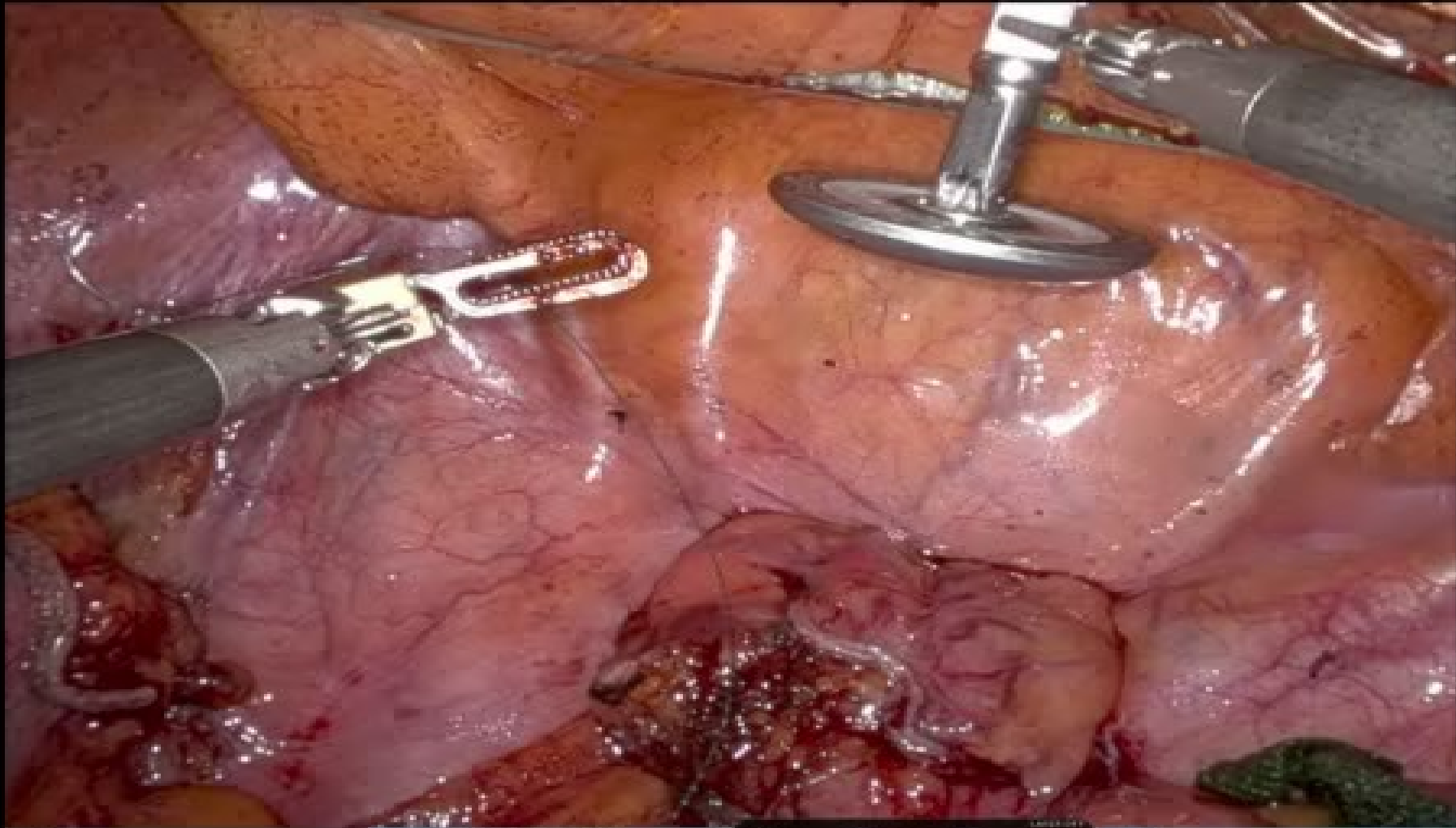
1 PERFORATED BIPOLAR FORCEPS

2

3 LARGE MUSCLE BELLY

4 PICK UP FENESTRATED DRAPE

# Intracorporeal Anastomosis – Left Colon



1 TIP-UP FENESTRATED GRASPER

2 FENESTRATED BIPOLAR FORCEPS

3

4 LARGE SUTURECUT NEEDLE DRIVER







1 TIP-UP FENESTRATED GRASPER

2 FENESTRATED BIPOLAR FORCEPS

3



4 MONOPOLAR CURVED SCISSORS







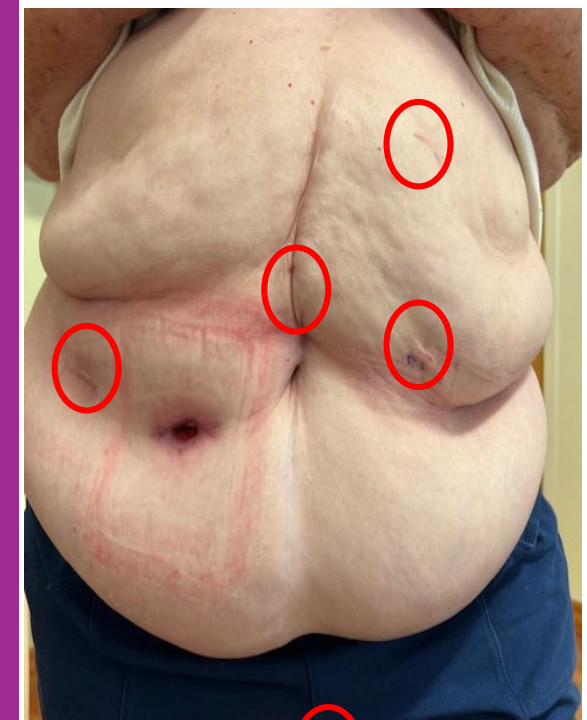




# End Stoma Reversals



- Eliminate re-entry in the midline
  - Decreased hernia risk
  - Decreased wound healing complications
- Working incision/specimen extraction via stoma aperture



Comparative Study > [Surg Endosc.](#) 2018 Jun;32(6):2894-2901.

doi: 10.1007/s00464-017-5999-6. Epub 2017 Dec 22.

## Robotic versus laparoscopic colectomy for stage I-III

colon cancer  
outcome

Katelin A Mirkin

Retrospective Cohort Study

Short- and long-term outcomes of robotic- versus laparoscopic-assisted right hemicolectomy: A propensity score-matched retrospective cohort study

Yaqi Zhang<sup>a,1</sup>, Hao  
Xiaopin Ji<sup>a</sup>, Xi Ch

Review > [J Clin Med.](#) 2022 Apr 24;11(9):2387. doi: 10.3390/jcm11092387.

## Short- and Long-Term Outcome of Laparoscopic- versus Robotic-Assisted Right Colectomy: A Systematic Review and Meta-Analysis

Peter Tschann<sup>1</sup>, Philipp  
Stephanie Adler<sup>1</sup>, Paolo  
Philipp Schredl<sup>6</sup>, Christ

Review > [Int J Colorectal Dis.](#) 2022 Jul;37(7):1497-1507. doi: 10.1007/s00384-022-04194-8.

Epub 2022 Jun 1.

## Robotic versus laparoscopic left colectomy: a systematic review

Leonardo Solaini<sup>1,2</sup>, Antonio Boc  
Davide Cavaliere<sup>4</sup>, Giorgio Ercola

## Robotic and laparoscopic colectomy: propensity score-matched outcomes from a national cancer database <sup>FREE</sup>

Sameh Hany Emile, Nir Horesh, Zoe Garoufalia, Rachel Gefen, Peige Zhou, Victor Strassman, Steven D Wexner ✉

*British Journal of Surgery*, Volume 110, Issue 6, June 2023, Pages 717-726,  
<https://doi.org/10.1093/bjs/znad096>



**The robot costs more.**



**Is it safe?**



**The robot takes longer.**



**Does the robot compromise outcomes?**







# Closing Thoughts

- No consensus on which minimally invasive platform for CRS is superior, if at all.
- The robot is a tool used to enhance outcomes, improve efficiency, navigate technical challenges, and pioneer growth in the field.
- Learning curve dictates comfortability, proficiency, willingness to tackle 'of-the-beaten-path' cases
- Future directions
  - Maximum ERAS – same day discharge for robotic colectomies

> [Am J Surg.](#) 2023 May;225(5):826-831. doi: 10.1016/j.amjsurg.2023.01.024. Epub 2023 Jan 21.

**Beyond enhanced recovery after surgery (ERAS):  
Evolving minimally invasive colectomy from multi-  
day admissions to same-day discharge**

Michael M Vu <sup>1</sup>, Karleigh R Curfman <sup>2</sup>, Gabrielle E Blair <sup>3</sup>, Chirag A Shah <sup>4</sup>, Laila Rashidi <sup>5</sup>

# THANK YOU

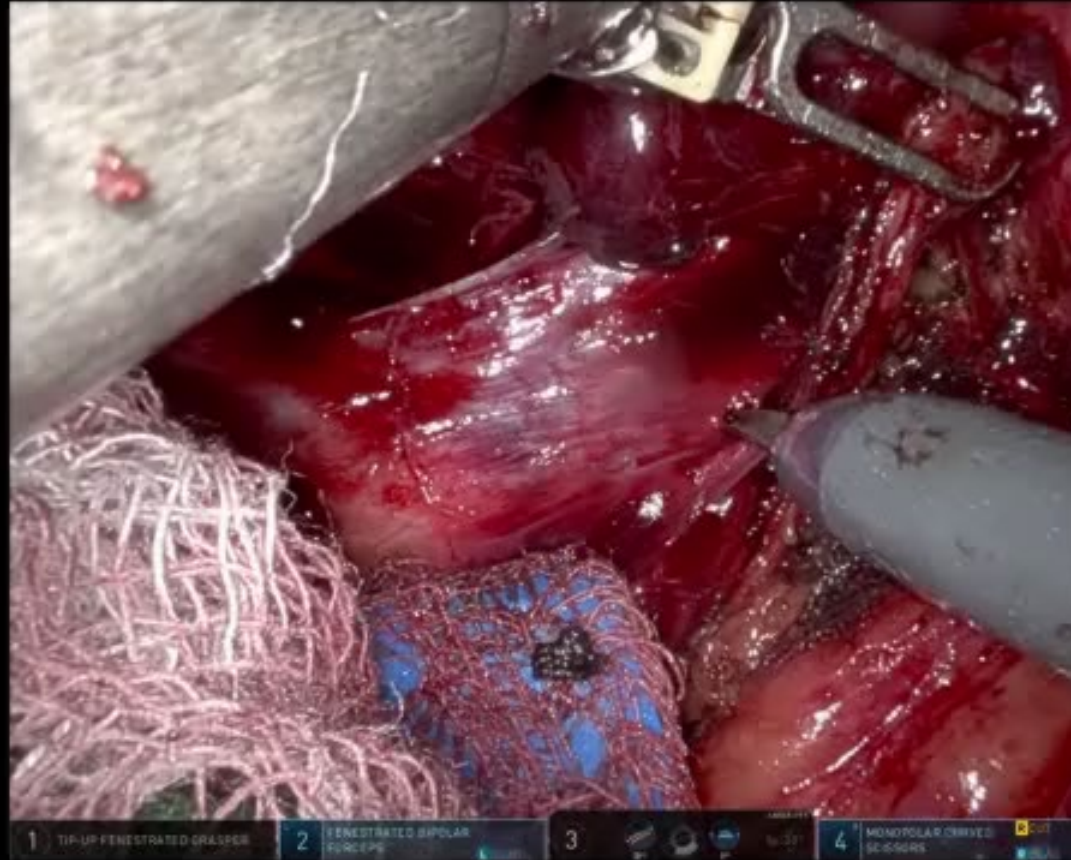
[cunninghamke@upmc.edu](mailto:cunninghamke@upmc.edu)

**UPMC**  
LIFE CHANGING MEDICINE





LOA –



# Cost: Lap vs Robo