Novel Robotic Techniques for Endoscopic Resection of Large Polyps

Joe Carmichael, MD | February 2, 2018

10th Annual Gastroenterology & Hepatology Symposium

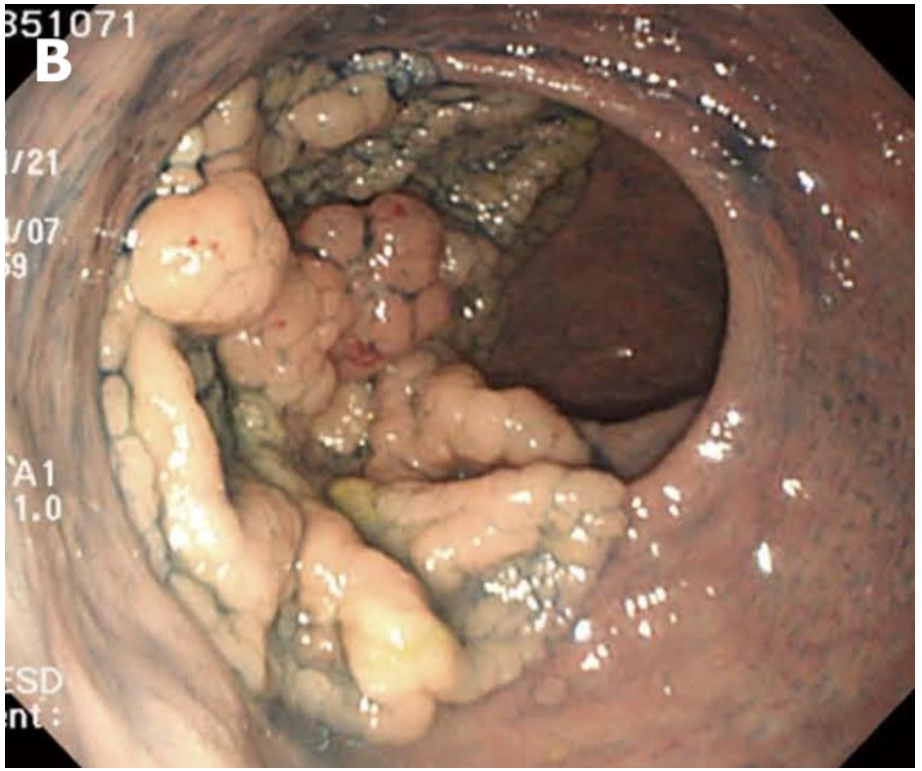
UC Irvine Health
School of Medicine

Disclosures

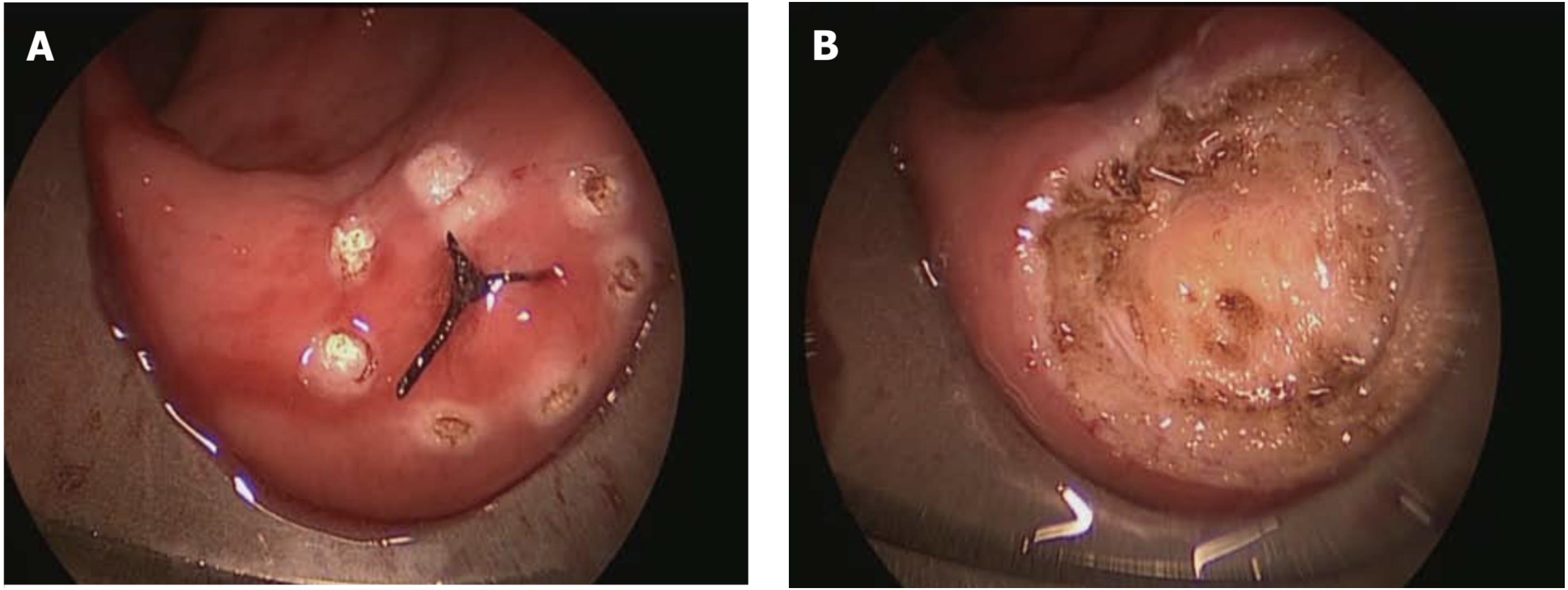
- Medrobotics

Large Polyps

- Some large rectal polyps (and many early rectal cancers) cannot be removed endoscopically
- These patients are frequently referred for surgical excision
- Surgical options have traditionally included:
  - Transanal excision (TAE)
  - Transanal endoscopic microsurgery (TEM)
  - Transanal Minimally Invasive Surgery (TAMIS)



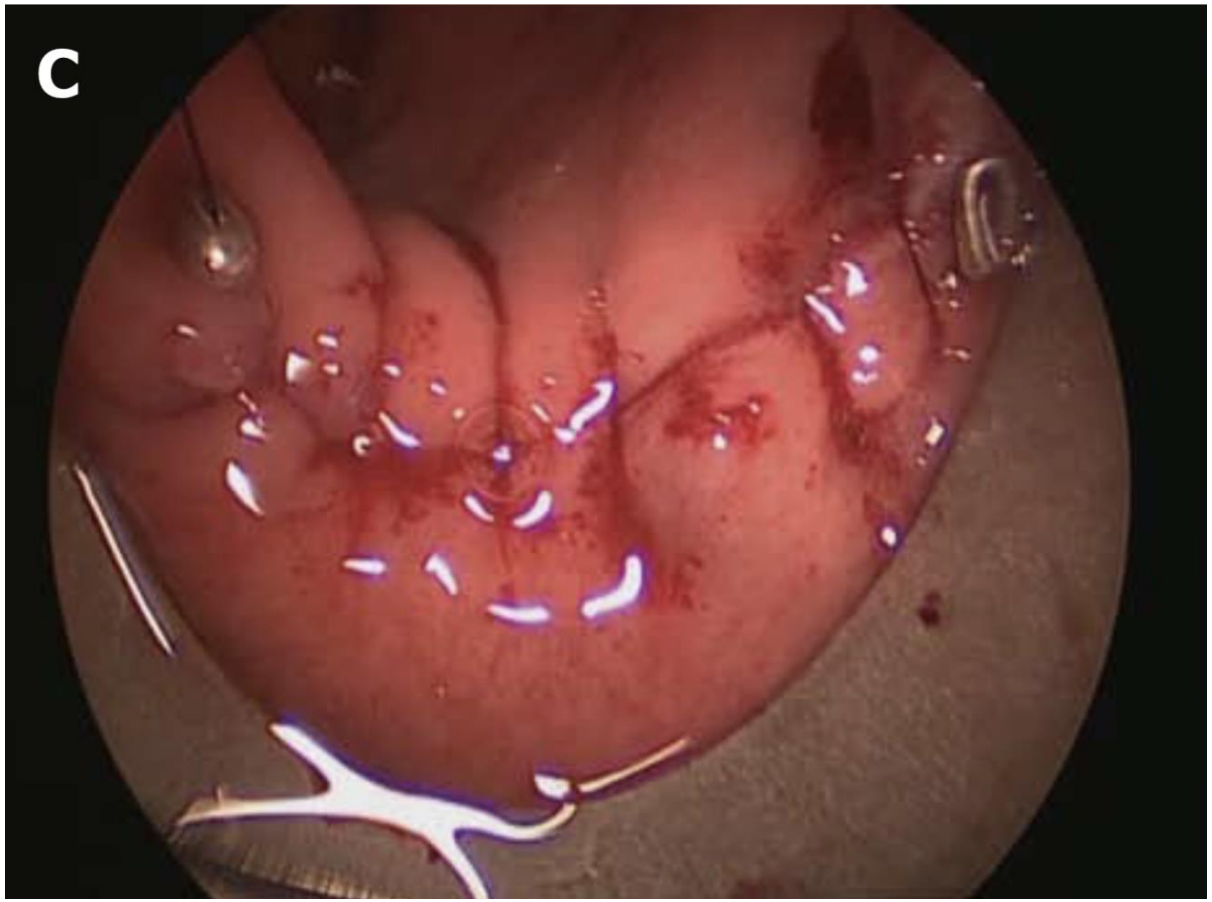
TEM of Neuroendocrine Tumor

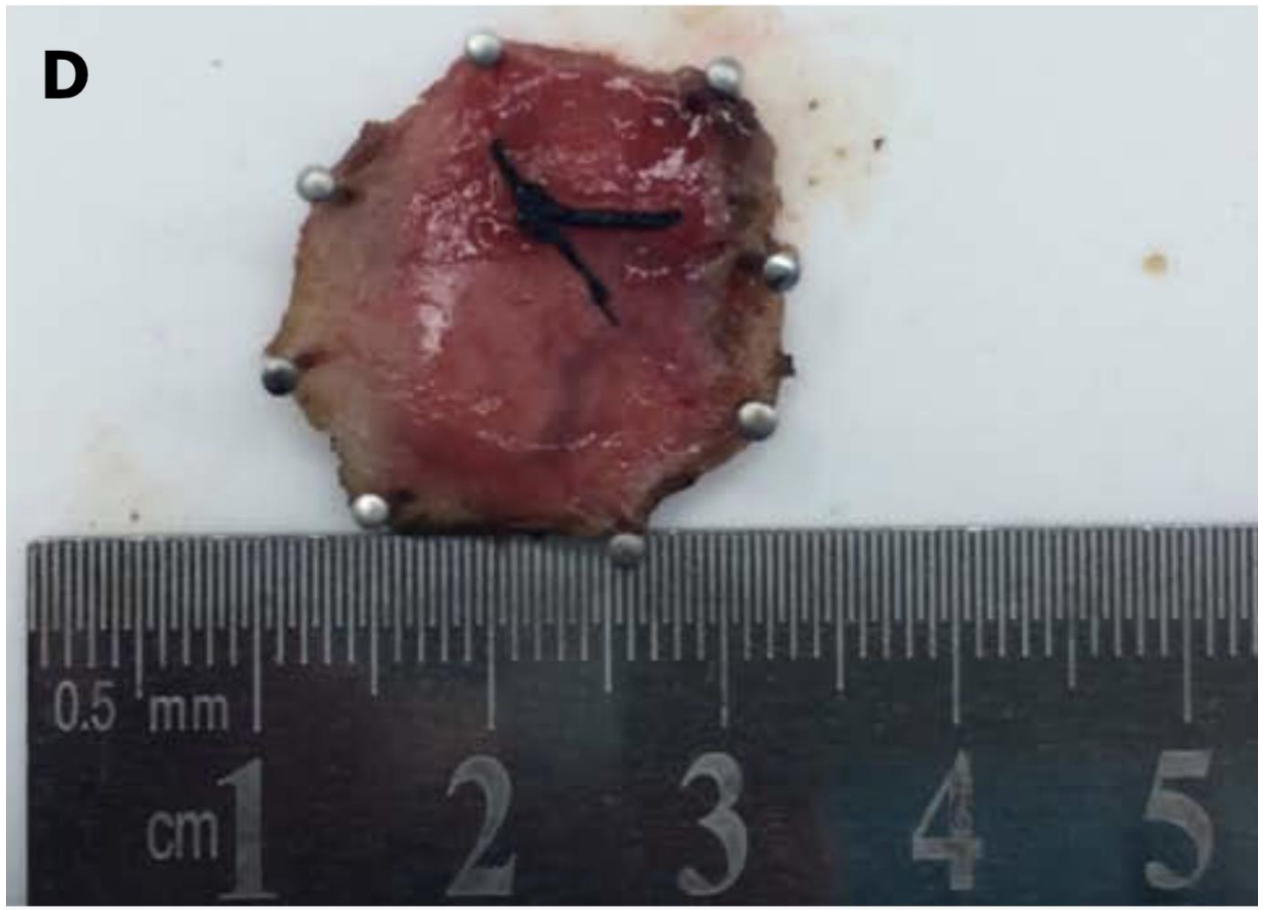


Chen WJ et al. World J Gastroenterol 2015.

UC Irvine Health
School of Medicine

TEM of Neuroendocrine Tumor

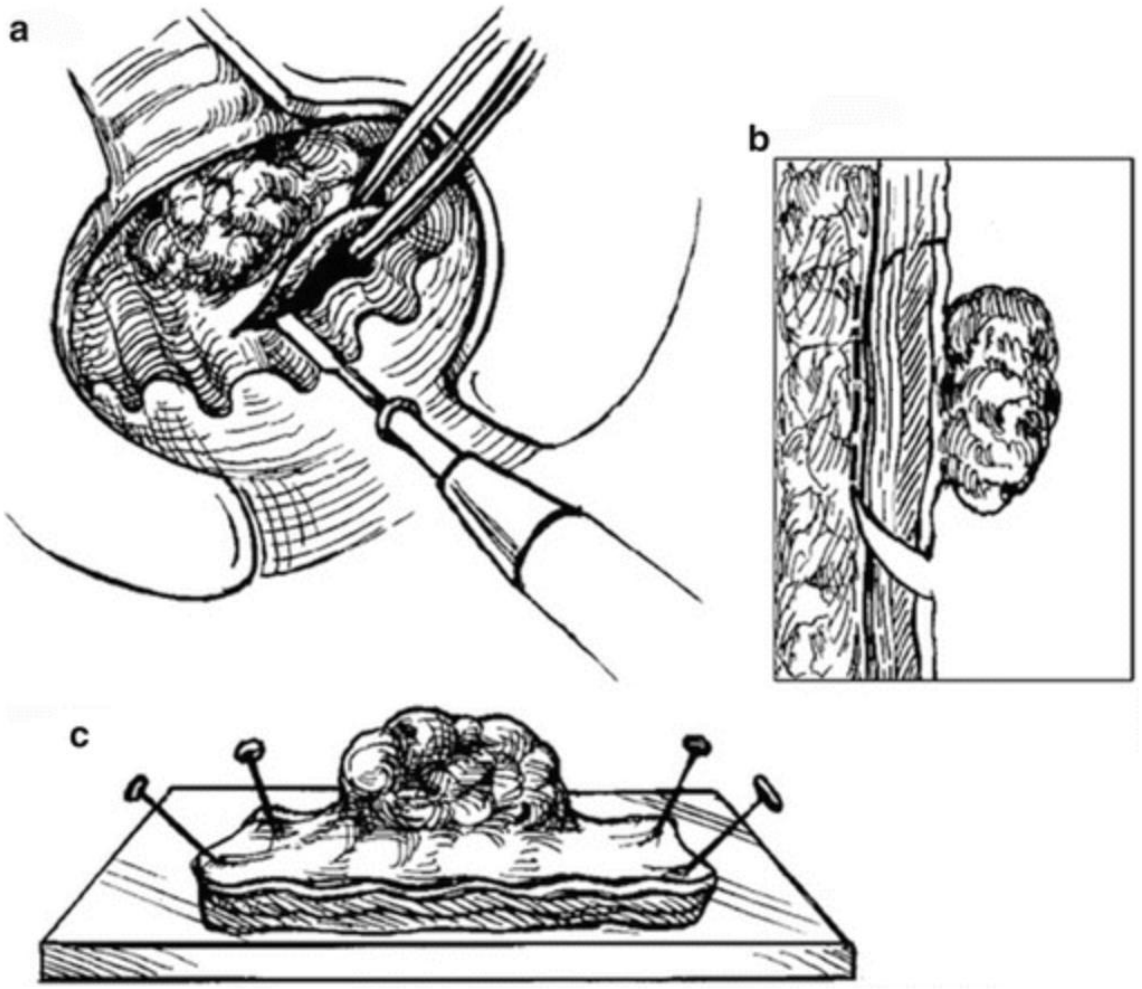




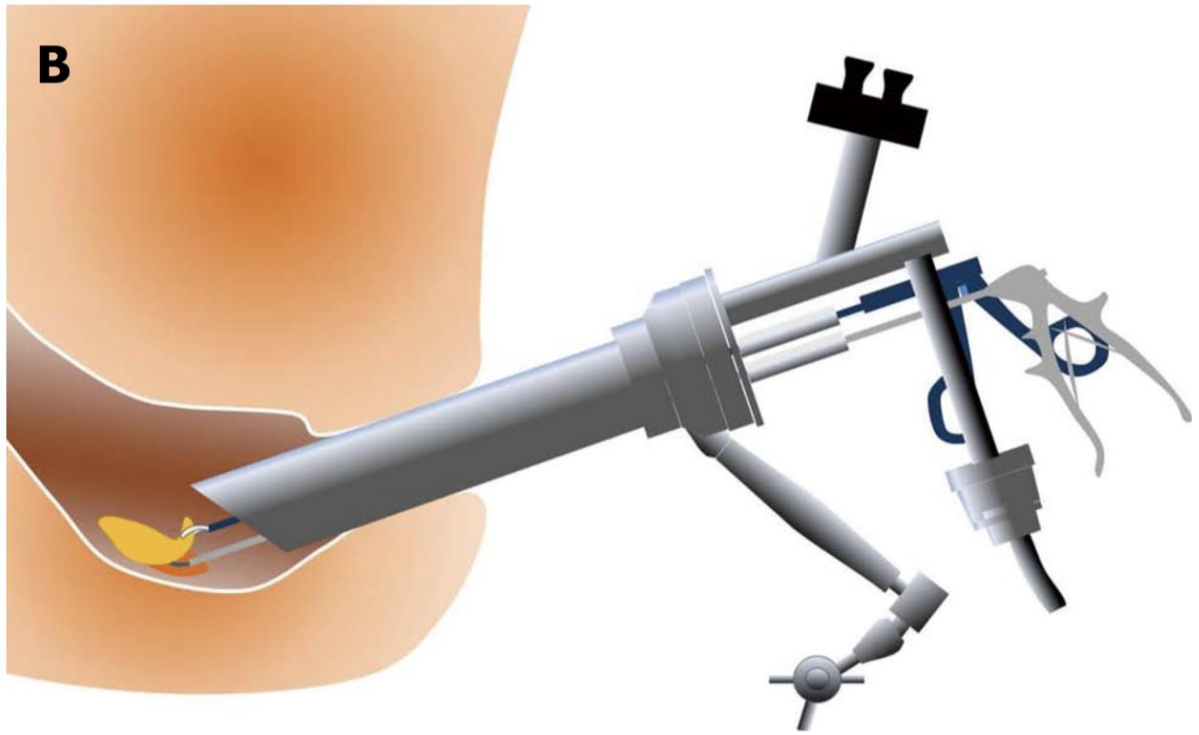
Chen WJ et al. World J Gastroenterol 2015.

UC Irvine Health
School of Medicine

Traditional Transanal Excision



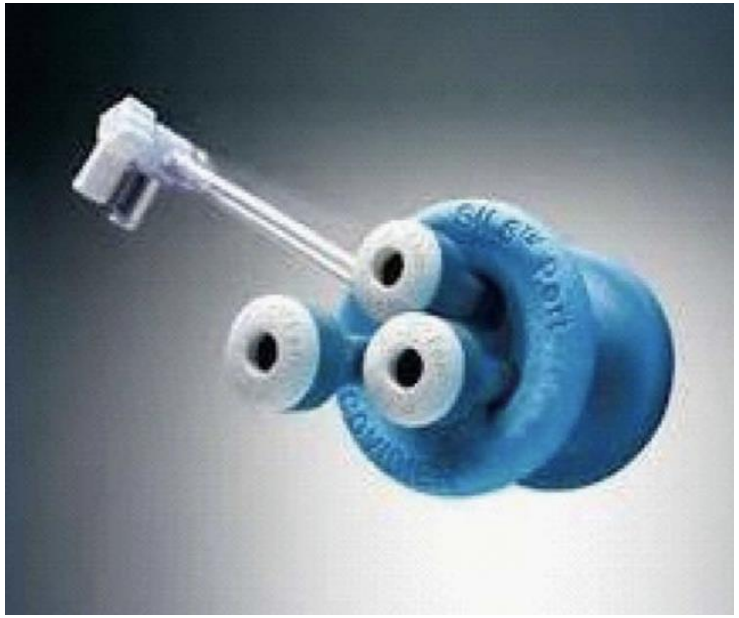
Transanal Endoscopic Microsurgery (TEM)

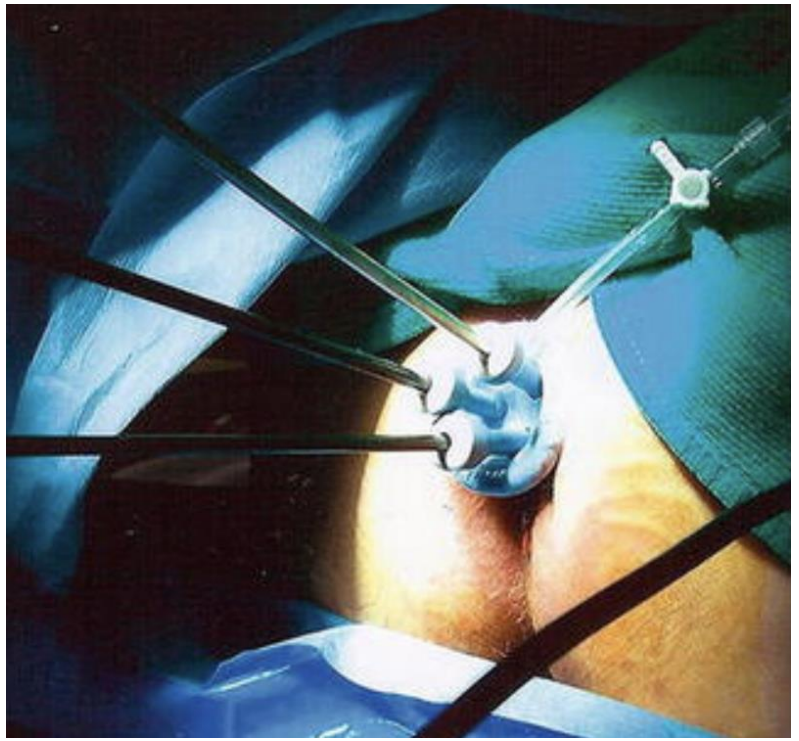


Santos BF et al. World J Gastroenterol 2011
Asano M. World J Gastrointest Endosc 2012.

UC Irvine Health
School of Medicine

Transanal Minimally Invasive Surgery (TAMIS)

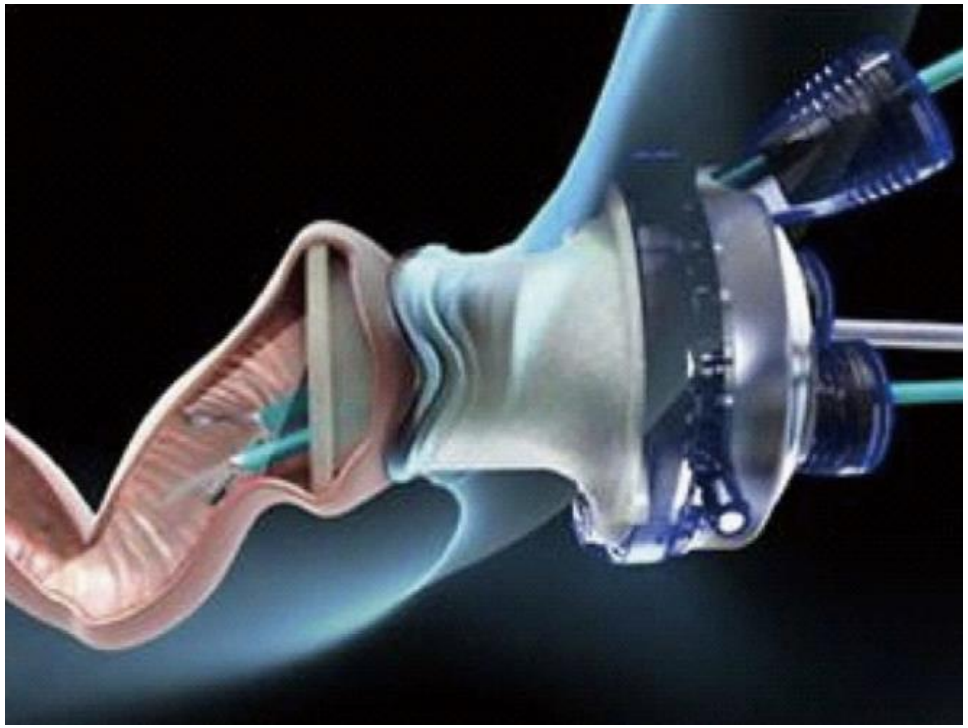




Garcia-Florez LJ et al. World J Gastroenterol 2015

UC Irvine Health
School of Medicine

Transanal Minimally Invasive Surgery (TAMIS)



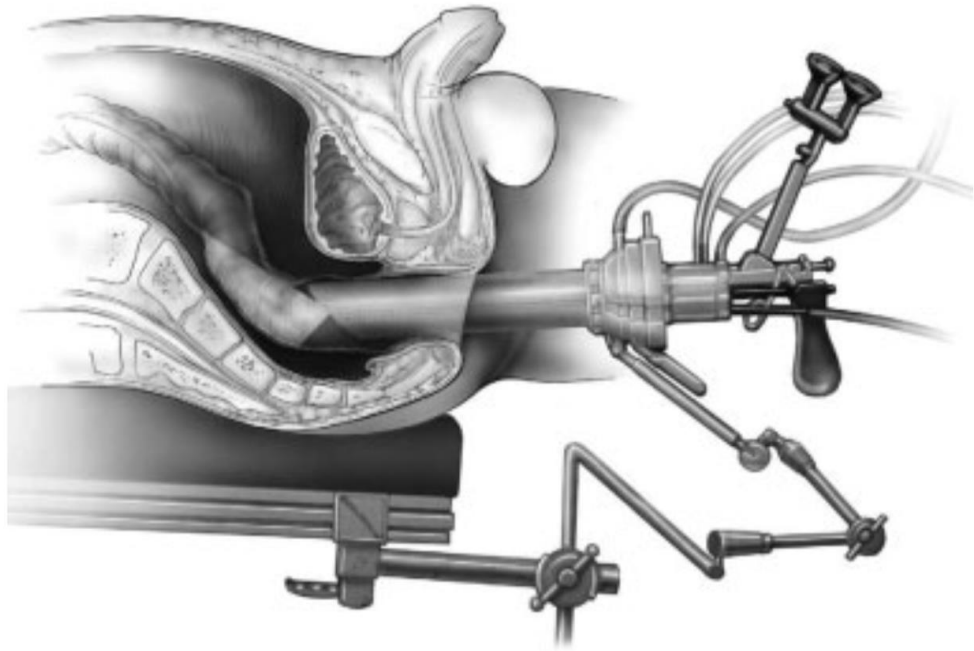
Garcia-Florez LJ et al. World J Gastroenterol 2015

UC Irvine Health
School of Medicine

TEM/TAMIS Advantages over Transanal Excision

- Transanal excision:
  - Limited to polyps tumors 6-8cm from the anal verge
  - Limited to smaller polyps/tumors
  - Associated with higher recurrence rates of polyps and tumors compared with TEM/TAMIS

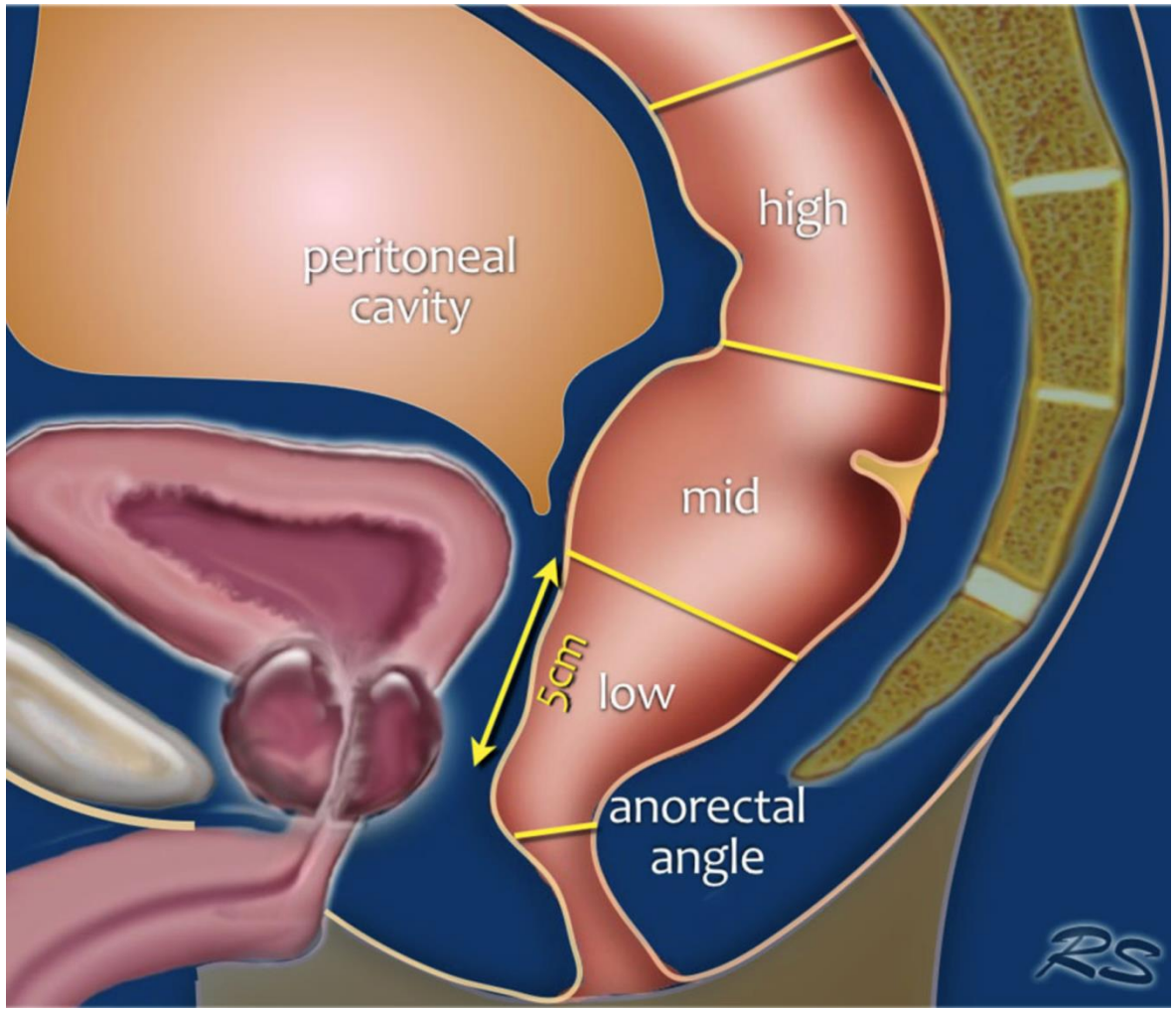
- TEM/TAMIS:
  - Allows for excision of mid/high rectal tumors
  - Allows for excision of large tumors
  - Allows for full thickness excision
  - Limited by need for straight anoscope



Rai V and Mishra N. Clin Colon Rectal Surg 2016.

UC Irvine Health
School of Medicine

- Low Rectum → Transanal Excision
- Mid Rectum → TEM/TAMIS
- High Rectum → ??



Flex® Robotic System

- Operator-controlled, computer-assisted flexible endoscope
- Enables the physician to easily access and visualize anatomical structure through a transoral approach
- Provides 2 accessory channels for compatible flexible instruments

UC Irvine Health
School of Medicine

Flex® Robotic System

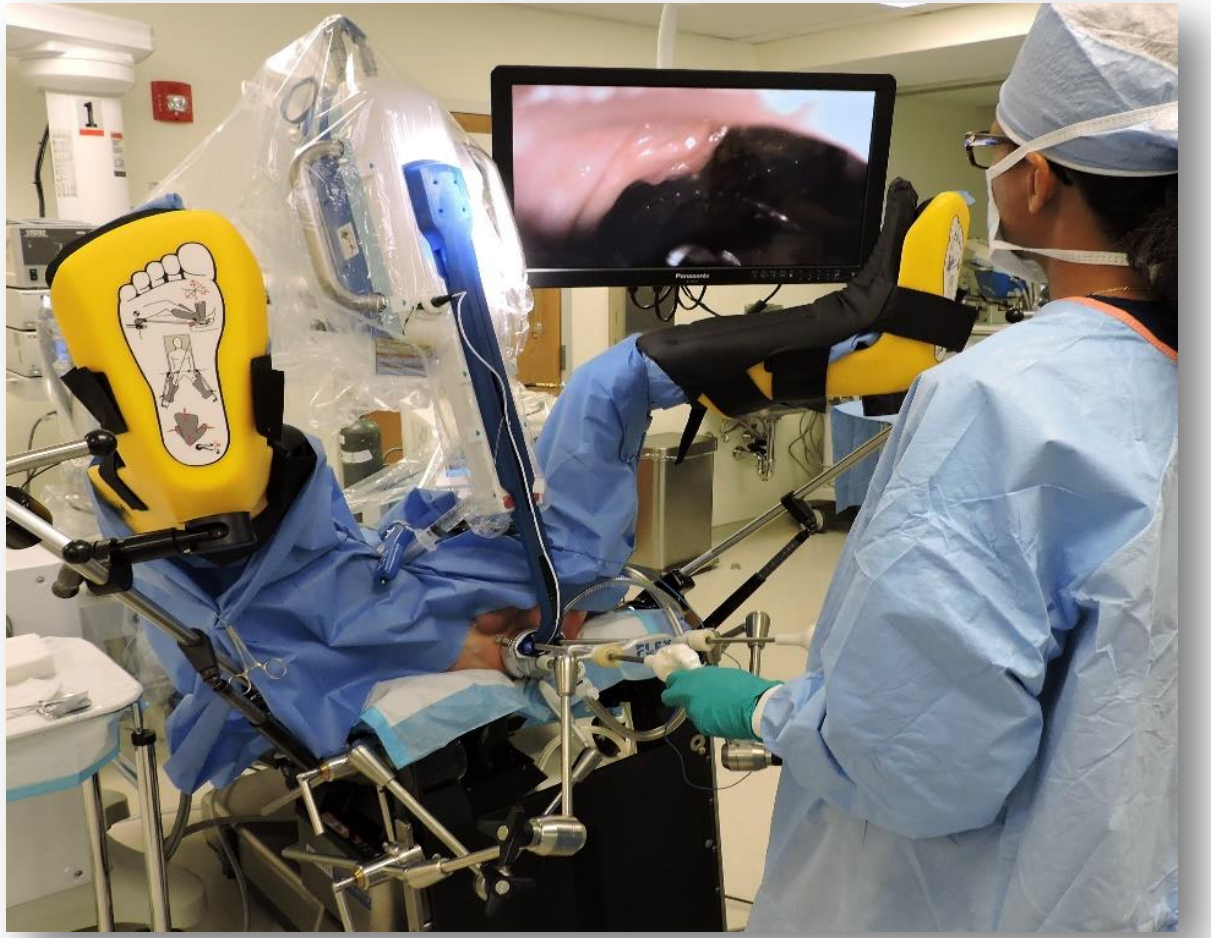
UC Irvine Health
School of Medicine

Flex® Robotic System

Flex® Robotic System

- This system was originally applied to oral surgery
- Feasibility was originally demonstrated in removing lesions in the oropharynx, hypopharynx and larynx

Why can’t flexible robotics be an alternative tor TEM and TAMIS to reach high rectal/sigmoid lesions?



UC Irvine Health
School of Medicine

Technical Challenges for Transanal Access

- Need to seal the links of the robot to maintain pneumorectum
- Develop compatible access device
- Refine instrumentation
- Cadaveric and procine testing to demonstrate feasibility for transanal surgery

Cadaveric Assessment

Objectives/ Hypothesis	**To evaluate the Medrobotics Flex® Robotic System and Flex® Rectoscope's ability to facilitate access for and visualization of surgical resection and closure within the rectum using Flex® Instruments via a transanal entry**
Study Design	Preclinical anatomic study utilizing 6 cadavers
Methods	2 surgeons participated in this study Each participant utilized the Flex® Robotic System to excise and close rectal wall specimens.
Results	14/14 (100%) resected successfully 13/14 (93%) closed successfully
Conclusion	This study provides evidence that the Flex® Robotic System, Flex® Rectoscope, and Flex® Instruments can be used to perform transanal colorectal surgical procedures (tissue resection and resection closure) with a high degree of success.

UC Irvine Health
School of Medicine

Porcine Assessment

- The porcine study was designed to evaluate Flex® Robotic System's wound closure vs a TEM system (Storz® TEO) in a live tissue model

- Eight swine
  - 2 control animals
  - 6 test animals
  - Rectal wall excision and closure

- Grade excision site 7 days after closure

Porcine Wound Scoring & Characteristics	
0	No separation of wound edges/No edema/No inflammation
1	Mild (< 2 mm) separation of wound edges; mild tissue edema, bleeding surfaces or inflammation
2	Moderate separation of wound edges (>2 mm but < 1 cm): moderate surrounding tissue edema, moderate oozing surfaces, or inflammation
3	Complete separation of wound edges (>1 cm): severe tissue edema, extensive oozing surfaces, or inflammation

	Storz® TEO	Flex® Robotic System
N	2	6
Mean Surgical Site	0	0.3
StDevP Surgical Site	0	0.5
Mean Surgical Area	0	0
StDevP Surgical Area	0	0

UC Irvine Health
School of Medicine

Excision of Rectosigmoid Junction Polyp

Novel Robotic Techniques for Endoscopic Resection of Large Polyps

Joe Carmichael, MD | February 2, 2018

10th Annual Gastroenterology & Hepatology Symposium

UC Irvine Health
School of Medicine