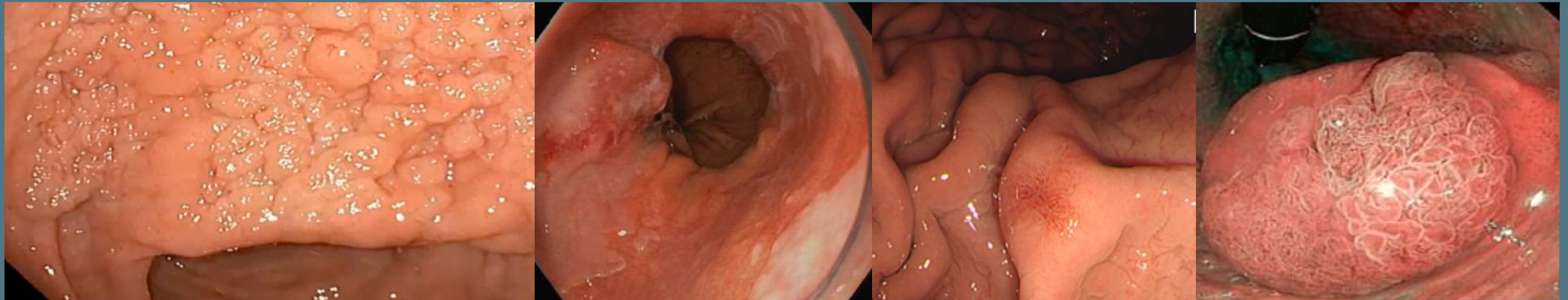


# THE ALPHABET SOUP OF ENDOSCOPIC RESECTION



**Ohio Gastroenterology Society Annual Meeting  
September 20, 2025**

**Brooke Glessing, MD  
The Gastroenterology Group, Inc. Akron, OH**



# DISCLOSURES

- Consultant for Boston Scientific
- Consultant for Steris
- No financial interest or affiliation concerning material discussed in this presentation

## CASE PRESENTATION

58 y/o F presents for open access colonoscopy for routine screening colonoscopy. Last colonoscopy was 10 years ago and was normal. No known FH of colon cancer. No current colon symptoms.

### PMH/PSH:

- HTN
- H/o hysterectomy for fibroids
- No other abdominal surgeries



## WHAT TO DO?

- Attempt resection now?
- Biopsy?
- Tattoo?
- How to document?
- Refer for EMR?
- Refer for ESD?
- Refer to Surgery?



## **QUESTION:**

HOW BEST TO APPROACH RIGHT SIDED LARGE  
POLYPS?



# OBJECTIVES

- Recognize the importance of inspection and lesion assessment
- Review various approaches to resection
- The “Right” endoscopic technique for the “Right” lesion
- Disclaimer
  - Extensive literature, there is no “one size fits all” technique and even expert opinion varies. And while I do perform EMR and know a lot about ESD, I don’t perform ESD

# INSPECTION

- Critical aspect of the exam and resection strategy
  - Macroscopic characterization gives histologic prediction
    - ✓ Presence of deep submucosal invasion
    - ✓ Optimal removal strategy
- Several classification systems
  - Paris classification, JNET, NICE, KUDO, etc.
- QUESTION: presence of submucosal invasion and/or malignancy?
- GOAL: Identify and remove the lesion with the most appropriate and safest treatment with curative intent (minimize recurrence)

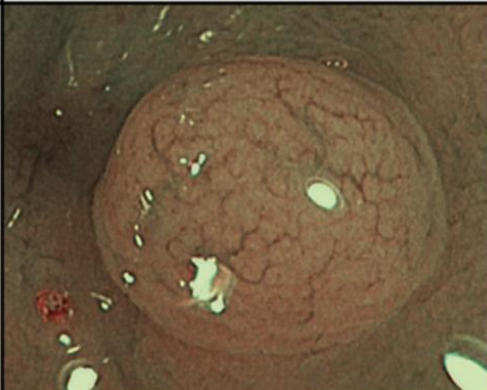
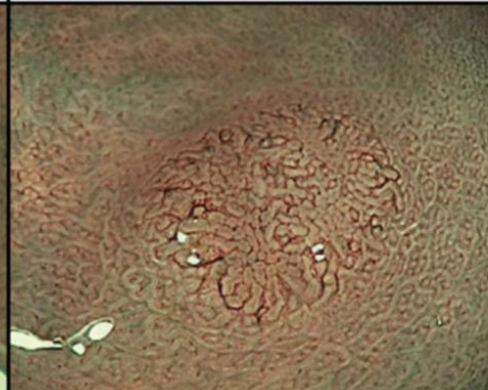
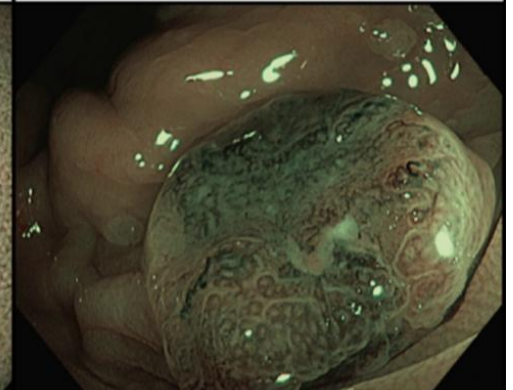




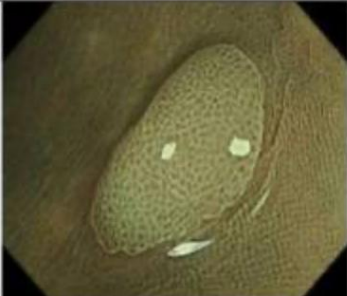
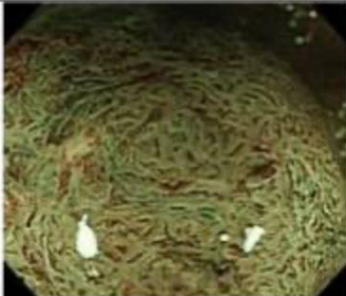
Slide courtesy of Rashmi Advani, MD

# NBI/NICE CLASSIFICATION – OPTICAL DIAGNOSIS

- ✓ Validated
- ✓ Used with or without magnification
- ✓ Does not require use of dye spray

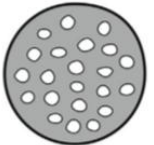
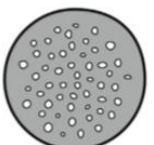
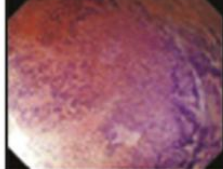
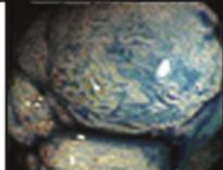
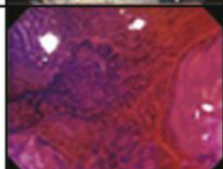
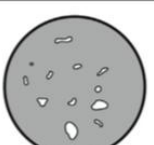
|                       | Type 1                                                                              | Type 2                                                                               | Type 3                                                                               |
|-----------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Color                 | Same or lighter than background                                                     | Browner relative to background (verify color arises from vessels)                    | Brown to dark brown relative to background; sometimes patchy whiter areas            |
| Vessels               | None, or isolated lacy vessels may be present coursing across the lesion            | Brown vessels surrounding white structures**                                         | Has area(s) of disrupted or missing vessels                                          |
| Surface pattern       | Dark or white spots of uniform size, or homogeneous absence of pattern              | Oval, tubular, or branched white structures** surrounded by brown vessels            | Amorphous or absent surface pattern                                                  |
| Most likely pathology | Hyperplastic and sessile serrated lesions***                                        | Adenoma****                                                                          | Deep submucosal invasive cancer                                                      |
|                       |  |  |  |

# JAPAN NARROW BAND IMAGING EXPERT TEAM CLASSIFICATION (JNET)

|                              | Type 1                                                                             | Type 2A                                                                              | Type 2B                                                                               | Type 3                                                                               |
|------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Vessel pattern</b>        | •Invisible <sup>1</sup>                                                            | •Regular caliber<br>•Regular distribution<br>(meshed/spiral pattern) <sup>2</sup>    | •Variable caliber<br>•Irregular distribution                                          | •Loose vessel areas<br>•Interruption of thick vessels                                |
| <b>Surface pattern</b>       | •Regular dark or white spots<br>•Similar to surrounding normal mucosa              | •Regular<br>(tubular/branched/papillary)                                             | •Irregular or obscure                                                                 | •Amorphous areas                                                                     |
| <b>Most likely histology</b> | Hyperplastic polyp/<br>Sessile serrated polyp                                      | Low grade intramucosal neoplasia                                                     | High grade intramucosal neoplasia/<br>Shallow submucosal invasive cancer <sup>3</sup> | Deep submucosal invasive cancer                                                      |
| <b>Endoscopic image</b>      |  |  |   |  |

# KUDO PIT PATTERN

- ✓ Distinguish neoplastic and non-neoplastic via magnifying endoscopy
- ✓ Appearance, structure, and staining patterns
- Type I and II: non-tumorous epithelial tissue (inflammatory or hyperplastic)
- Type III S/L: tubular adenoma
- Type IV: tubulovillous or villous adenoma
- Type V: neoplastic, invasive

|                  |                                                                                       |                                                                                              |                                                                                       |
|------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| I                |    | Round pit (normal pit)                                                                       |    |
| II               |    | Asteroid pit                                                                                 |    |
| III <sub>s</sub> |    | Tubular or round pit that is smaller than the normal pit (type I)                            |    |
| III <sub>L</sub> |    | Tubular or round pit that is larger than the normal pit (type I)                             |    |
| IV               |    | Dendritic or gyrus-like pit                                                                  |    |
| V <sub>I</sub>   |  | Irregular arrangement and sizes of III <sub>L</sub> , III <sub>s</sub> , IV type pit pattern |   |
| V <sub>N</sub>   |  | Loss or decrease of pits with an amorphous structure                                         |  |

Kudo, Shin-Ei, et al. "Diagnosis of colorectal tumorous lesions by magnifying endoscopy." *Gastrointestinal endoscopy* 44.1 (1996): 8-14.

Tanaka, et al, *Gastrointest Endosc* 2006;64:604–13

# PARIS CLASSIFICATION

- ✓ First assessment for superficial colorectal lesions ONLY (no MP invasion)
- ✓ Informs removal strategy
- ✓ Depressed IIc lesions are uncommon but highest risk of submucosal invasion vs flat lesions.
- ✓ 40% of IIc lesions contain submucosal invasive cancer.

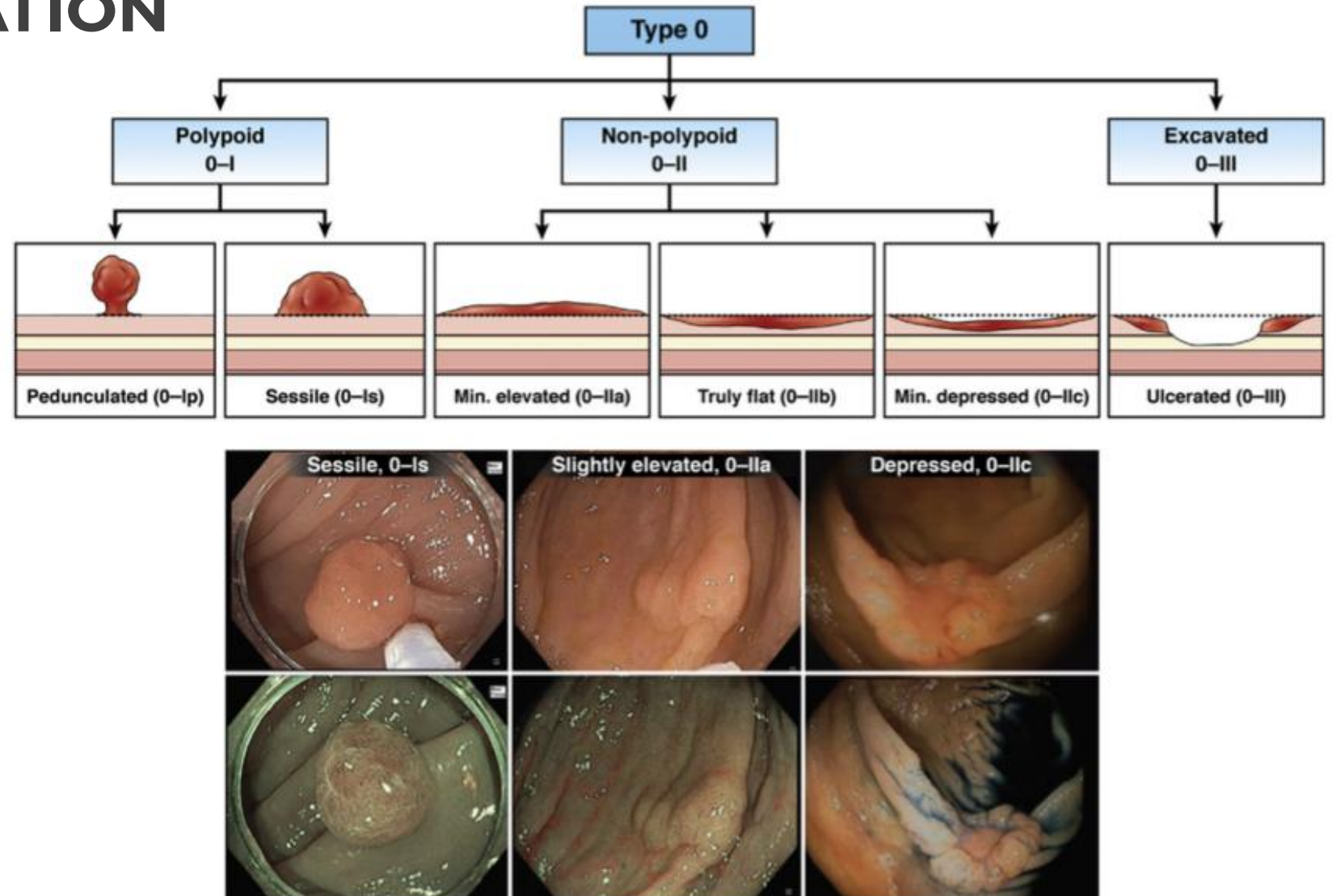
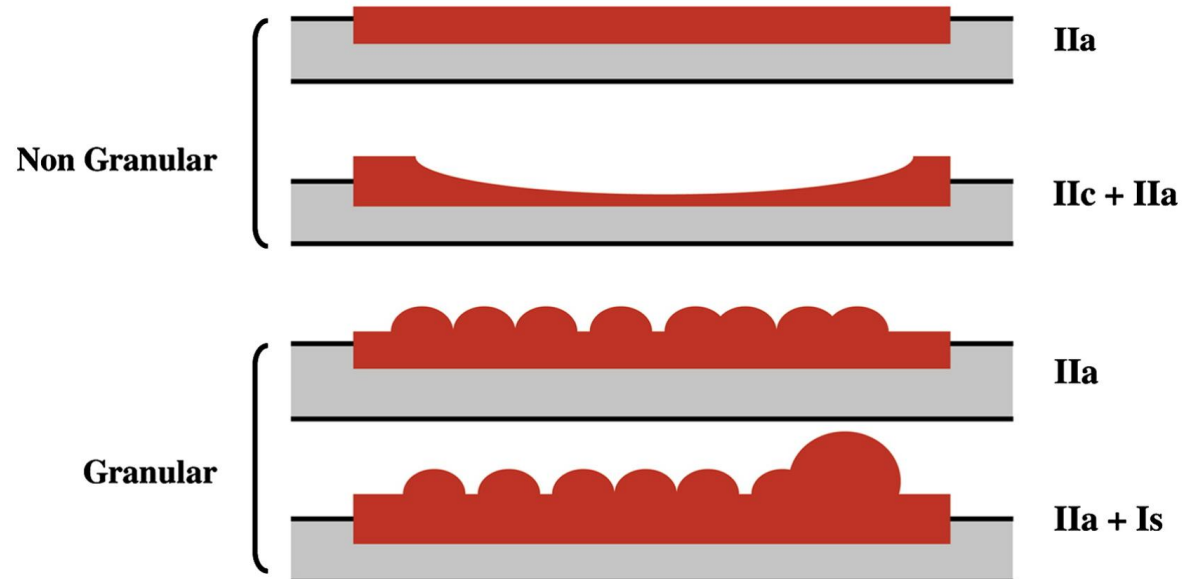


Figure 1. Paris Endoscopic Classification of superficial neoplastic lesions in the colon and rectum.

# LATERAL SPREADING TUMORS

- ✓ Non-polypoid lesions  $\geq 10$  mm
- ✓ Low vertical axis and extend laterally (flat or sessile)
- ✓ Different characteristics imply different neoplastic potential



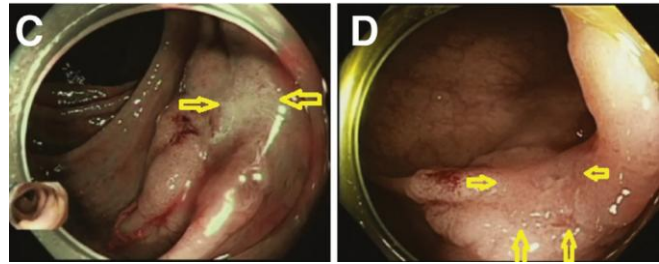
- ✓ Inform risk of SM invasion and SM fibrosis
- ✓ LST-NG risk of SM invasion (up to 43.4%)
- ✓ LST-G has less submucosal carcinoma (rare in homogenous)
- ✓ **LST-G: larger nodules w/ higher risk of SM invasion**

| Morphology according to Paris Classification | Risk of deep SMI       |
|----------------------------------------------|------------------------|
| LST-G homogeneous type (0-IIa)               | 0.5% (CI 0.1%-1.0%)    |
| LST-G mixed nodular type (0-IIa + Is)        | 10.5% (CI 5.9%-15.1%)  |
| LST-NG flat type (0-IIa)                     | 4.9% (CI 2.1%-7.8%)    |
| LST-NG pseudodepressed type (0-IIa + IIC)    | 31.6% (CI 19.8%-43.4%) |

# KNOW WHAT FEATURES PREDICT SM INVASION

## ■ Appearance:

- Fold convergence
- Expansion
- Stiff/rigid/firm
- Irregular border, uneven surface
- Friability, surface ulceration



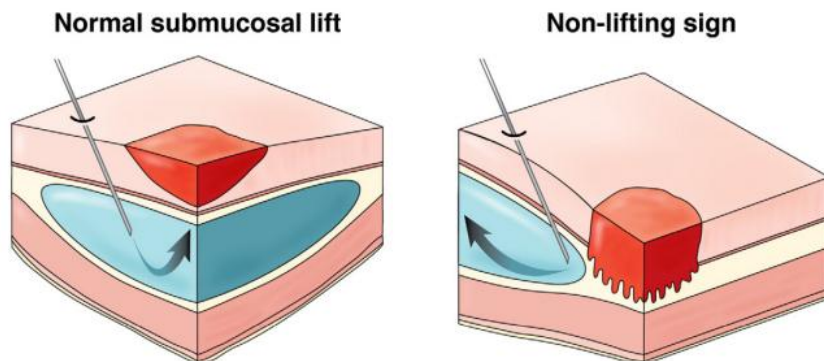
Shaukat et al USMSTF guidelines 2020

## ■ Classification:

- Non-granular surface particularly pseudodepressed subtype
- NICE 3 and KUDO Vn lesions

## ■ Non-lifting sign:

- Positive predictive value for invasive cancer if non-lifting sign is present can be 80% in treatment-naïve lesions



## CASE PRESENTATION



## CLASSIFICATION

- Paris 0-IIa
- LST-G-mixed
- NICE Type 2
- JNET: Type 2A (?2B)
- KUDO Type IV

## PATHOLOGY

- Non-invasive low grade neoplasia
- Tubulovillous adenoma
- No high-grade dysplasia

## WHAT TO DO?

- Attempt resection now?
  - Only if you can do it!
  - Consent?
- Biopsy?
  - Generally, no!
  - Pre-resection biopsy can cause scarring/fibrosis, can mimic depressed/non-lifting lesion
- Tattoo?
  - Not in cecum and rectum
  - Few cms distal
  - Appropriate photo documentation for future resection
  - Don't lift using tattoo



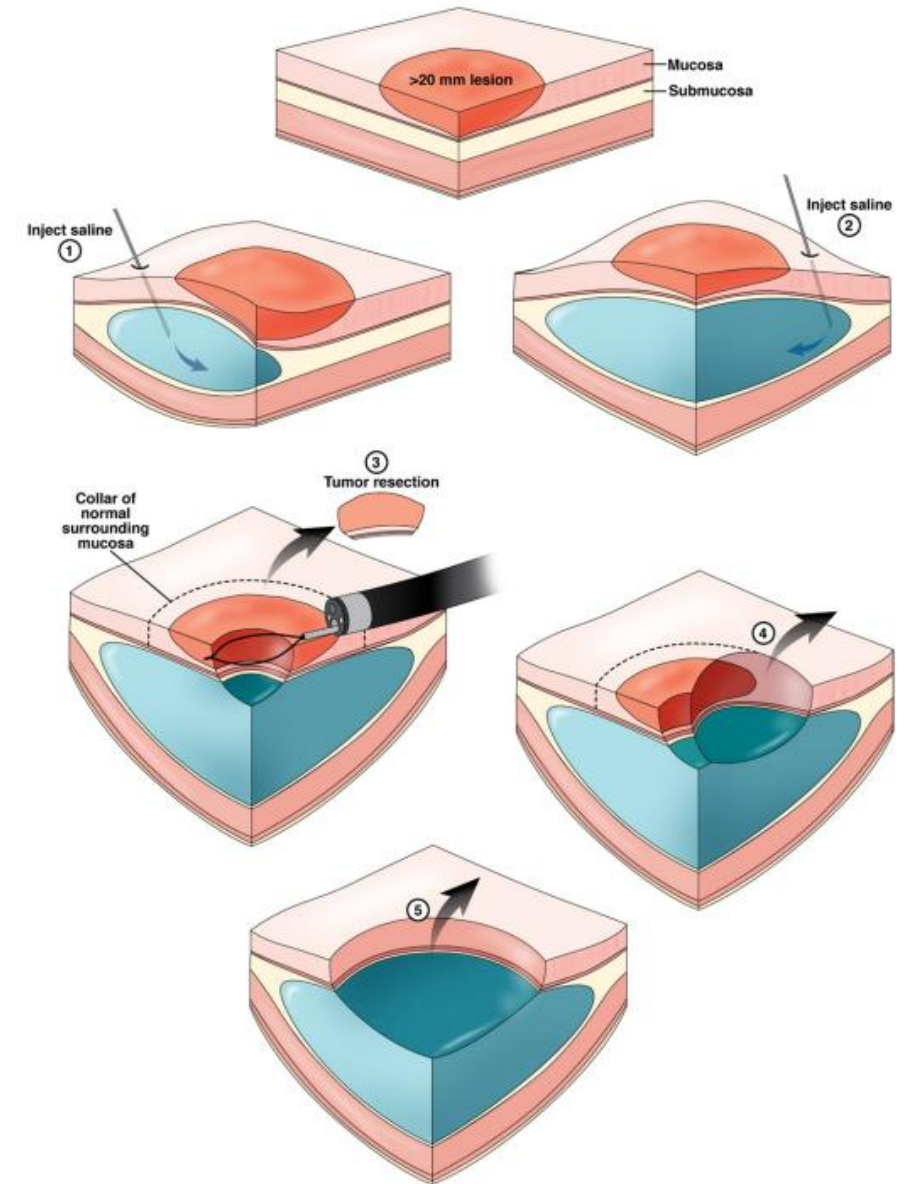
# DEBATE: EMR VS ESD VS SURGERY?

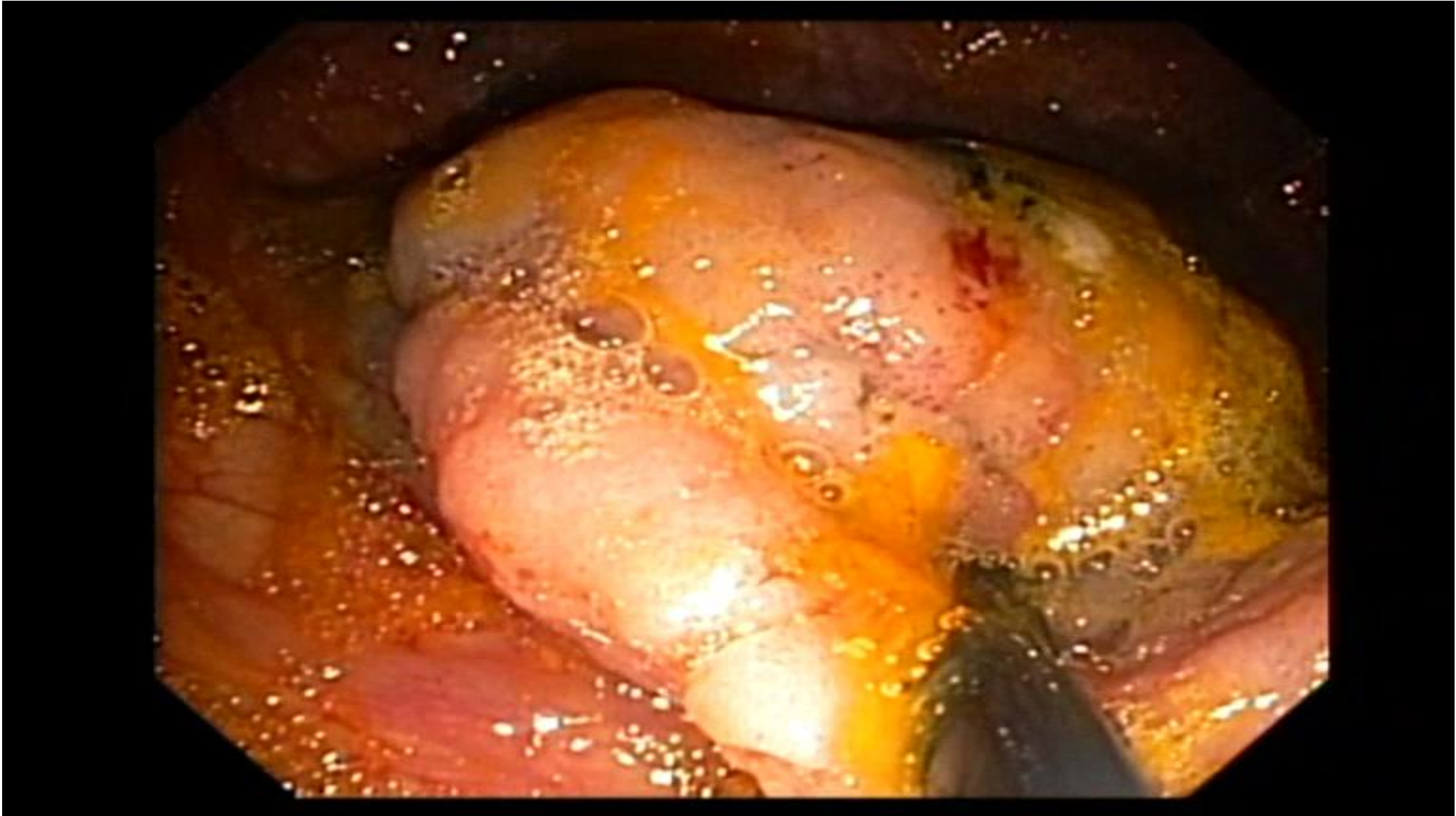
GLESSING = PRO EMR



# EMR - PROS

- Readily available, many can do this
- Short learning curve
  - 40-50 EMR cases vs >280 cases for ESD
- Various options
  - Hot snare, cold snare, underwater
- Reproducible depth of resection
- Good outcomes
- Inexpensive and efficient
- Don't need fancy tools
- Generally low rate of complications
- Reimbursable



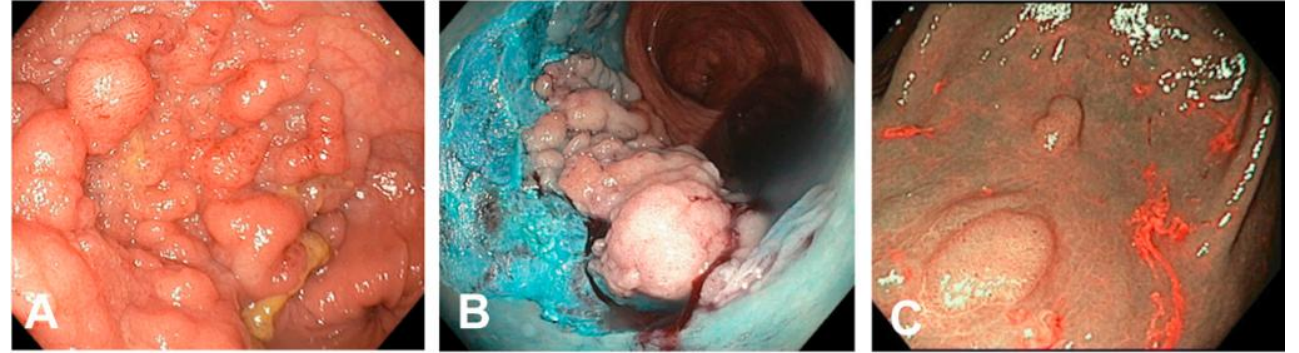


Video courtesy of Mohammad Bilal, MD

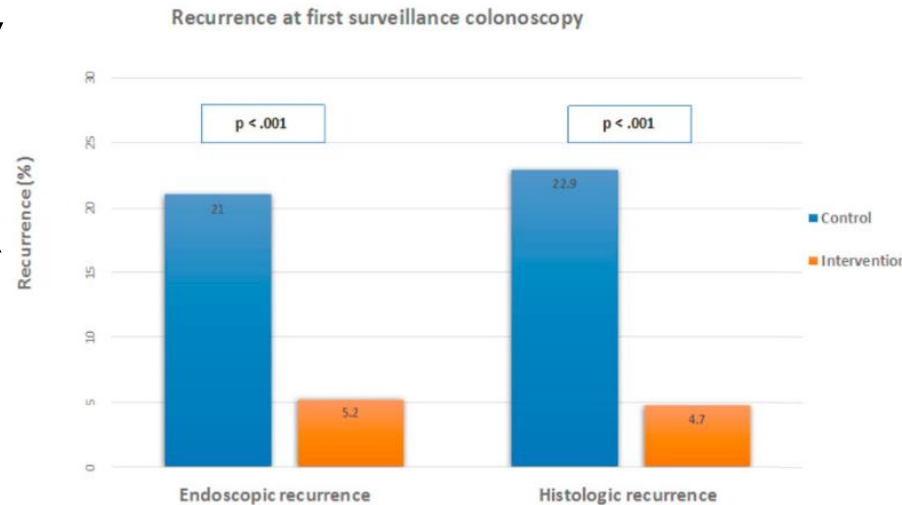
## EMR - CONS

- Lower en-bloc resection, especially if > 20 mm
- Somewhat blind procedure
- Resection margins may be compromised from cautery artifact leading to suboptimal histologic assessment of specimen
- Relatively superficial submucosal plane of dissection
- Piecemeal EMR results in higher risk of adenoma recurrence
- Requires more frequent follow-ups and re-intervention

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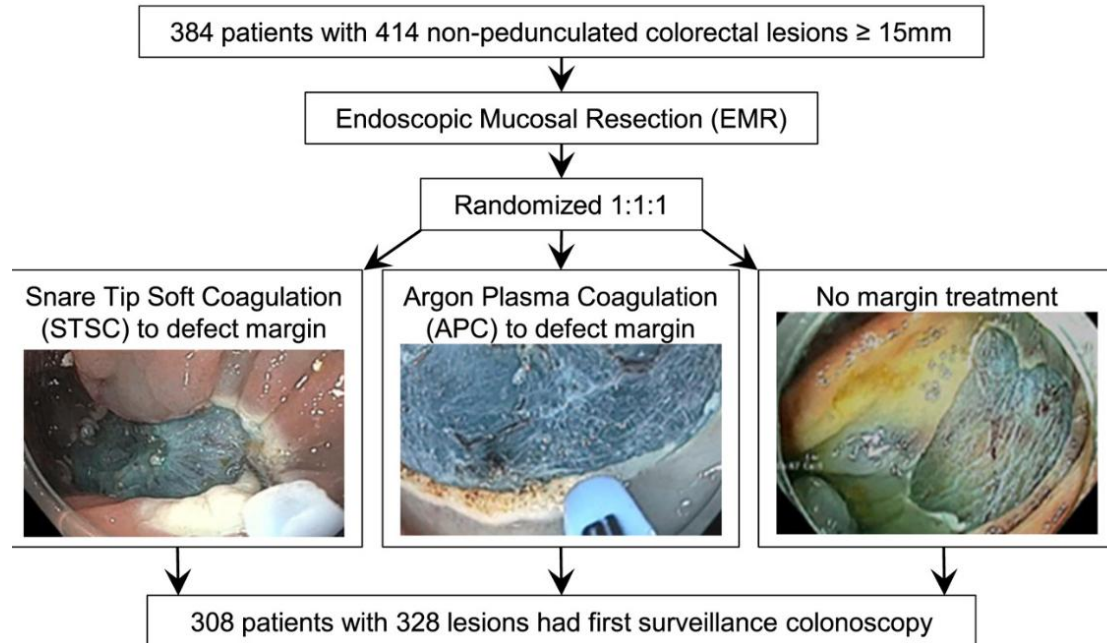


- Endoscopic mucosal resection (EMR) is performed to remove large laterally spreading colonic lesions, which have a high risk of progression to CRC
- The biggest drawback of piecemeal EMR is the high rate (15%-30%) of polyp recurrence at follow-up



In this multi-center randomized trial, thermal ablation to the post-EMR mucosal defect margin resulted in a 4-fold reduction in adenoma recurrence at first surveillance colonoscopy

# TREAT THE MARGINS



## Snare Tip Soft Coagulation vs Argon Plasma Coagulation vs No Margin Treatment After Large Nonpedunculated Colorectal Polyp Resection: a Randomized Trial

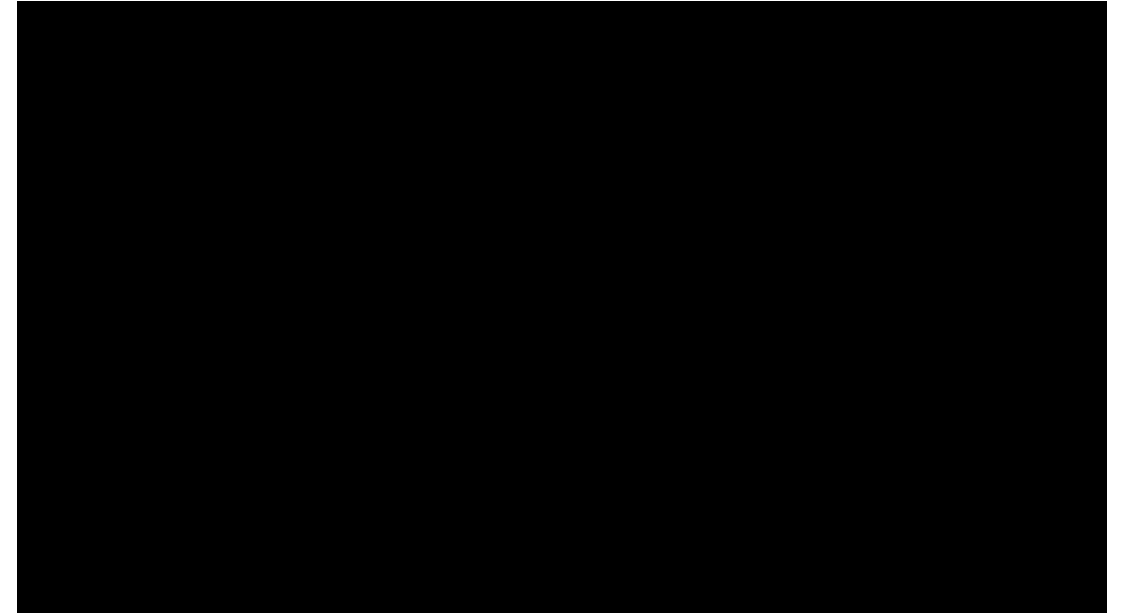
| Recurrence rate at first surveillance |       |   |            |
|---------------------------------------|-------|---|------------|
| STSC                                  | 4.6%  | } | P = 0.001  |
| No treatment                          | 21.4% |   |            |
| APC                                   | 9.3%  |   | } P = 0.01 |
| No difference between STSC and APC    |       |   |            |

| Time to apply treatment |          |             |
|-------------------------|----------|-------------|
| STSC                    | 3.35 min | } P = 0.019 |
| APC                     | 4.08 min |             |

Conclusion: STSC and APC were both superior to no margin treatment for reduction of recurrences. STSC was faster to apply. Since STSC requires no extra catheter, STSC is preferred for margin treatment after EMR.

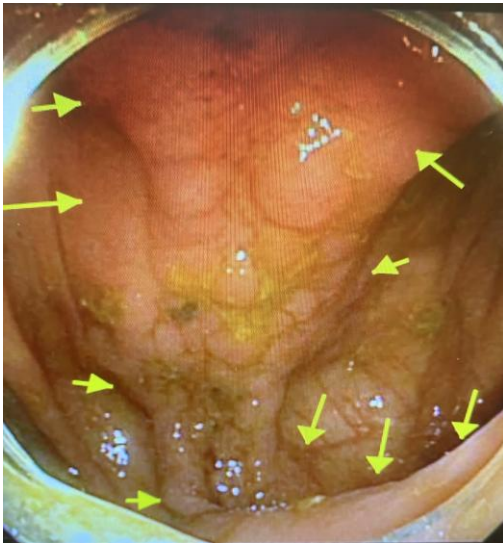
# COLD SNARE EMR – COLD REVOLUTION

- To combat some of the pitfalls of the hot EMR technique (cautery-related adverse events such as delayed bleeding, perforation, and postpolypectomy syndrome)
- Cold EMR just as effective as conventional EMR, especially for large SSA
- Virtually no risk for delayed post-polypectomy bleeding (1.5%) or delayed perforation (0%)
  - IS associated with increased recurrence rate (Size  $\geq 20$  mm: 12.3%, Adenomas: 17.1%, SSLs: 5.7%)
- To prevent recurrence, ensure confluent resection and extend lateral margin to include normal tissue



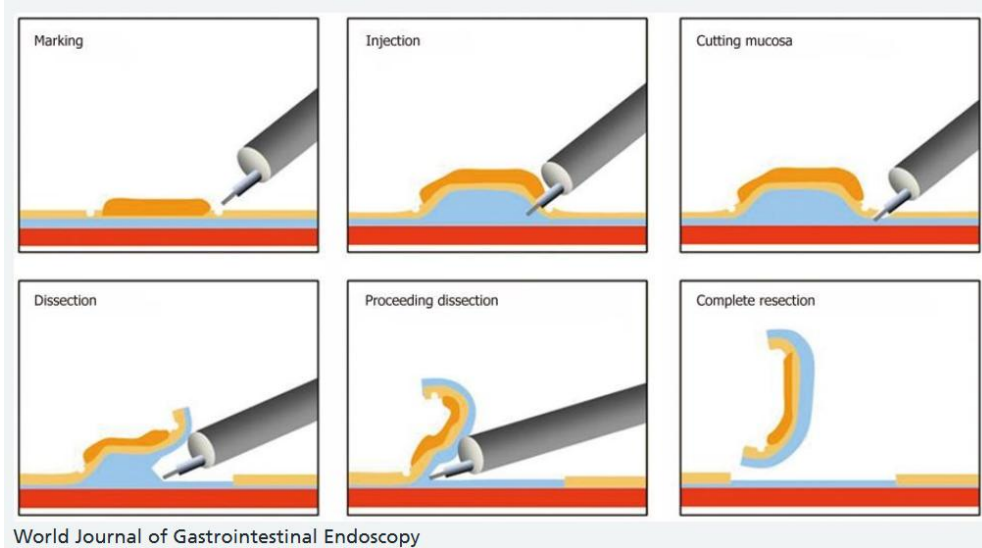
# UNDERWATER EMR – NEW KID ON THE BLOCK

- Similar to EUS, water immersion causes mucosal and submucosal layers to act like gastric folds and lift well, contrary to the muscle layer, which remains deep. That phenomenon happens due to the antigravity effect of submucosal fat tissue.
- This enables snare grasping to be effective and safe without requiring submucosal injection.
- Lumen is completely filled with saline (200-1000 mL), margins are marked, polyp removed by hot snare resection



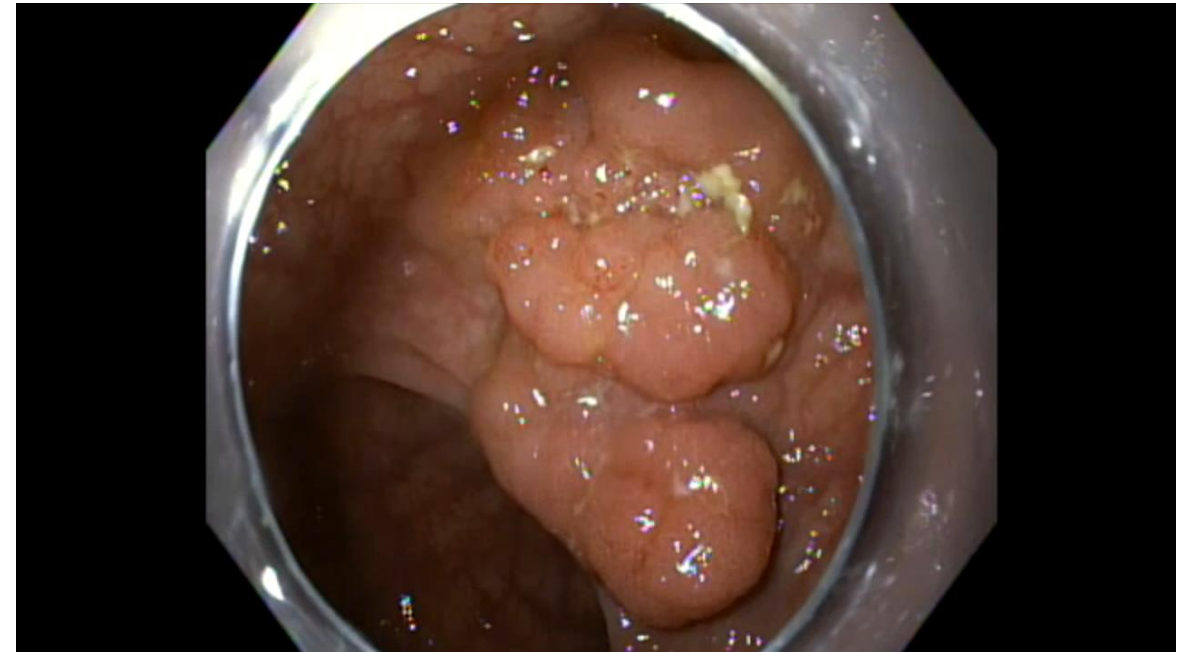
- Meta-analysis of 7 studies with 1237 polyps
- UEMR had significant increase in en-bloc resection rates (OR: 1.84)
- Significant reduction in the rate of recurrence (OR: 0.30)
- No difference in bleeding and perforation

# ENDOSCOPIC SUBMUCOSAL DISSECTION - ESD



- Higher R0 resection in early cancers = curative
- High en-bloc resection
- Can dissect into lower 1/3 of the submucosal layer, deeper than EMR which allows for better 1) staging with assessment for lymphovascular invasion and 2) assessment of recurrence risk
- Lower risk of recurrence

- Disadvantages:
  - Training, steep learning curve
  - Procedure time
  - Complication rate (10% perforation rate)
  - No reimbursement code in US



Video courtesy of Dr. Mohammad Bilal,

# DOES LOCATION OF POLYP MATTER?

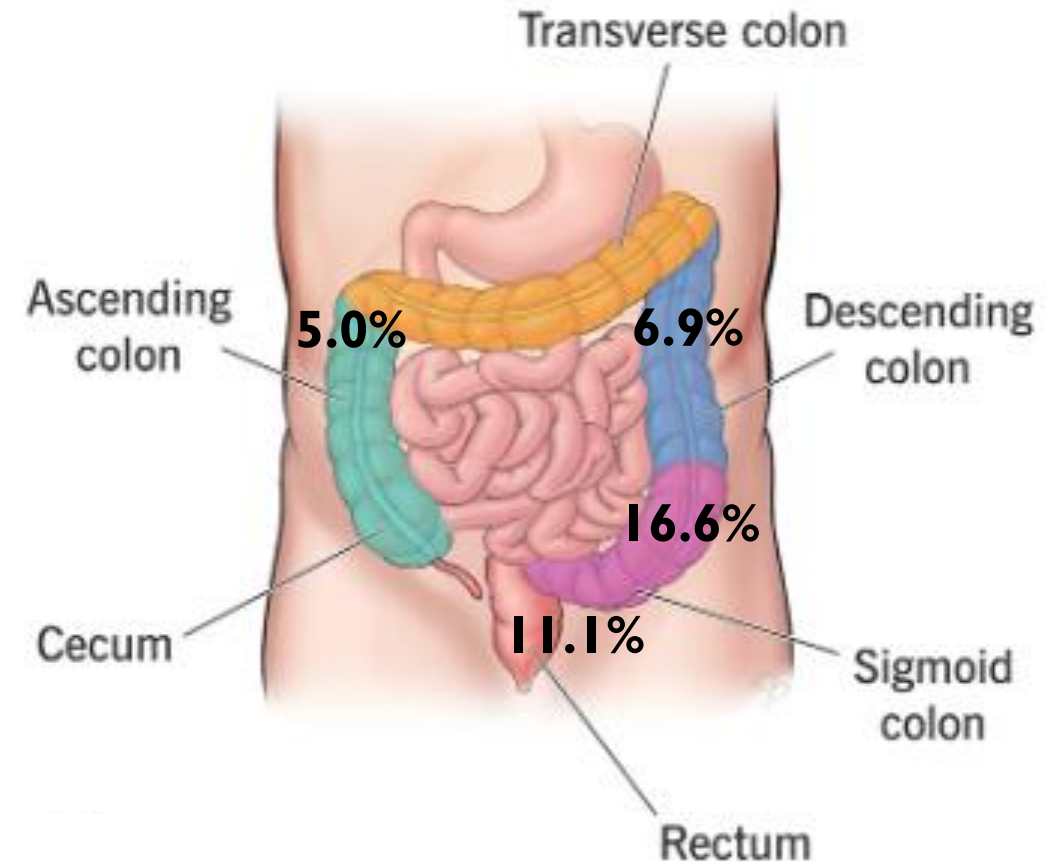
Gastroenterology 2017;153:732–742

## Risk Stratification for Covert Invasive Cancer Among Patients Referred for Colonic Endoscopic Mucosal Resection: A Large Multicenter Cohort

Nicholas G. Burgess,<sup>1,2</sup> Luke F. Hourigan,<sup>3,4</sup> Simon A Zanati,<sup>5,6</sup> Gregor J. Brown,<sup>5,7</sup> Rajvinder Singh,<sup>8</sup> Stephen J. Williams,<sup>1</sup> Spiro C. Raftopoulos,<sup>9</sup> Donald Ormonde,<sup>9</sup> Alan Moss,<sup>6</sup> Karen Byth,<sup>10</sup> Hema Mahajan,<sup>11</sup> Duncan McLeod,<sup>11</sup> and Michael J. Bourke<sup>1,2</sup>



| Lesion location, n (%)                             |             |           |
|----------------------------------------------------|-------------|-----------|
| Rectum                                             | 378 (88.9)  | 47 (11.1) |
| Sigmoid colon                                      | 201 (83.4)  | 40 (16.6) |
| Descending colon to splenic flexure (distal colon) | 134 (93.1)  | 10 (6.9)  |
| Distal transverse colon to cecum (proximal colon)  | 1393 (95.0) | 74 (5.0)  |
| Lesion location, n (%)                             |             |           |
| Rectum and sigmoid colon (rectosigmoid)            | 579 (86.9)  | 87 (13.1) |
| Descending colon to cecum                          | 1527 (94.8) | 84 (5.2)  |



# WHAT TECHNIQUE TO USE?

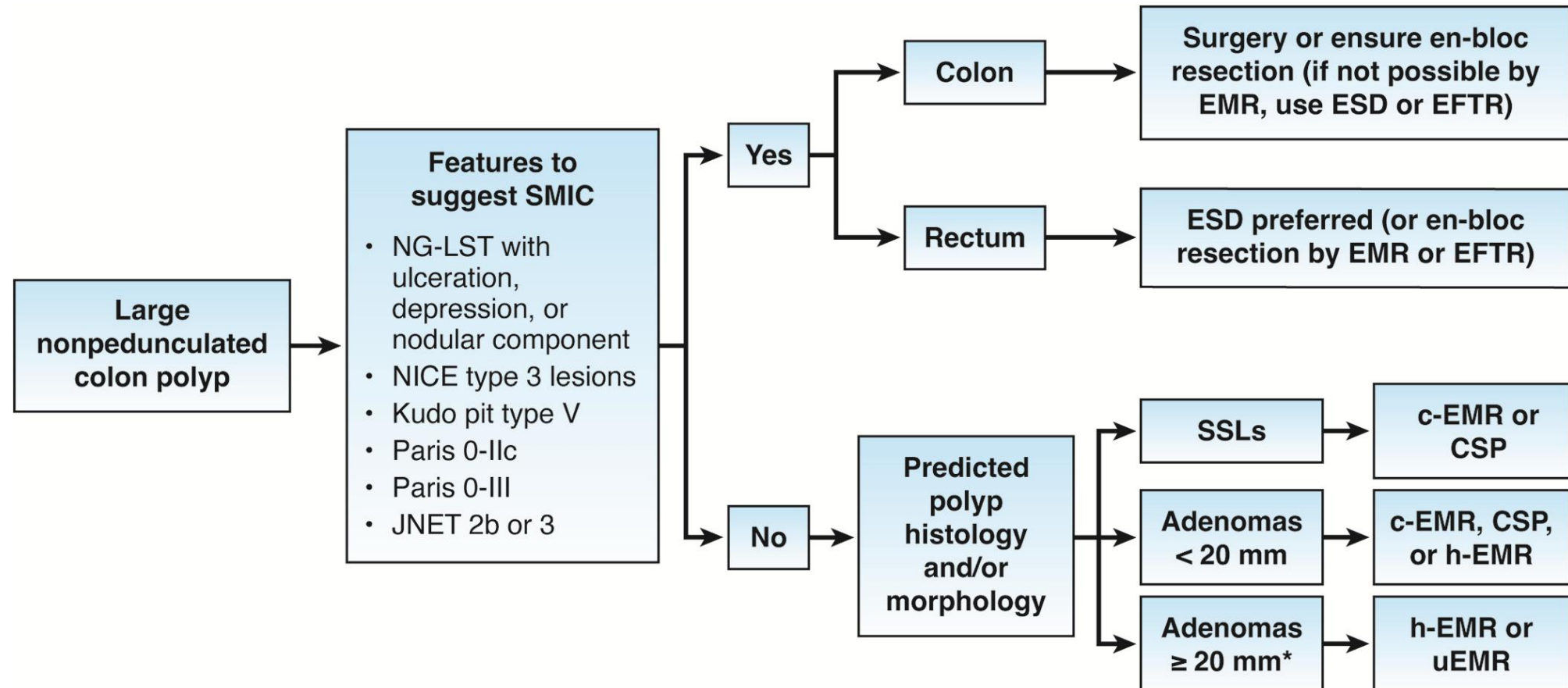
Clinical Gastroenterology and Hepatology 2024;22:2388–2391

## CLINICAL PRACTICE: HERE AND NOW

Prasad G. Iyer, Section Editor

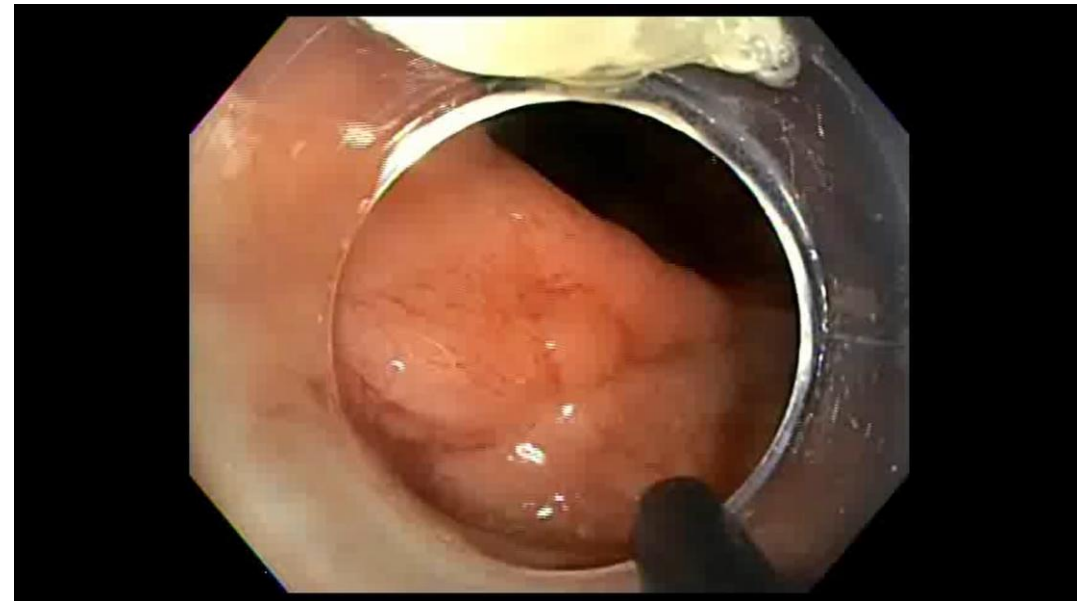
### Updates in Colon Endoscopic Mucosal Resection

Mohammad Bilal<sup>1</sup> and Heiko Pohl<sup>2,3</sup>



# RECURRENT/RESIDUAL POLYP AFTER EMR

- If you perform enough EMR, polyp recurrence will occur
- Repeat EMR
- Hot forceps avulsion
- Cold avulsion + STSC (CAST)
- Endoscopic full thickness resection (FTR device)
- Endoscopic Powered Resection Device (EndoRotor)
- ESD
- Consider surgery
- TALK TO PATIENT – discuss options



# PRACTICAL CONSIDERATIONS & TIPS

- Thorough consent
- Pregame plan with team to ensure you have the equipment and tools you need
- Distal attachment cap can be a game changer
- Pediatric colonoscope allow for easier maneuverability in retroflexion
- Know your patient
- Personal preference regarding various techniques:
  - SSL: cold EMR
  - Adenomas < 2 cm: cold EMR
  - Adenomas > 2 cm: conventional hot EMR or underwater EMR
  - Rectal lesions > 2 cm: Prefer en-bloc resection
  - Difficult / unstable position, blood thinners, defect closure challenging -> cold EMR
  - Prior attempts, submucosal fibrosis: underwater EMR and/or EMR-hybrid EFTR

*Best technique is what gets the polyp out*

# FINAL THOUGHTS

- Lesion characterization is CRITICAL to the art and practice of colonoscopy
- Several validated tools- KNOW THEM
- Examine twice, cut once
- Acknowledge that no one size fits all
- All experts have their preferences
- Eventual goal of resection is: i) *remove lesion* ii) *safely* iii) *minimize recurrence*
- Don't start what you cannot finish!

# THANK YOU

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Very special thanks to Drs.  
Mohammad Bilal and Rashmi Advani  
for sharing their excellent talks with  
me in preparation for this talk

