

Tips and Tricks of Endoscopic Mucosal Resection

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Disclosures

- Consultant for Boston Scientific

Learning Objectives

- Site-specific EMR (esophagus, stomach, duodenum, colon)
- Utilization of the appropriate tools for a successful EMR
- Potential adverse events associated with EMR

Endoscopic Mucosal Resection

- Minimally invasive (i.e., organ-removal sparing) endoscopic removal of lesions
- Indicated for benign and early malignant lesions limited to no deeper than the superficial layers (mucosa and submucosa)

Benign Lesions in the Colon

- Colonoscopy with removal of adenomatous polyps achieves 50% reduction in death from colorectal cancer (CRC)
- Endoscopic polypectomy is first-line treatment
- Despite this, there has been increased rates of colectomies for non-cancerous colonic lesions
 - Nearly $\frac{1}{4}$ of colectomies now for this indication
 - 0.7% post-op mortality and 14% major adverse events post-op
 - Comparatively, EMR -> up to 0.08% mortality risk

Kaltenbach et al, GIE 2020

Martin et al, AJG 2017

Peery et al, GIE 2018

Hassan et al, Gut 2016

Colonic EMR – Nonpedunculated lesions

- Polyps \geq 10mm
 - Cold or hot snare polypectomy +/- submucosal injection to lift prior
- Polyps \geq 20mm
 - Should be performed by a gastroenterologist with experience in advanced polypectomy maneuvers
 - If identified by gastroenterologist not performing EMR
 - Careful utilization of tattooing agents if felt to be warranted
 - DO NOT BIOPSY unless concern for cancerous changes
 - Hot snare
 - Careful inspection prior to any intervention

TABLE 4. Submucosal Injectants for Endoscopic Resection

Injectant name	Concentration	Unit size	Company	En bloc resection rates for lesions ≥ 2 cm, %	Residual lesion rates for lesions ≥ 2 cm, %	Price, \$ (cost/MSRP)	FDA approved (available in the United States)?
CRISE Gel		2 × 10 mL syringe per kit	Boston Scientific	No data	No data	135 (57.50/10 mL)	Yes
Eleview	0.001% methylene blue	5 × 10-mL ampules per kit	Aries Pharmaceutical	18.6 (Repici et al ⁸⁷)	0 18.6, adverse events (Repici et al)	462.50 (92.50/10 mL)	Yes
Normal saline solution	0.9% NaCl, may add dilution of indigo carmine or methylene blue	10 mL	Various	20.5–29 (Yandrapu et al ⁸⁶)	13.46 (Yandrapu et al ⁸⁶)	<0.01/mL	No
Succinylated gelatin	0.09 mg/mL methylene blue	10 mL	—	No data	No data	0.02/mL	No
Glyceol	10% glycerin; 5% fructose	—	Chugai Pharmaceutical	23.1 (Uraoka et al ¹⁹⁷)	No data	0.01–0.03/mL	No
Dextrose	50%	10-mL syringe	Various	54 (Katsinelos et al ⁸²)	87.5 (Katsinelos et al ⁸²)		No
Fibrinogen	1 g fibrinogen, 50 mL NS, 0.5 mL Indigo carmine, 0.5 mL 1:1000 epinephrine	—	Green Cross Corps	No data	60 (Lee et al ⁸⁵ ; n = 35)	0.2/mL	No
Sodium hyaluronate	0.4% sodium hyaluronate 5% indigo carmine	—	—	67 (LSTs only)	No data	50–120/mL	No

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Colonic EMR

- Thermal ablation
- Ablation should be avoided; risk of recurrence
- Helpful tools in EMR (Olympus)
- Electrocautery SETTINGS TO UTILIZE:



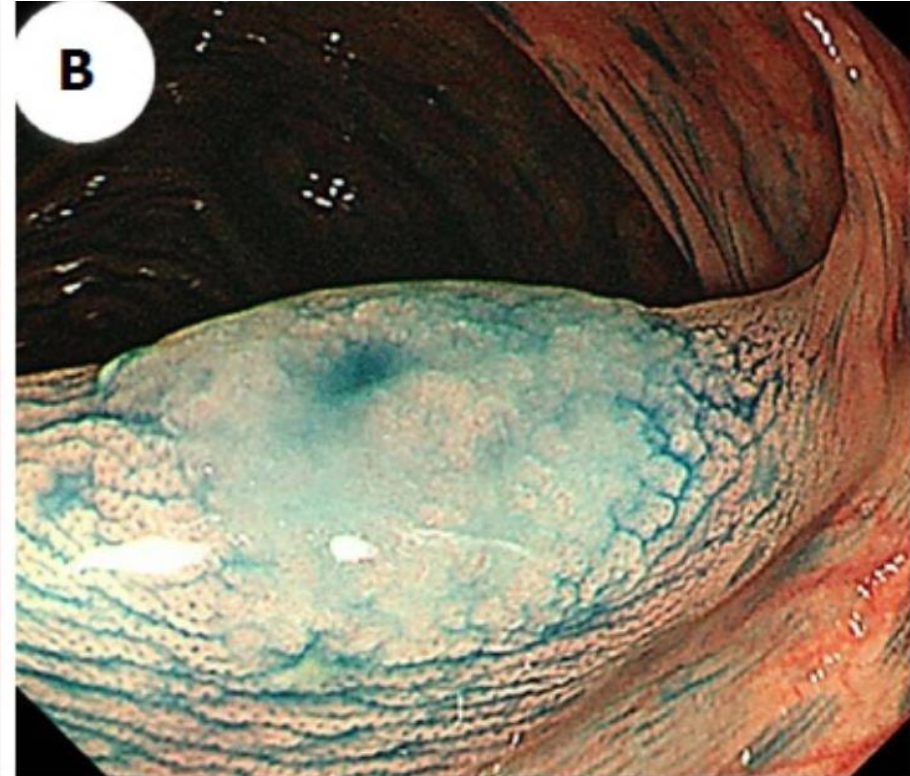
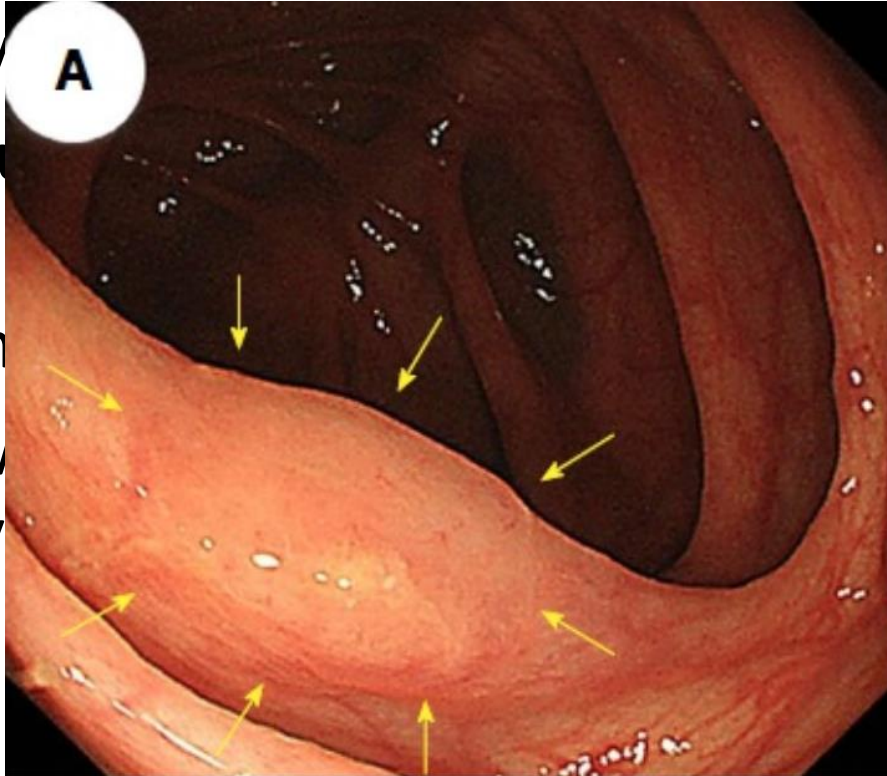
• risk of recurrence
 • al tissue -> increased
 • coagulation graspers

TABLE 5. Suggested Electrocautery Setting^a

Method	Mode	Effect	Cut duration	Cut interval	Maximum watts
Inject-and-cut EMR	Endocut Q	2/3	1	4	—
Snare tip soft coagulation	Soft Coag	5	—	—	80
Hot forceps avulsion	Endocut I	1	4	1	—
Underwater EMR	Autocut, Drycut	5	—	—	80

Colonic EMR – Flat and Sessile Serrated Lesions

- Very
- If m
- SSA
- High
- New poly



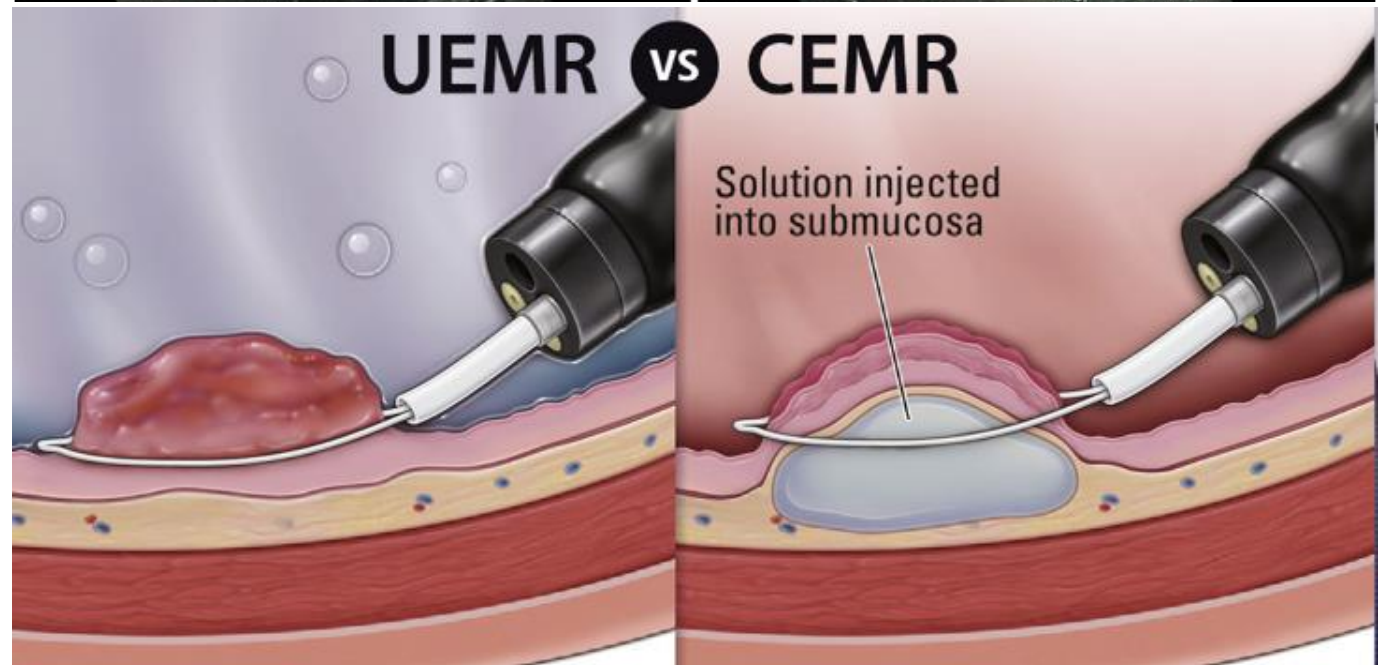
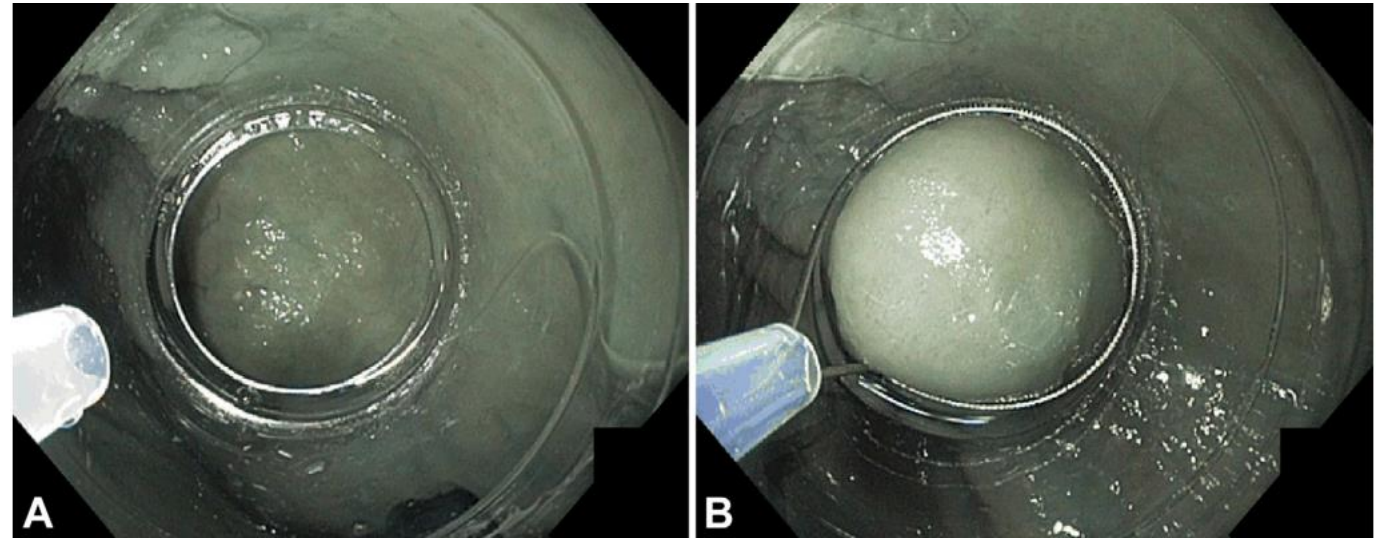
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Types of EMR

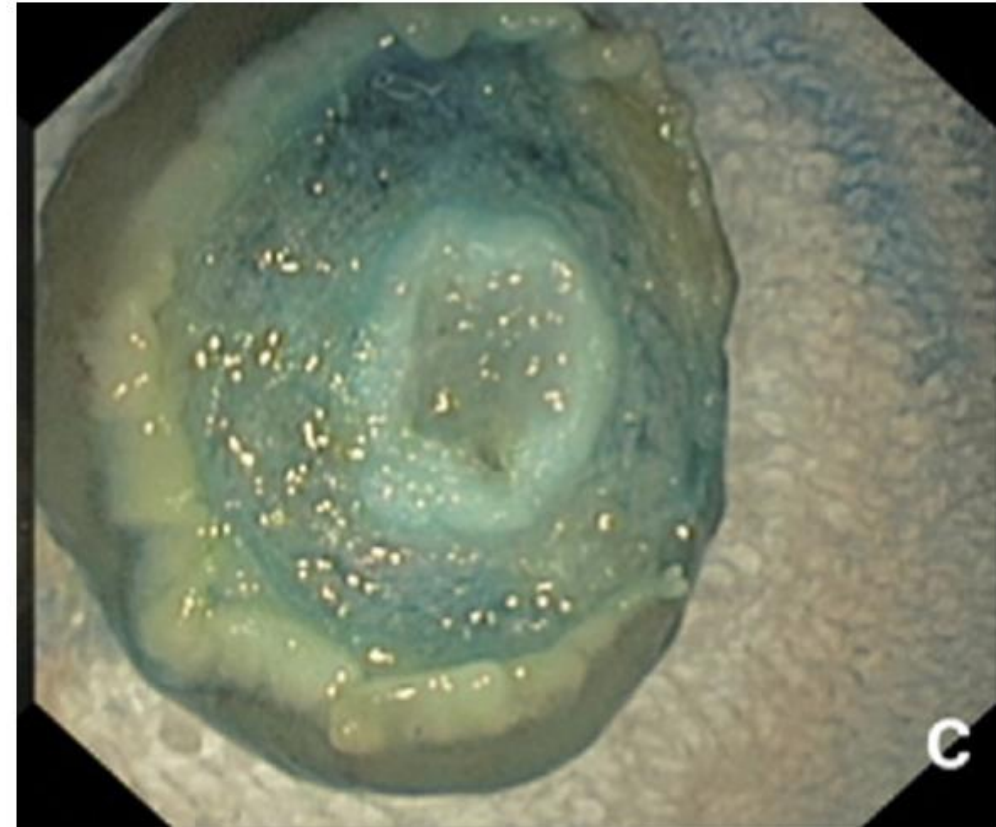
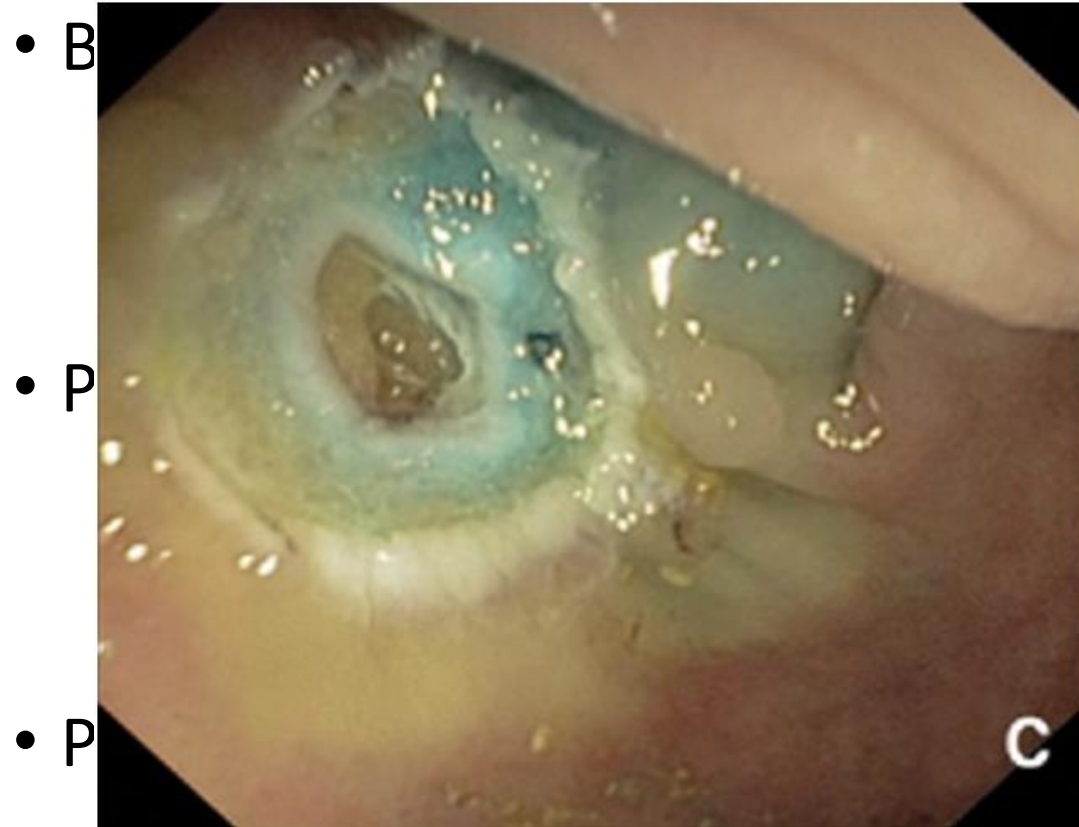
- Inject and cut most widely used
- Some newer studies are showing equivalence utilizing only cold snare piecemeal polypectomy

Types of EMR

- Cap-Assisted
- Ligation-Assisted*
- Underwater



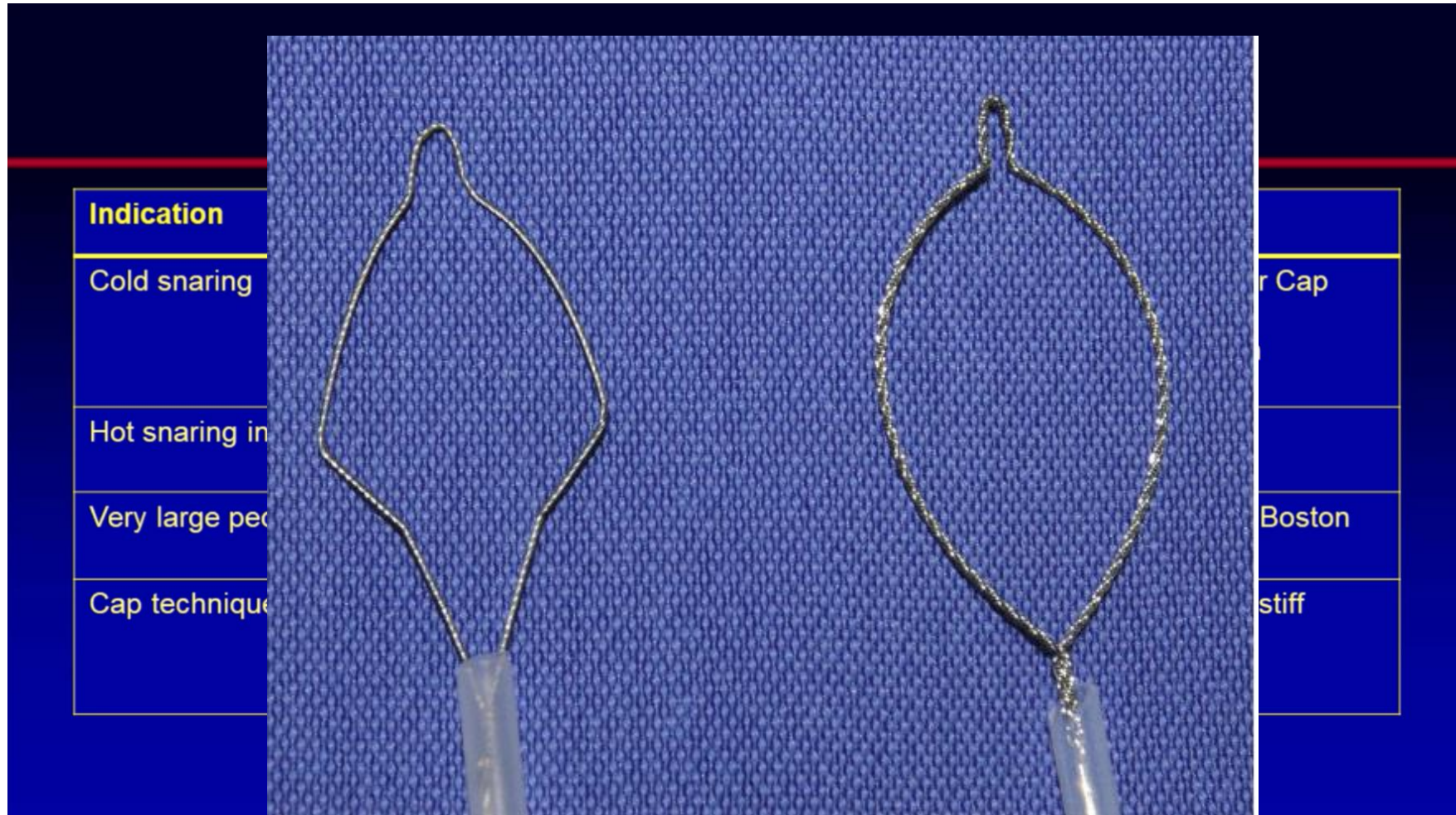
Colonic EMR – Complications



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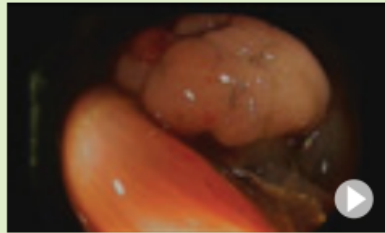
• target sign

Snare Selection in Colonic EMR



Snare Selection in Colonic EMR

Large Flat Adenomas and Laterally Spreading Tumors



For larger polyps that are flat, a stiff snare helps grasp the normal tissue adjacent to the polyp and prevent sliding over the lesion. For flat lesions and during EMR procedure, the larger crescent and hexagonal snares can be useful. I particularly like the 33mm Captivator II because its large size and circular shape facilitate grasping large sections of lateral-spreading tumors and makes it easy to get over and around large pedunculated polyps. I typically inject prior to resection for sessile and flat lesions that are greater than 2cm, especially if they're located in the proximal colon.

Polyps > 1cm and Polyps 6-9mm pedunculated or sessile



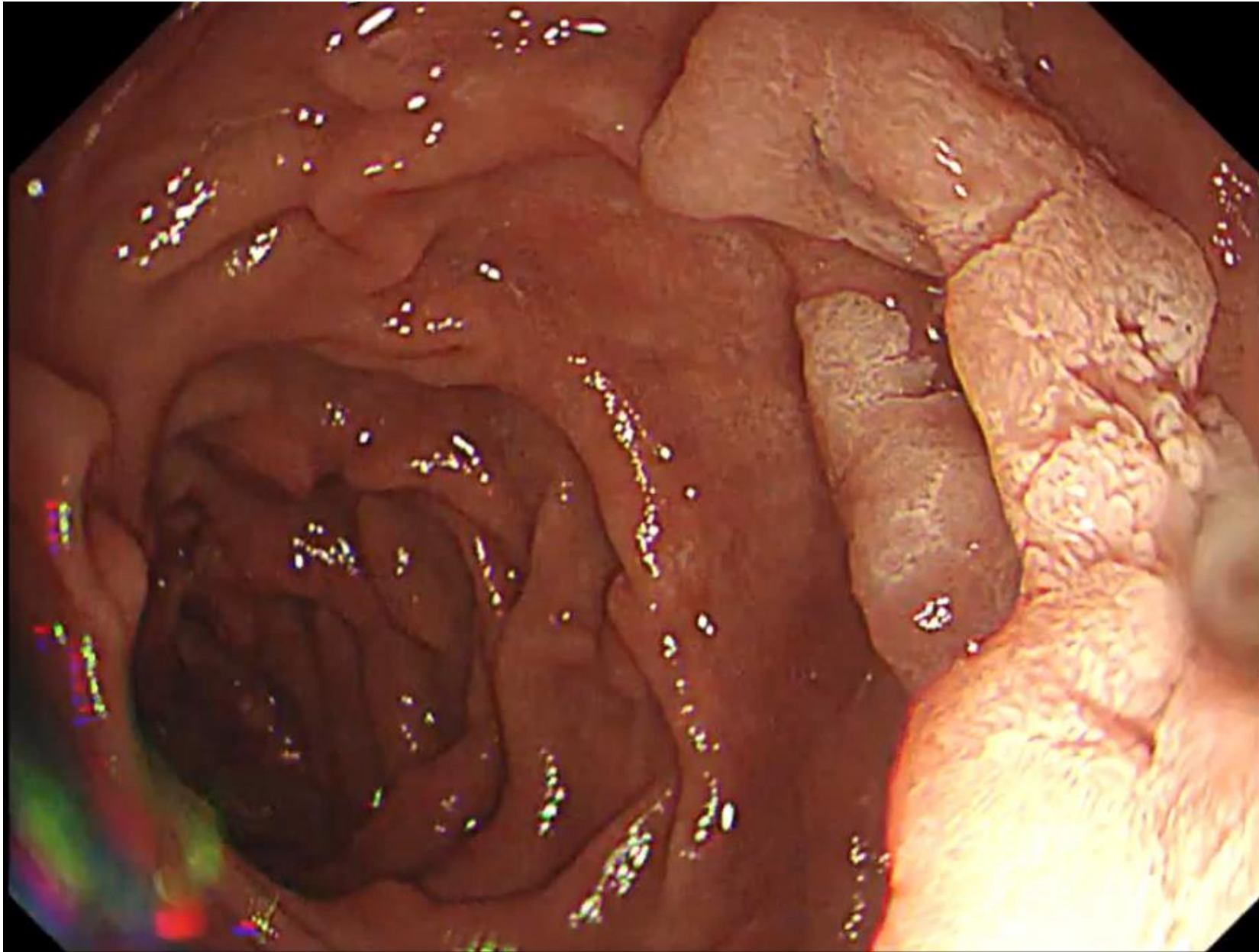
Hot snaring technique is preferred for this type of lesion. Only the polyp or the polyp and a small rim of normal tissue should be grasped. Once the polyp is firmly in the grip of the snare, the lumen is deflated and the polyp is lifted in order to protect the muscularis propria from the cautery burn. Only after tenting and deflation is cautery applied and the polyp transected.

Colonic EMR – additional thoughts

- If future endoscopic evaluation/resection warranted of a lesion, tattoo marking should be performed
 - 3-5 cm DISTAL to lesion at 2-3 sites
 - If marking for surgical resection -> in line with lesion and opposite wall
- Not indicated at ileocecal valve, cecum, or rectum
- Surveillance colonoscopy should be in 6 months
- Carbon dioxide or water should be utilized for insufflation
- Caution for non-lifting lesion

Duodenal adenomas (non-ampullary)

- Given rarity of sporadic (non-polyposis syndrome associated) duodenal polyps, limited data to provide guidelines
- Should be performed by advanced endoscopists only
 - Thin luminal wall increases risk of perforation
 - Extensive vascular supply increases risk of post-resection bleeding
- Recommended method:
 - Imperative to lift prior to mucosectomy
 - Traditionally hot snare performed, but new data suggesting comparative efficacy with cold snare polypectomy
 - Surveillance in 3 months then 6 months



EMR in the Stomach

- Indications

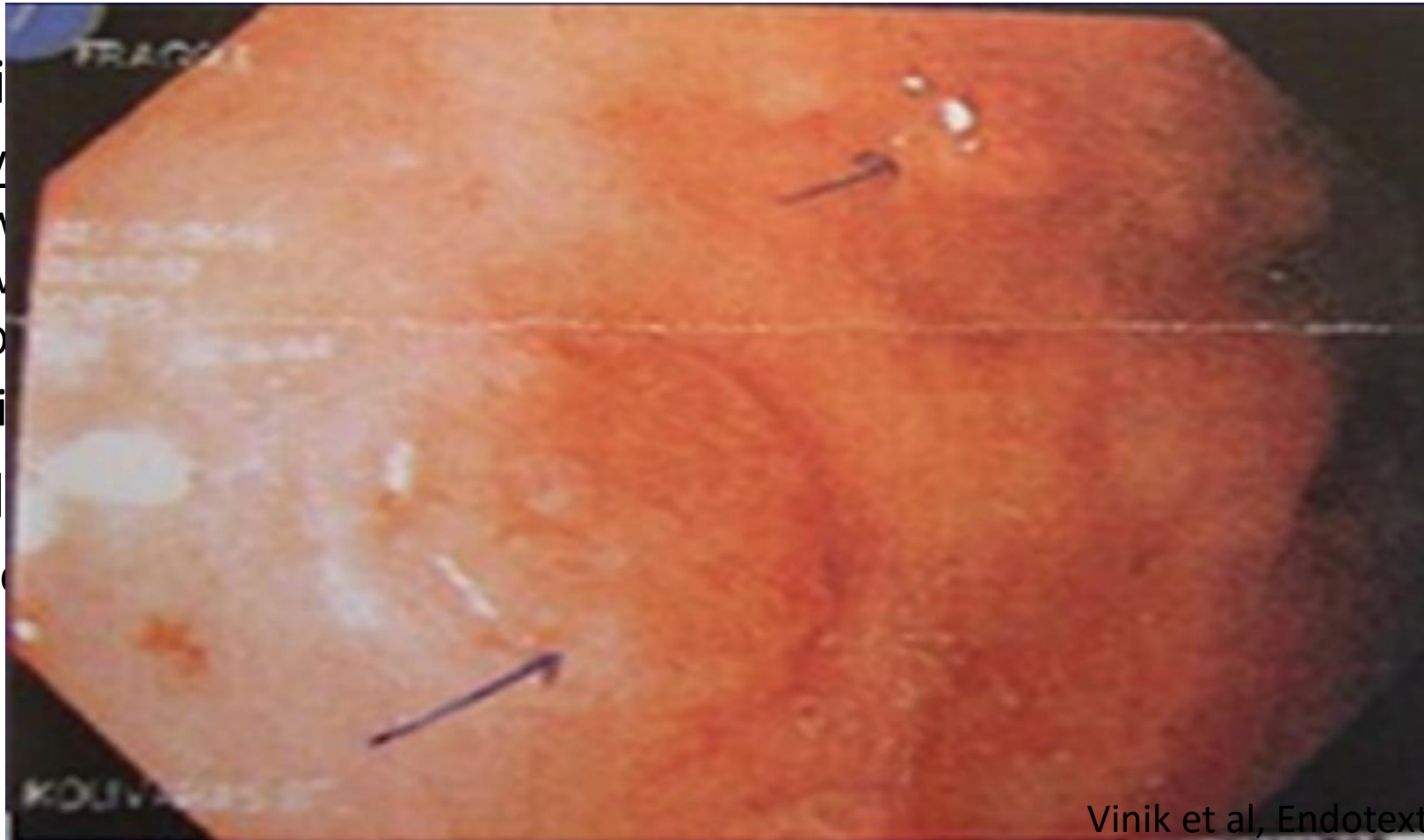
- Early

- W
 - w
 - D

- Carcin

- Surveillance

- Risk



ration

layers

Vinik et al, Endotext 2015

Ono et al, DEN 2020

Delle Fave et al, Neuroendocrinology 2012

Barrett's Esophagitis



- E
- F
- [

- Helps discern cutting lesion above or below band



EMR in Barrett's Esophagitis

AGA Clinical Practice Update on Endoscopic Treatment of Barrett's Esophagus With Dysplasia and/or Early Cancer: Expert Review



Prateek Sharma,^{1,2} Nicholas J. Shaheen,³ David Katzka,⁴ and Jacques J. G. H. M. Bergman⁵

- Pathology of the resected lesion guides surveillance endoscopy timing:
 - Intramucosal Adenocarcinoma or HGD – 3 months, 6 months, 12 months, then annually
 - LGD – 1 year and 3 years

Esophageal EMR – Complications

- Bleeding and perforation remain rare: < 1%
- Most common:
 - Esophageal stricture
 - Occurs at a rate of 6%
 - This rate increases if EMR performed for > 50% of the esophageal circumference
 - As such, nodular lesions approaching 50% esophageal circumference or flat HGD/intramucosal adenocarcinoma should NOT be resected

Applicable CPT codes

CPT®1 code	Description
Eleview®* submucosal injectable composition	
43211	Esophagoscopy, flexible, transoral; with endoscopic mucosal resection
43254	Esophagogastroduodenoscopy, flexible, transoral; with endoscopic mucosal resection
45349	Sigmoidoscopy, flexible; with endoscopic mucosal resection
45390	Colonoscopy, flexible; with endoscopic mucosal resection
44403	Colonoscopy through stoma; with endoscopic mucosal resection
44404	Colonoscopy through stoma; with directed submucosal injection(s), any substance
45381	Colonoscopy, flexible; with directed submucosal injection(s), any substance
45385	Colonoscopy, flexible; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique
43192	Esophagoscopy, rigid, transoral; with directed submucosal injection(s), any substance
43201	Esophagoscopy, flexible, transoral; with directed submucosal injection(s), any substance
43236	Esophagogastroduodenoscopy, flexible, transoral; with directed submucosal injection(s), any substance
45335	Sigmoidoscopy, flexible; with directed submucosal injection(s), any substance

Thank You

