Management of the Complex Colon Polyp

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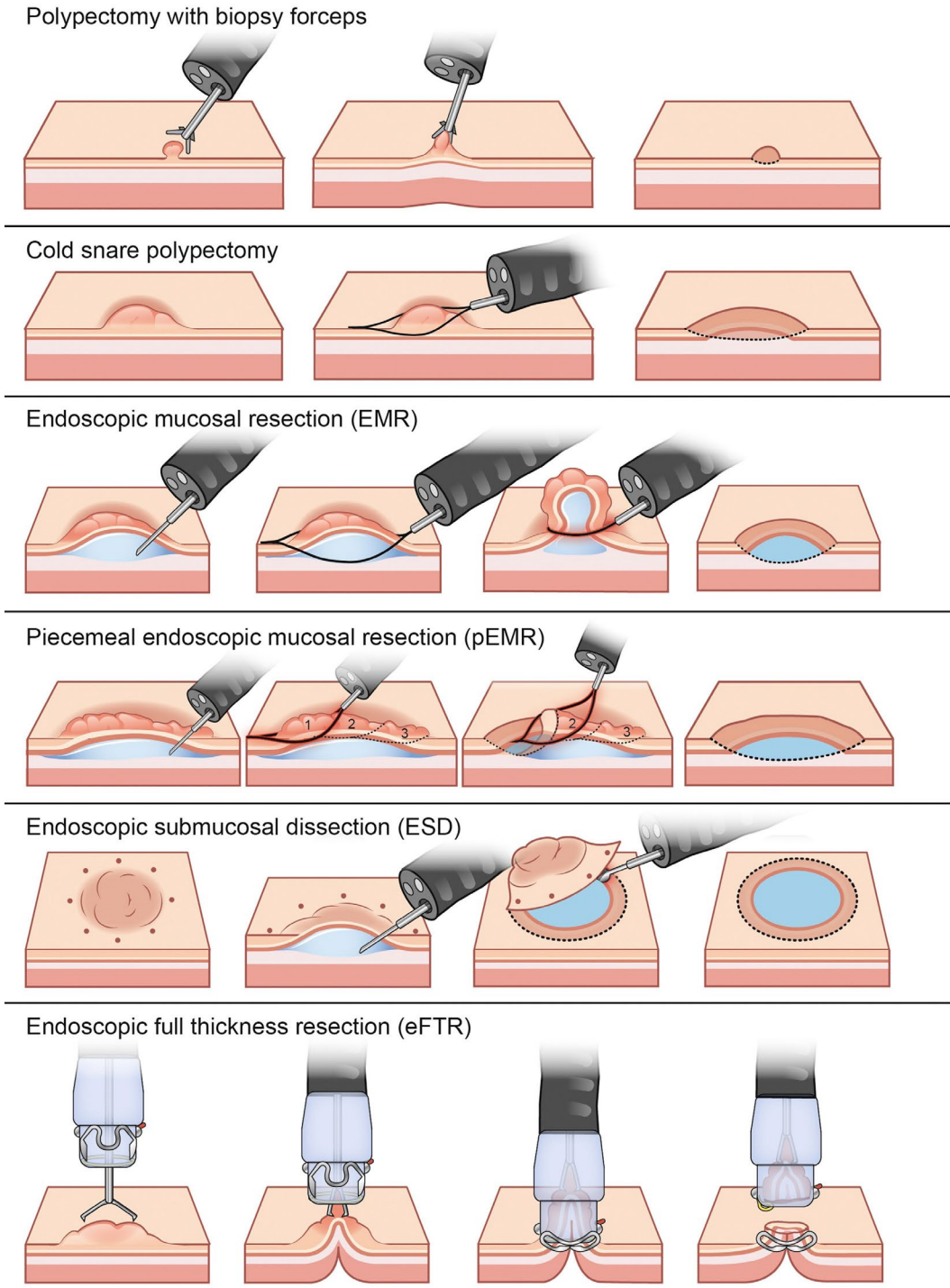
Disclosures

- NONE

Objectives

- Define complex colon polyps
- Discuss techniques to determine the resectability of a polyp
- Understand the importance of accurate examination and classification of colon polyps
- Describe endoscopic treatment options for complex colon polyps



What is a “complex colon polyp”?

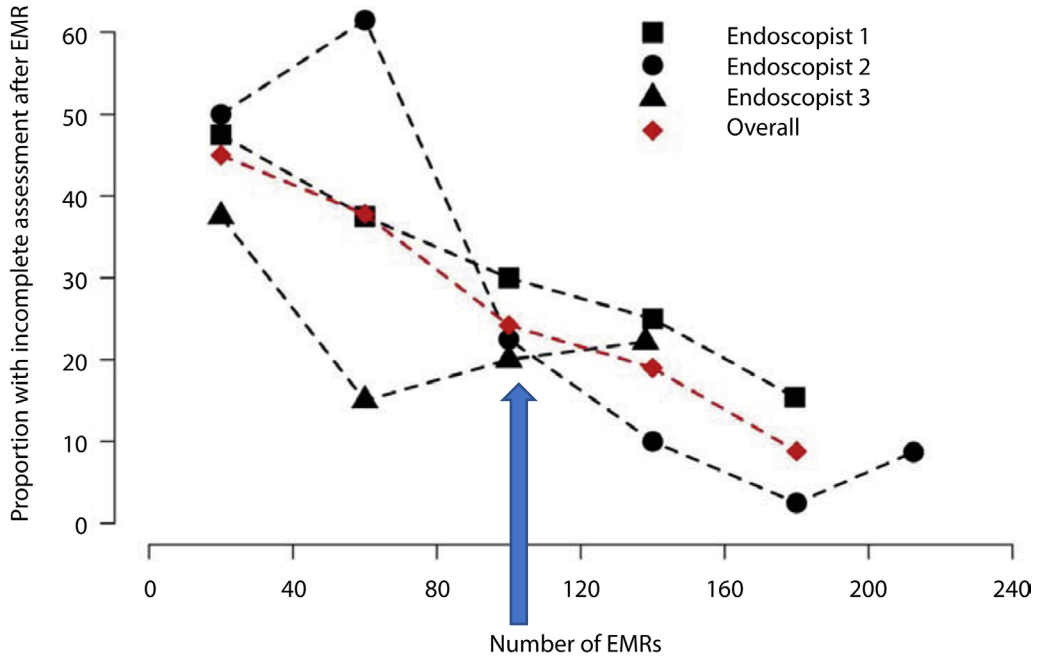
- Any polyp with a technically challenging resection
  - Size (>20mm)
  - Shape (flat, bulky, nodular)
  - Extent (crossing 2 folds, >1/3 circumference of lumen)
  - Location (right colon, ileocecal valve, dentate line)
  - Fibrosis (due to prior attempted resections/injections/tattoo)

Assessment of Technical Difficulty

- Incomplete resection is common
- Increases difficulty of future resection attempts
  - Increases likelihood of surgical referral
- Complex colon polyps should be referred to experts in these techniques at multispecialty centers

Complete Resection is the goal

- Variable reported rates of incomplete polypectomy
  - 6.5% to 22.7%
- 50% post-colonoscopy colon cancer due to incompletely resected polyps
- Polypectomy/EMR is operator dependent



Pohl H, et al. Incomplete Polyp Resection During Colonoscopy—Results of the Complete Adenoma Resection (CARE) Study Gastro 2013. 144(1)74-80
Robertson D, et al. Colorectal cancers soon after colonoscopy: a pooled multicohort analysis. *Gut* 2014;63:949-956.
Burhwahl A, et al. Endoscopic mucosal resection: learning curve for large nonpolypoid colorectal neoplasia. GIE 2016. 84 (6): 959-968

SMSA scoring system

Table 1 Components of the size, morphology, site and access score.

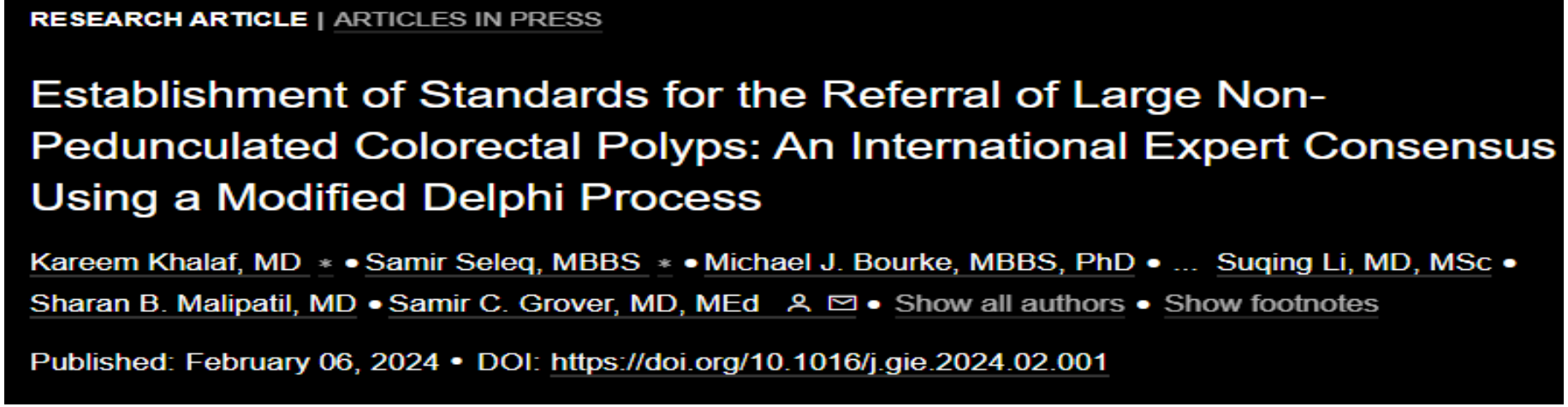
Component	Benchmark (cm)	Points[a]
Size	< 1	1
	1–1.9	3
	2–2.9	5
	3–3.9	7
	> 4	9
Morphology	Pedunculated	1
	Sessile	2
	Flat	3
Site	Left	1
	Right	2
Access	Easy	1
	Difficult	3

[a] SMSA scores: level 1 (4–5), level 2 (6–9), level 3 (10–12) and level 4 (> 12)

Table 2 Correlation between the size, morphology, site and access score and endoscopic outcome parameter following endoscopic mucosal resection (Pearson correlation performed).

SMSA polyp level	Incomplete resection	Additional procedures	Complications	Advanced histology
2	0/9 (0%)	0/9 (0%)	0/9 (0%)	2/9 (22%)
3	1/64 (2%)	25/64 (39%)	3/64 (5%)	16/64 (25%)
4	8/41 (20%)	17/41 (41.5%)	0/41 (0%)	10/41 (24%)
P-value	0.001	0.093	0.416	0.585

Currie AC, Merriman H, Nadia Shah Gilani S, Mackenzie P, McFall MR, Baig MK. Validation of the size morphology site access score in endoscopic mucosal resection of large polyps in a district general hospital. Ann R Coll Surg Engl. 2019 Nov;101(8):558-562. doi: 10.1308/rcsann.2019.0068. Epub 2019 Jun 24. PMID: 31233327; PMCID: PMC6818069.



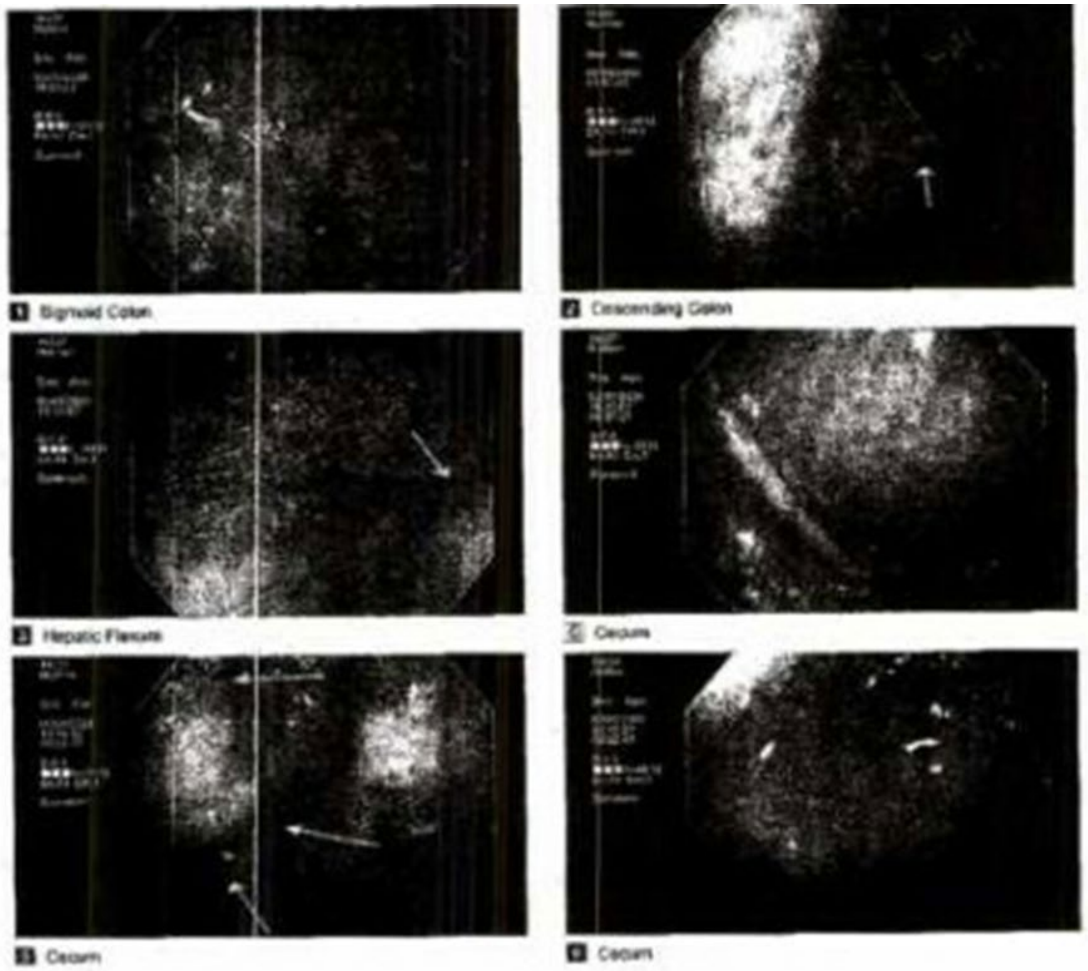
RESEARCH ARTICLE | ARTICLES IN PRESS

Establishment of Standards for the Referral of Large Non-Pedunculated Colorectal Polyps: An International Expert Consensus Using a Modified Delphi Process

Kareem Khalaf, MD * • Samir Seleq, MBBS * • Michael J. Bourke, MBBS, PhD • ... Suqing Li, MD, MSc • Sharan B. Malipatil, MD • Samir C. Grover, MD, MEd • Show all authors • Show footnotes

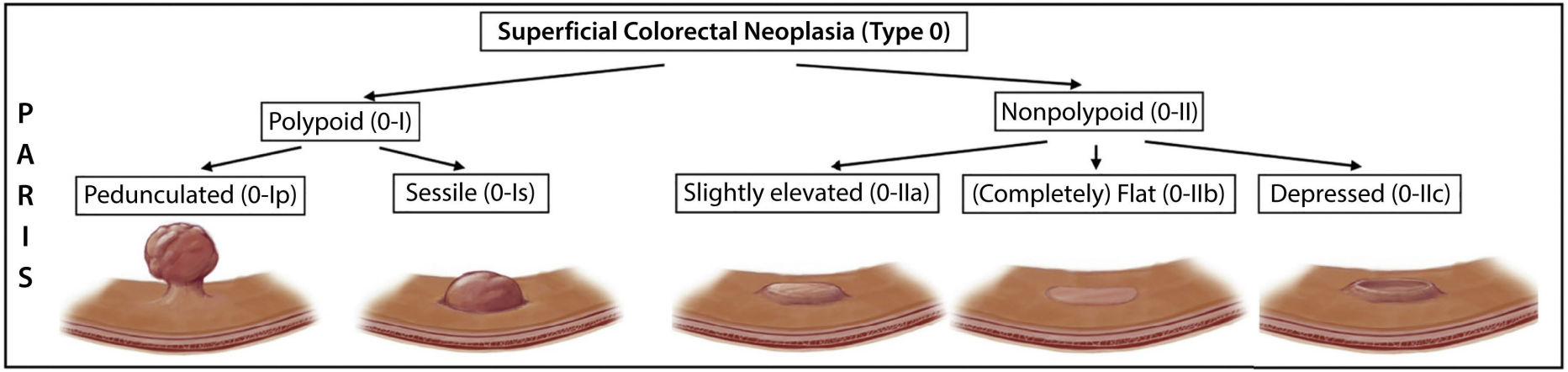
Published: February 06, 2024 • DOI: https://doi.org/10.1016/j.gie.2024.02.001

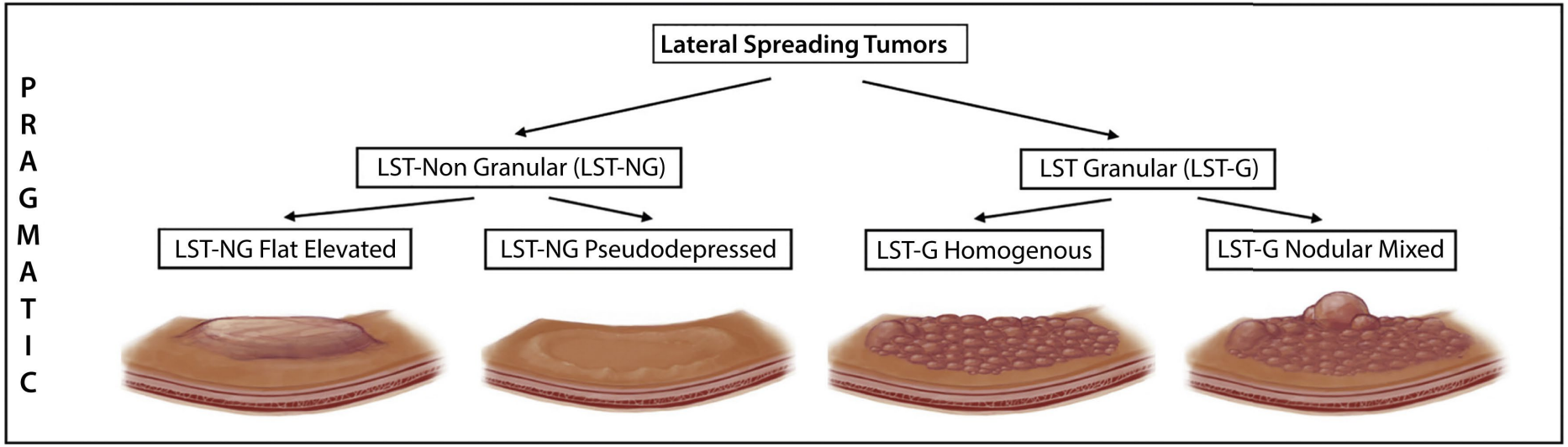
- Documentation is key
  - Demographics, color photos, procedure report (scope used, prep quality, difficulty), prior polypectomy attempts
- Lesion descriptions
  - Polyp characteristics
    - Paris and LST Classifications
  - Polyp surface and vascular characteristics
    - JNET, WASP, NICE, Kudo



Planning is key to success!

Paris and Laterally Spreading Tumor (LST) classifications





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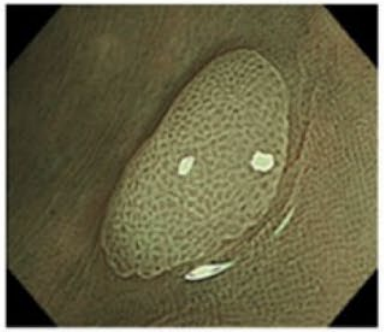
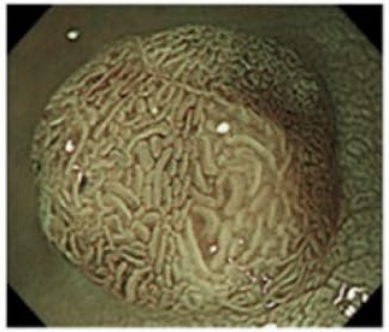
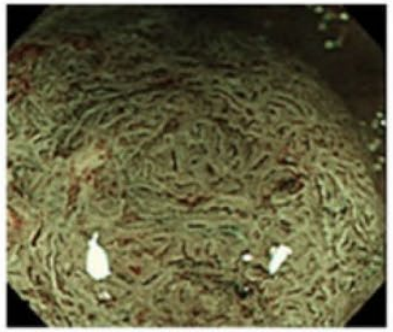
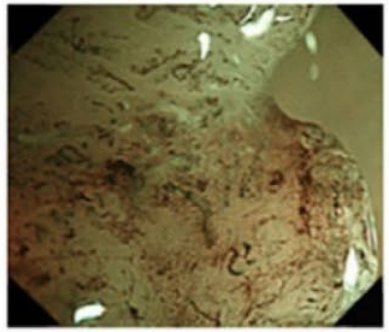
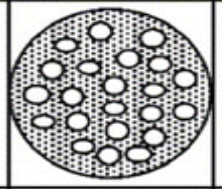
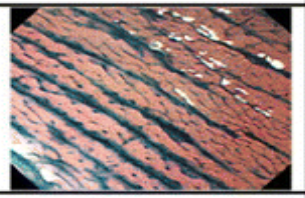
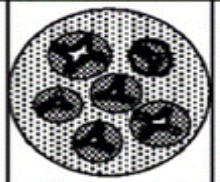
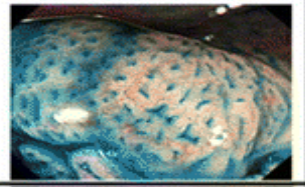
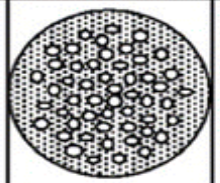
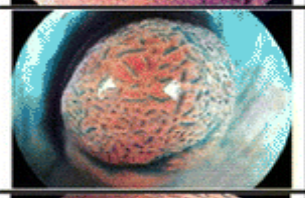
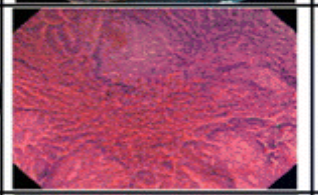
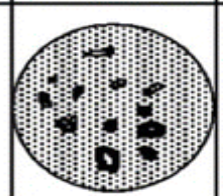
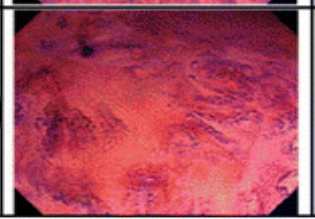
Roy Soetikno, Han Mo Chiu, Ravishankar Asokkumar, Silvia Sanduleanu, Shinji Tanaka, Amit Rastogi, Noriya Uedo, Hazem Hammad, George Triadafilopoulos,
Use of the ACES (Appearance, Classification, Enhanced endoscopy, and Safe resection) algorithm for the recognition and mangement of malignant polyps—a letter in response to the Multi-Society Task Force on Colorectal Cancer recommendations,Gastrointestinal Endoscopy,Volume 93, Issue 5,2021,Pages 1194-1198,ISSN 0016-5107,https://doi.org/10.1016/j.gie.2020.12.020

NICE classification

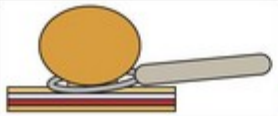
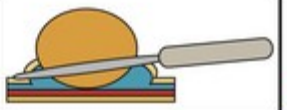
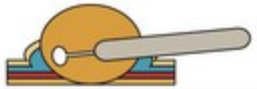
	Type 1	Type 2A	Type 2B	Type 3
Vessel pattern	· Invisible *1	· Regular caliber · Regular distribution (meshed/spiral pattern) *2	· Variable caliber · Irregular distribution	· Loose vessel areas · Interruption of thick vessels
Surface pattern	· Regular dark or white spots · Similar to surrounding normal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

Kudo pit pattern

Type	Schematic	Endoscopic	Description	Suggested Pathology
I			Round pits.	Non-neoplastic.
II			Stellar or pap-illary pits.	Non-neoplastic.
IIIs			Small tubular or round pits that are smaller than the normal pit	Neoplastic.
IIIL			Tubular or roundish pits that are larger than the nor-mal pits.	Neoplastic.
IV			Branch-like or gyrus-like pits.	Neoplastic.
VI			Irregularly ar-ranged pits with type IIIs, IIIL, IV type pit patterns.	Neoplastic (invasive).
VN			Non-structural pits.	Neoplastic (massive submucosal invasive).

Endoscopic Resection Techniques

- Endoscopic Mucosal Resection (EMR)
- Endoscopic Submucosal Dissection (ESD)
- Full thickness resection (EFTR)

	Method		
	Polypectomy	Mucosal resection	Submucosal dissection
Schematic (blue color denotes submucosal injectant)			
Instrument	Any type of snare	Injection needle Stiff snare	Injection needle ESD knife
Intended plane of resection	Mucosa	Submucosa	Submucosa
Cost, skills, time	+	++	+++

Roy Soetikno, Han Mo Chiu, Ravishankar Asokkumar, Silvia Sanduleanu, Shinji Tanaka, Amit Rastogi, Noriya Uedo, Hazem Hammad, George Triadafilopoulos,
Use of the ACES (Appearance, Classification, Enhanced endoscopy, and Safe resection) algorithm for the recognition and mangement of malignant polyps—a letter in response to the Multi-Society Task Force on Colorectal Cancer recommendations,Gastrointestinal Endoscopy,Volume 93, Issue 5,2021,Pages 1194-1198,ISSN 0016-5107,https://doi.org/10.1016/j.gie.2020.12.020

- Before you even start, TURN THE CO2 on.

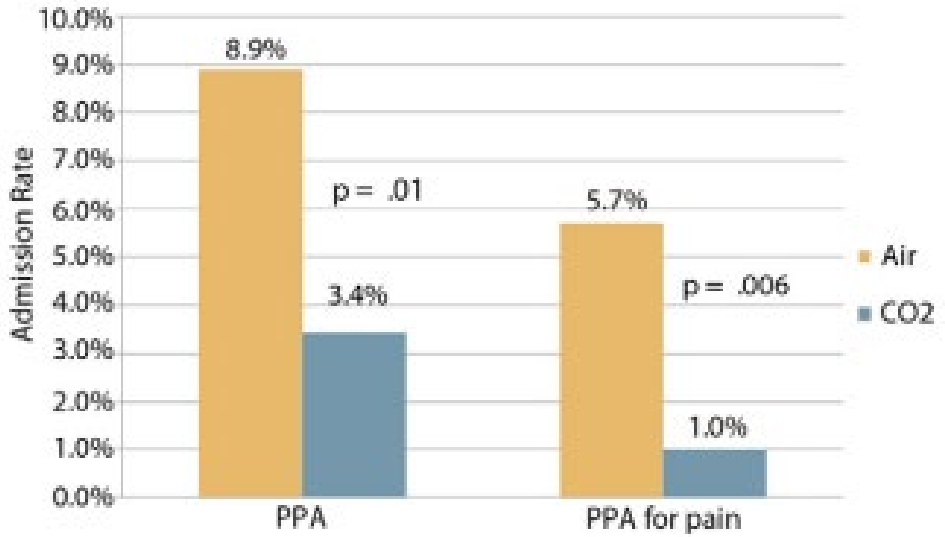


Figure 1. Postprocedure admission rates for all admissions and admissions for abdominal pain without perforation. *PPA*, postprocedure admission.

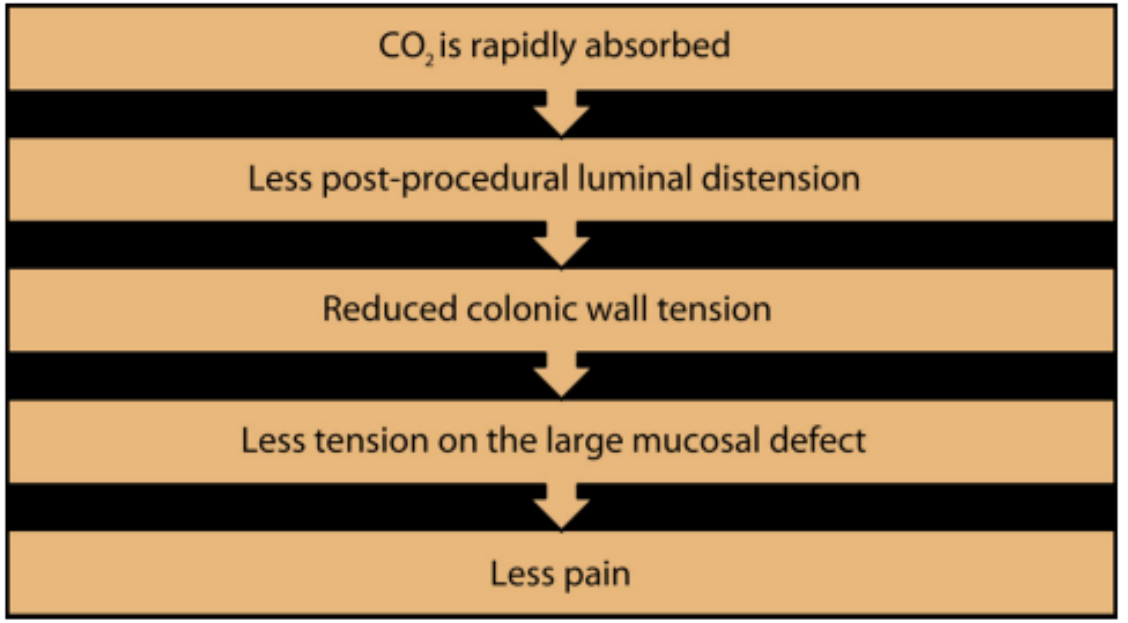
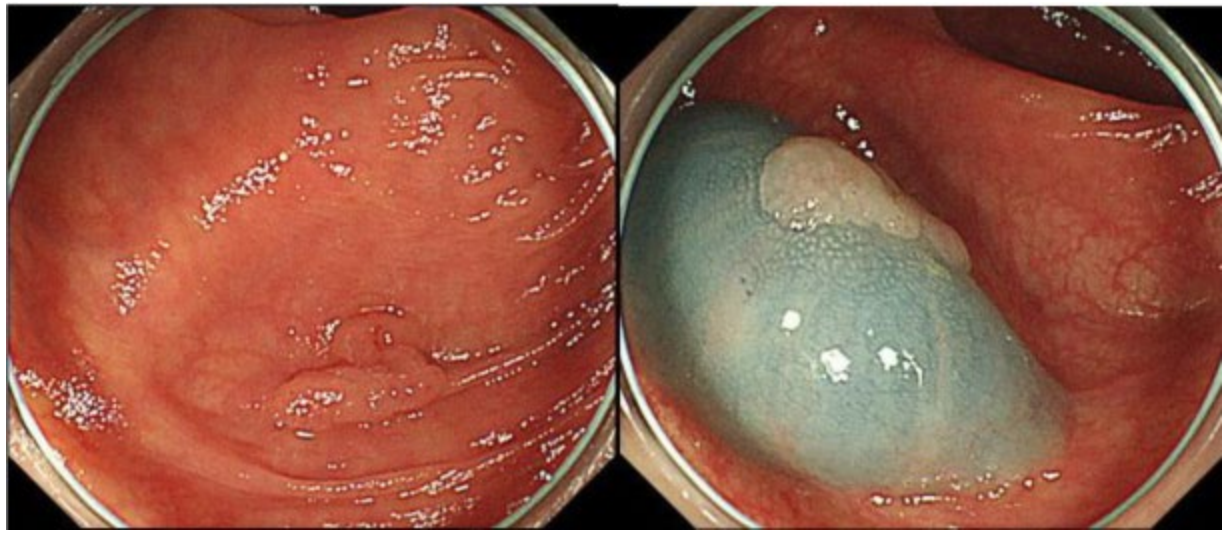


Figure 2. Postulated mechanism for the reduction in pain with CO_2 insufflation.

Bassan M et al.Carbon dioxide insufflation reduces number of postprocedure admissions after endoscopic resection of large colonic lesions: a prospective cohort study,Gastrointestinal Endoscopy,Volume 77, Issue 1

Endoscopic Mucosal Resection (EMR)

STEP 1: LIFT IT



The Submucosal lift

- Contrast agent (ie Methylene blue, indigo carmine)
- Solution= solvent + osmotic agent (+/- Bulking agent,contrast agent)

Table 1

Main features of some submucosal injection solutions

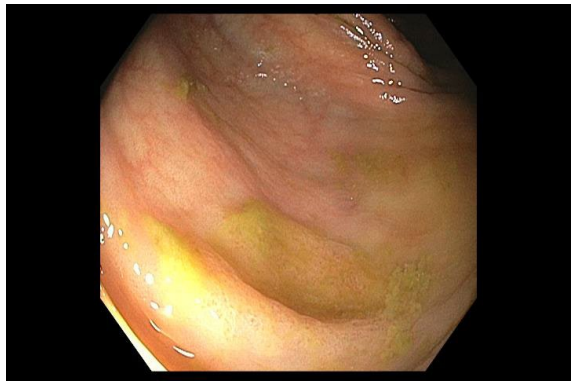
Solution	Cushion duration	Price	Advantages	Disadvantages
NS	+	Low	Widely available; Inexpensive; Non-toxic	Poor submucosal elevation
DW	++	Low	Widely available; Inexpensive	Moderate submucosal elevation; Significant tissue damage at high concentrations of dextrose
HPMC	+++	Moderate	Great submucosal elevation; Widely available	Moderately expensive; Risk of antigenic reactions
HES	++++	Low/moderate	Excellent submucosal elevation; FDA-approved for submucosal injection; Reasonably priced	None
HA	++++	High	Excellent submucosal elevation	Expensive; Can stimulate the growth of residual tumour cells
Eleview®	++++	High	Excellent submucosal elevation; Non-toxic	Expensive

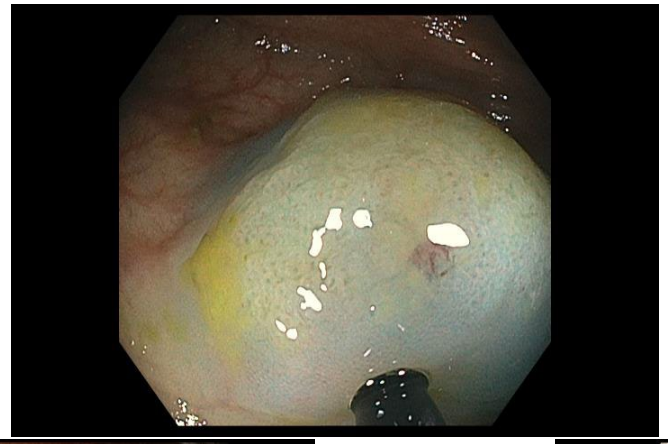
NS: Normal saline; DW: Dextrose water; HPMC: Hydroxypropyl methylcellulose; HES: Hydroxyethyl starch; HA: Hyaluronic acid; FDA: Food and Drug Administration.

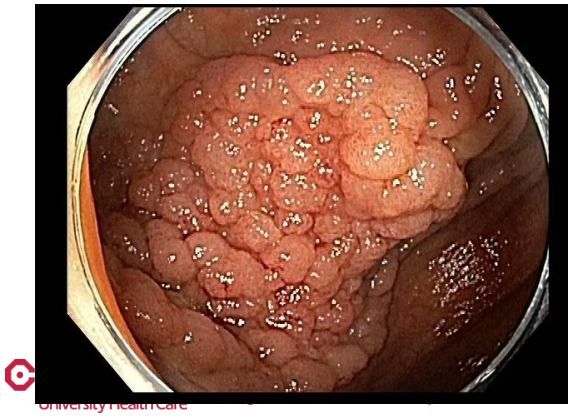
Castro R, et al World J Gastroenterol. 2019; 25(7): 777-788

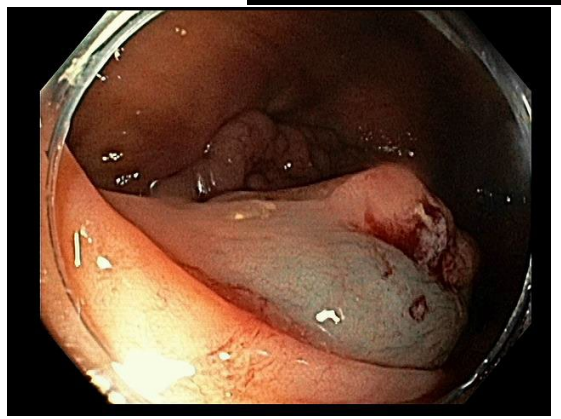
Tips for submucosal lift

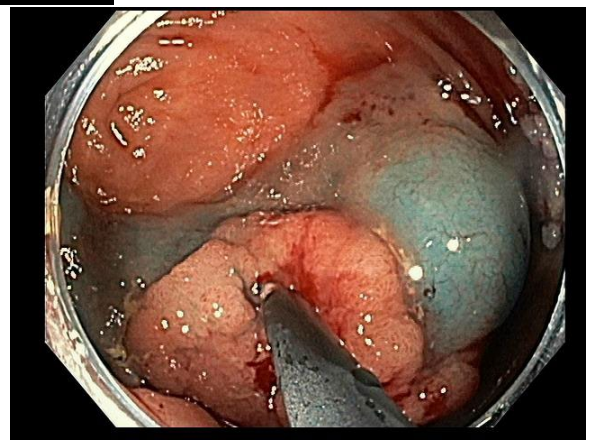
- Before injection, carefully identify borders of lesion
- Plan ahead!
  - Based on location, determine best location for initial injection











STEP 2: CUT IT

Hot Snare

- Stiff snares- several sizes
  - 10mm, 15mm, 20mm
    - Consider piecemeal resection of lesions >20mm
  - Provides adequate grip/traction
- Microprocessor-controlled electrosurgical generators

Cold Snare

- Thin, stiff monofilament cold snare
  - 10mm (only UP TO 15mm)
- Less concern for deep mural injury
- More intraprocedural bleeding
  - ? Increase risk of polyp recurrence
  - Reduction by submucosal injection tamponade

Mangira D, et al. Cold snare piecemeal EMR of large sessile colonic polyps ≥20 mm (with video). GIE 2020: 1343-1352.

CT

♡

Cold

EMR

Variable	Cold N=62	HOT N=300	p-value
Age, median (range)	69.0(47.0-85.0)	67.0(31.0-86.0)	0.1939
Age, n (%)			0.6586
Age <60	14(22.6)	78(26.0)	
60≤age<70	20(32.2)	105(35.0)	
Age≥70	28(45.2)	117(39.0)	
Sex (male), n (%)	22(35.5)	140(46.8)	0.1023
Race, n (%)			0.4975
White	57 (91.9)	266 (88.7)	
Black	4 (6.5)	19 (6.3)	
Other	1 (1.6)	15 (5.6)	
BMI, n (%)			0.0476
<25	27 (43.5)	84 (28.0)	
25-30	21 (33.9)	119 (39.7)	
≥30	14 (22.6)	97 (32.3)	
Lesion size, n (%)			0.0485
≤35	58 (93.6)	250 (83.3)	
>35	4 (6.4)	50 (16.7)	
Duration of procedure, n (%)			<0.0001
≤45	17 (27.4)	165 (55.0)	
>45	45 (72.6)	135 (45.0)	
Site, n (%)			0.2477
Proximal	56 (90.3)	254 (84.7)	
Distal	6 (9.7)	46 (15.3)	
Pathology 1, n (%)			0.0717
Adenoma	38 (61.3)	224 (74.7)	
Serrated	23 (37.1)	70 (23.3)	
Hyperplastic	1 (1.6)	6 (2.0)	
Pathology 2, n (%)			0.3389
Benign	53 (85.5)	269 (89.7)	
High grade dysplasia	9 (14.5)	31 (10.3)	
Other complication, n (%)	0 (0.0)	2 (0.67)	1.0000
Antiplatelet/anticoagulant use, n (%)	9 (14.5)	56 (18.7)	0.4383
Smoking, n (%)	43 (69.4)	42 (14.1)	<0.0001
Comorbidity, n (%)	8 (12.9)	158 (52.7)	<0.0001
Outcome, n (%)			
Delayed bleeding	0 (0.0)	12 (4.0)	0.2327
Recurrence	11 (17.7)	22 (7.3)	0.0095
Clip use	5 (8.1)	292 (97.3)	<0.0001

Table 2.1. Multivariable logistic regression analysis for the event of recurrence

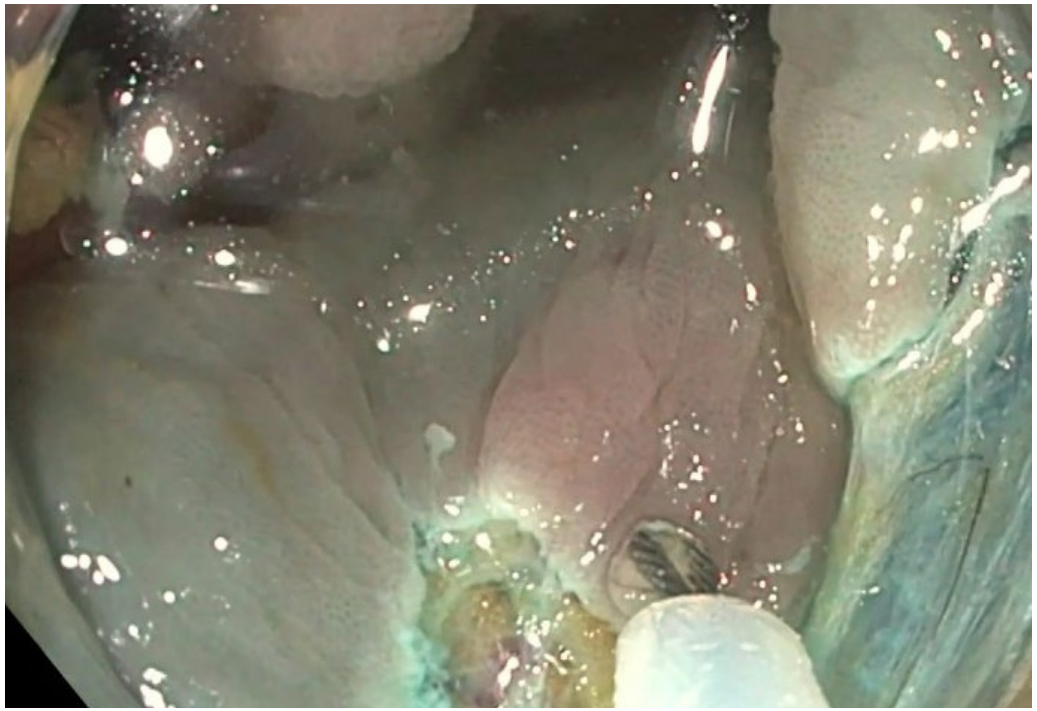
Variable	OR (95%CI)	p-value
Duration of procedure (≤45 vs. >45)	2.33 (1.04-5.21)	0.0396
Treatment (cold vs. hot)	4.63 (2.05-10.43)	0.0002

Table 2.2. Multivariable logistic regression analysis for the event of clip use

Variable	OR (95%CI)	p-value
Site (distal vs. proximal)	0.16 (0.04-0.65)	0.0102
Treatment (cold vs. hot)	660.6 (174.0- >999.9)	<0.0001

Gastrointestinal Endoscopy 2023 97AB535-AB536DOI: (10.1016/j.gie.2023.04.886)

STEP 3: TOUCH IT UP

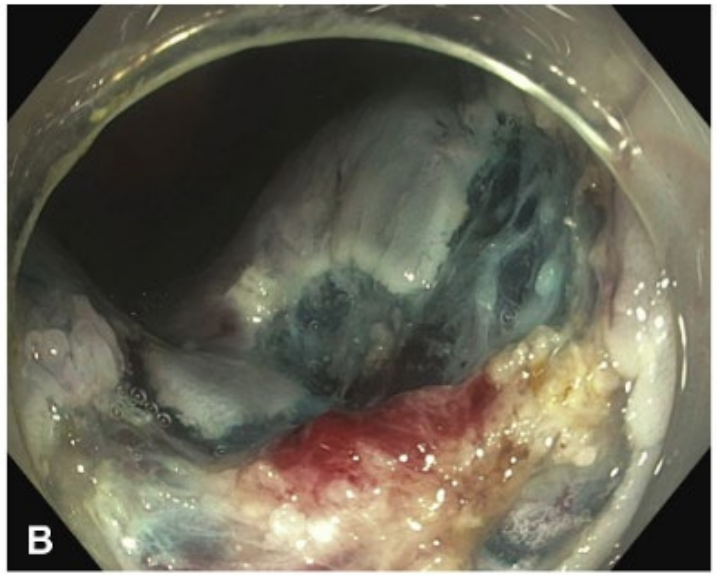


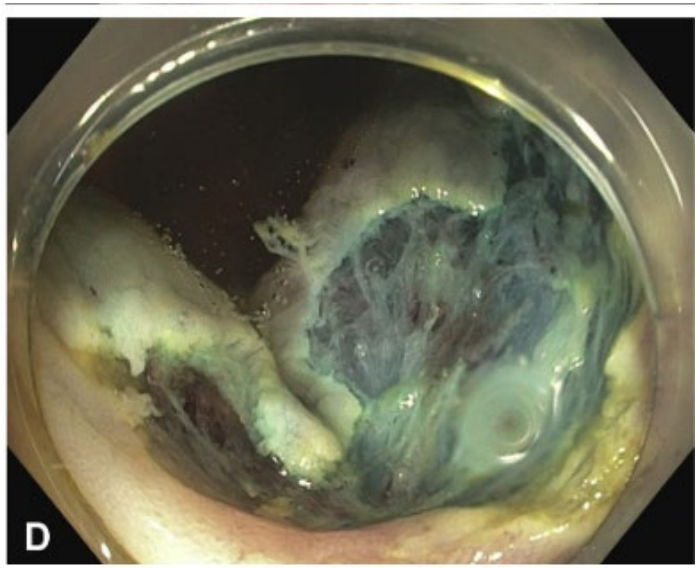
ORIGINAL ARTICLE: Clinical Endoscopy

Avulsion is superior to argon plasma coagulation for treatment of visible residual neoplasia during EMR of colorectal polyps (with videos)

Ian Holmes, MD,[1] Hyun Gun Kim, MD,[2] Dong-Hoon Yang, MD,[3] Shai Friedland, MD[4,5]

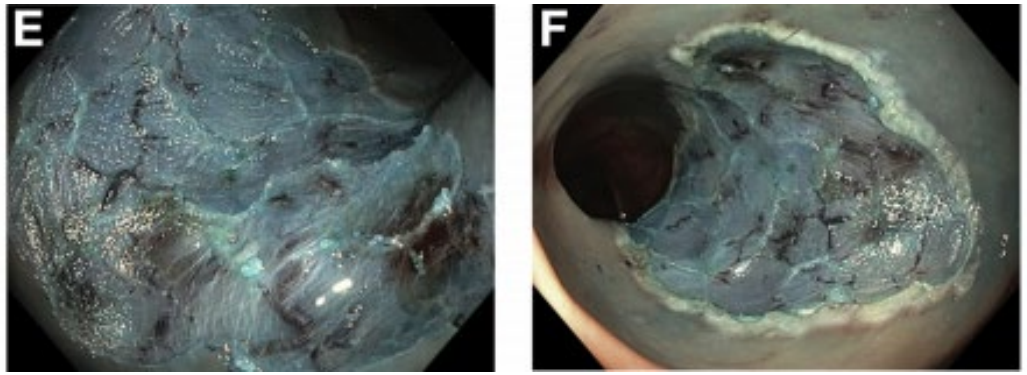
	APC	Avulsion	
Adverse events (bleeding)	2%	7%	p=0.18
Recurrence	59%	10%	p<0.001

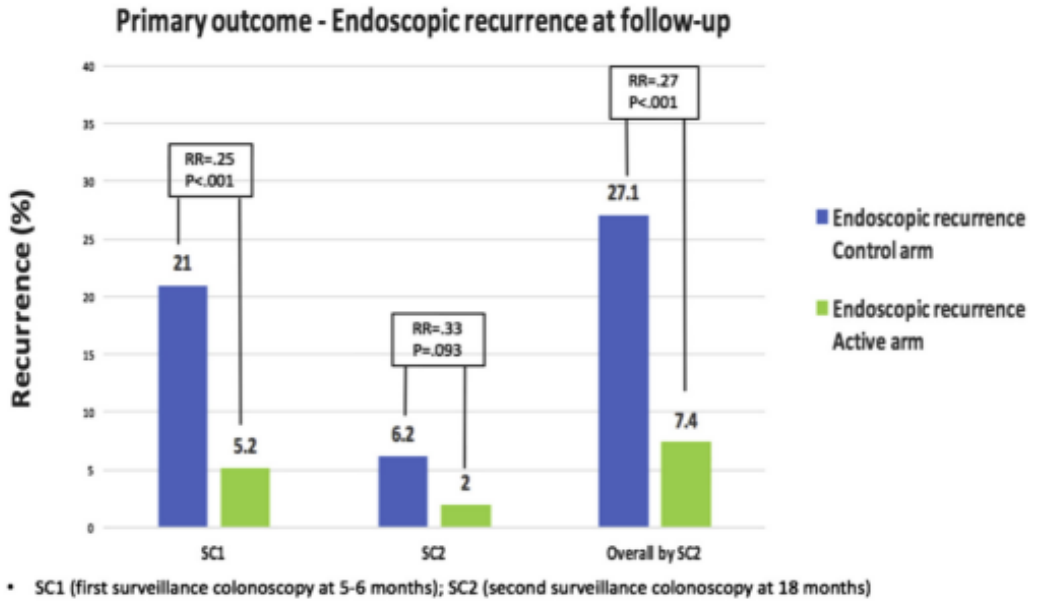




Adjuvant thermal therapy

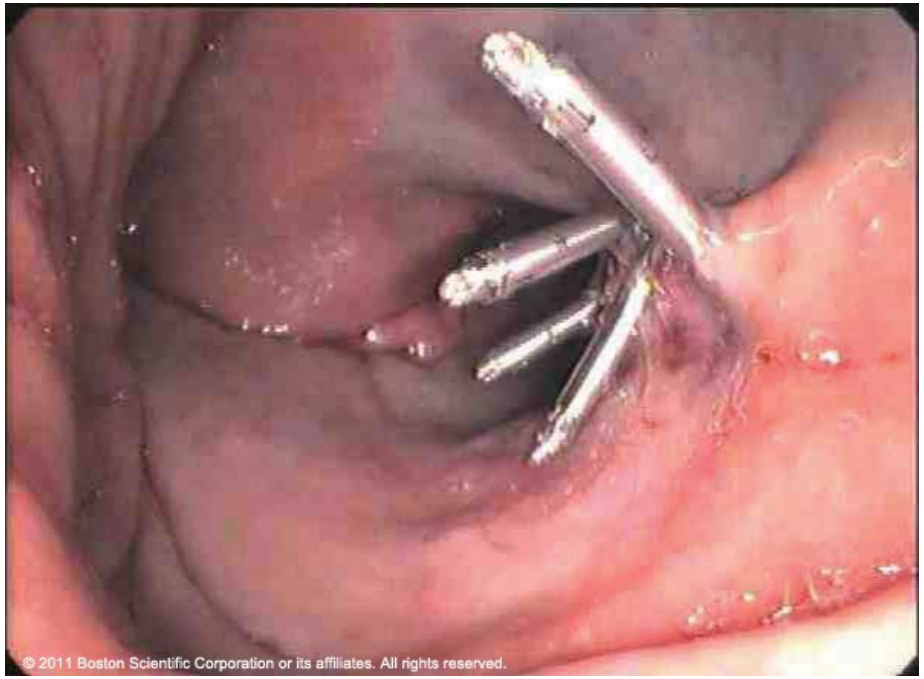
- Klein A, et al. Gastro 2019
  - Thermal therapy of EMR defect margins reduces rate of adenoma recurrence
  - Low voltage electrocautery
    - SOFT COAG mode





Klein, et al. Thermal Ablation of Mucosal Defect Margins Reduces Adenoma Recurrence After Colonic Endoscopic Mucosal Resection

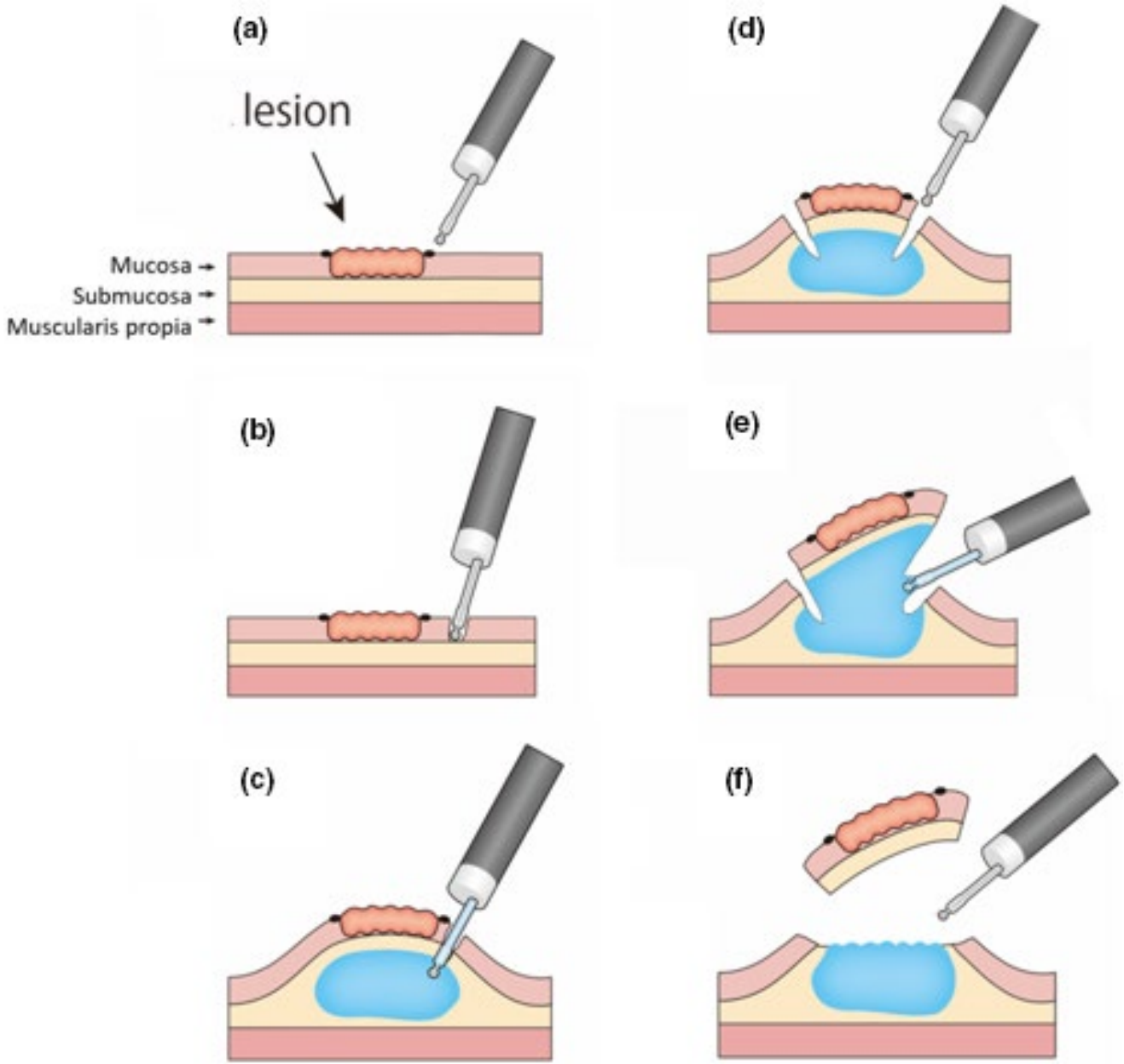
STEP 4: CLOSE IT (if high bleeding risk)

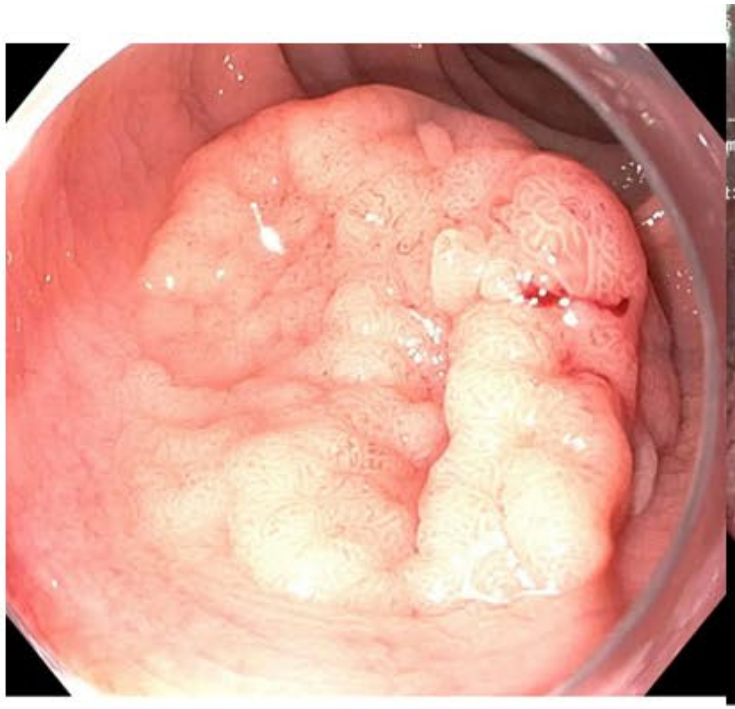


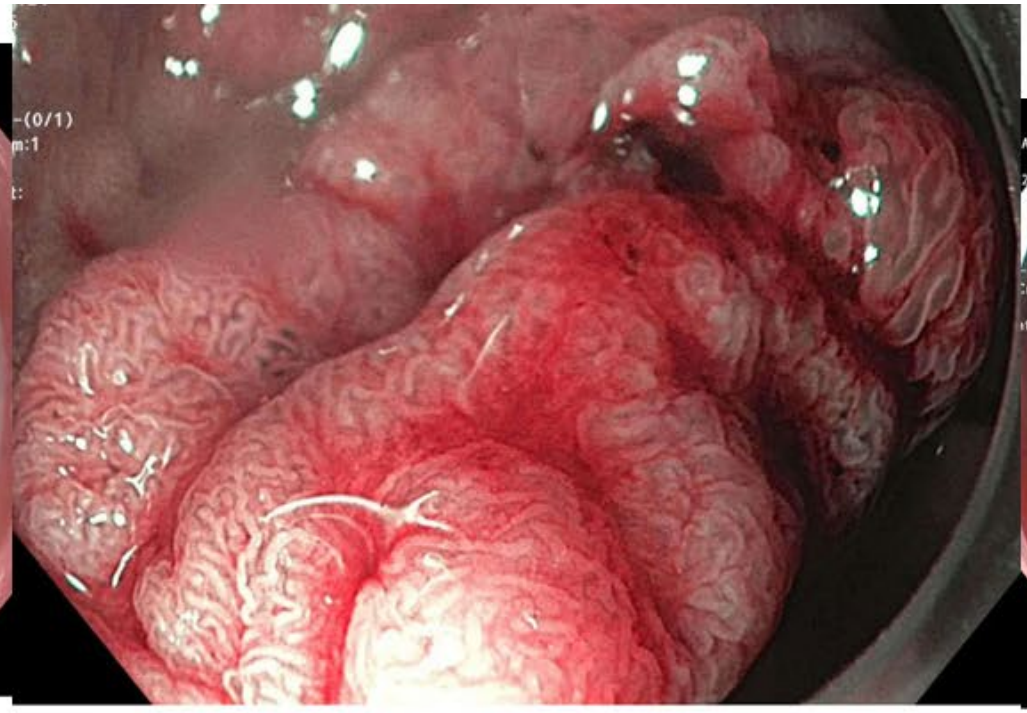
To clip or not to clip?

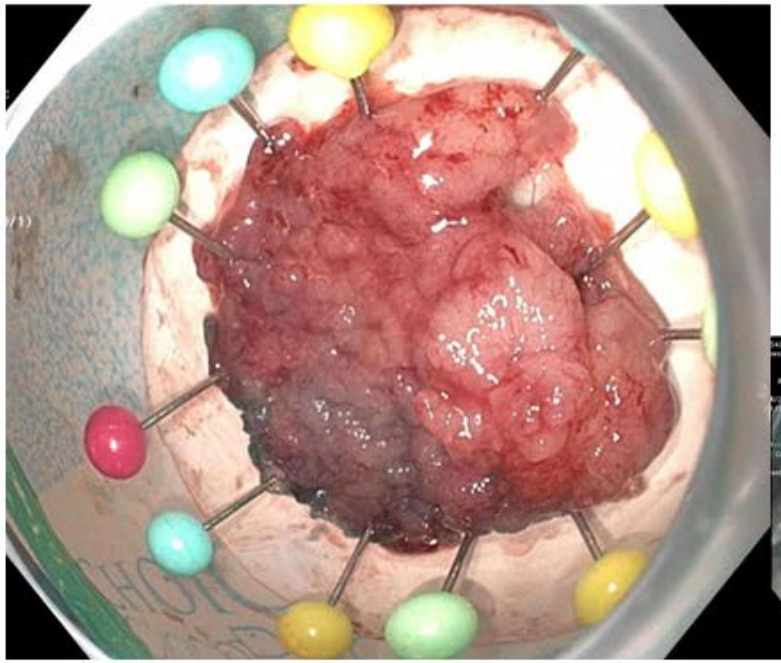
- Delayed post-polypectomy bleeding (DPB) most common complication of Hot EMR
  - Increased risk if:
    - Large (>20mm) lesion
    - Proximal lesion
    - Recent antithrombotic/antiplatelet medication use
- Very mixed data regarding efficacy of prophylactic clip closure

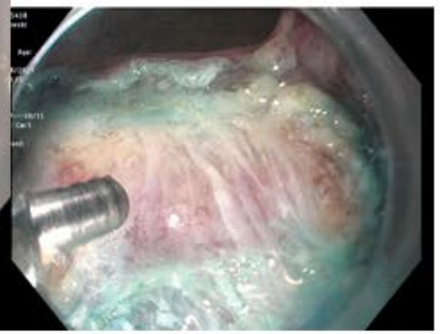
Endoscopic Submucosal Dissection (ESD)


(a)
lesion
Mucosa
Submucosa
Muscularis propia
(b)
(c)
(d)
(e)
(f)









T1b rectal adenocarcinoma

T1B rectal cancer, saved a LAR.

EMR vs. ESD

Table 1 Pooled proportions and comparative meta-analysis of endoscopic submucosal dissection and endoscopic mucosal resection

	Total papers	Sample size (ESD)	Pooled proportions	Sample size (EMR)	Pooled proportions	RR (CI)	*P* value	Publication bias
ESD — *En bloc* resection	11	1641	89% (0.83-0.94)	1411	47% (0.36-0.59)	1.837 (1.464-2.305)	< 0.001	0.0025
EMR — Positive lateral margin	2	123	3% (0.01-0.06)	187	14% (0.09-0.19)	0.292 (0.089-0.995)	0.042	-
Positive vertical margin	1	38	5% (0.00-0.17)	83	1% (0.00-0.07)	4.368 (0.409-46.710)	0.223	-
ESD — Complete resection	8	918	82% (0.74-0.88)	1012	56% (0.34-0.77)	1.504 (1.041-2.174)	0.03	-
Lymphovsacular invasion	1	54	6% (0.03-0.13)	23	0% (0.00-0.04)	4.352 (0.248-76.483)	0.315	-
ESD — Mean procedural time	8	1087	-	838	-	72.709 (54.487-90.931)	< 0.001	-
ESD — Additional surgery	2	99	13% (0.07-0.21)	153	5% (0.02-0.09)	3.139 (1.360-7.243)	0.007	-
ESD — Perforation	18	19470	5% (0.03-0.09)	260901	0% (0.00-0.01)	7.597 (4.281-13.479)	< 0.001	0.301
Bleeding	14	20048	3% (0.02-0.05)	257065	3% (0.02-0.04)	1.277 (0.896-1.820)	0.175	0.139
EMR — Recurrences	12	1822	2% (0.01-0.03)	37721	10% (0.04-0.17)	0.269 (0.112-0.648)	0.003	0.725

ESD: Endoscopic submucosal dissection; EMR: Endoscopic mucosal resection; CI: Confidence interval.

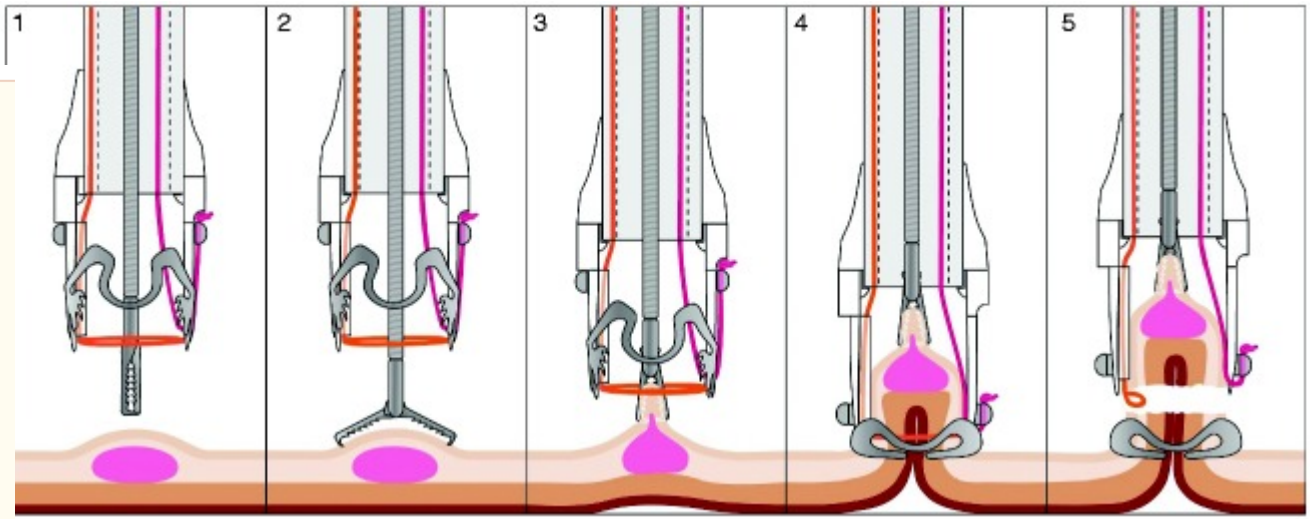
Lim XC, Nistala KRY, Ng CH, Lin SY, Tan DJH, Ho KY, Chong CS, Muthiah M. Endoscopic submucosal dissection vs endoscopic mucosal resection for colorectal polyps: A meta-analysis and meta-regression with single arm analysis. World J Gastroenterol. 2021 Jul 7;27(25):3925-3939. doi: 10.3748/wjg.v27.i25.3925. PMID: 34321855; PMCID: PMC8291020.

Endoscopic Full thickness resection (EFTR)

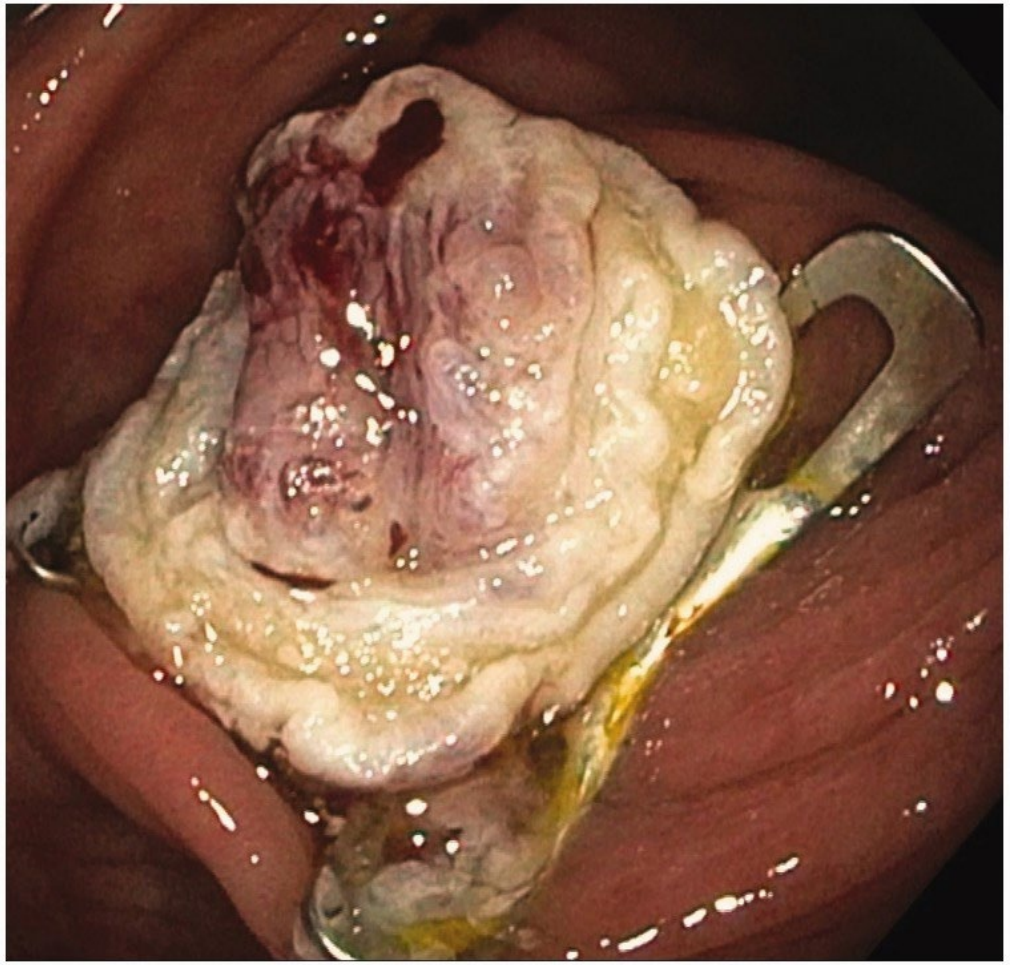
Table 1.

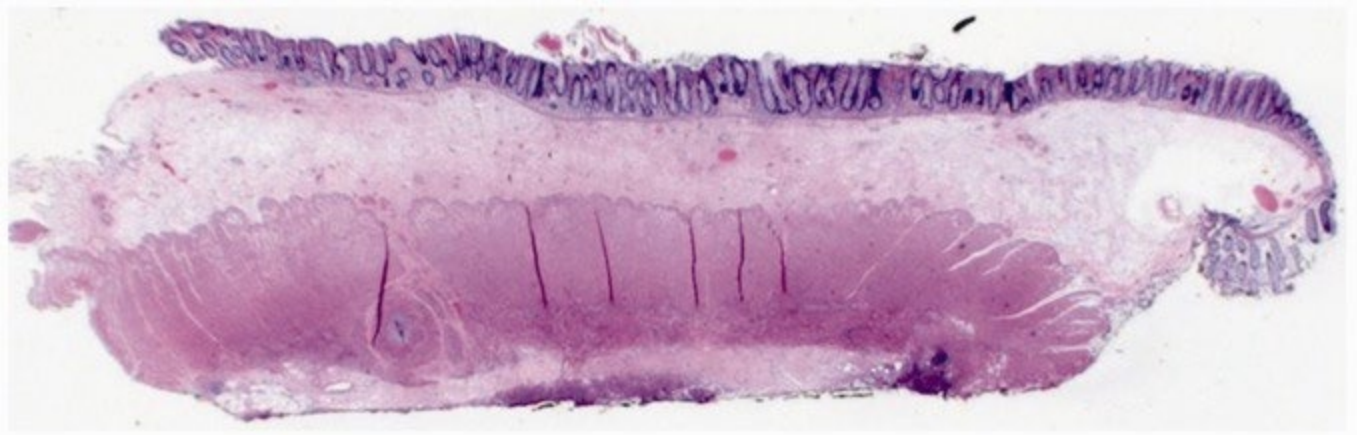
General indications for endoscopic full thickness resection (EFTR).

Nonlifting adenoma
- primary (without previous treatment)
- residual or recurrence of an adenoma after previous polypectomy
- staging following resection of a malignant polyp
Submucosal tumors (e.g. gastrointestinal stromal tumor (GIST), neuroendocrine tumors)
Adenomas at difficult anatomic locations (appendiceal orifice, diverticulum, folds)
Early carcinoma (low risk—T1, G1–G2, L0, sm1–2, R0)
Diagnostic workup of Hirschsprung's disease



Lesions must be ≤ 30mm





Aepli P, Criblez D, Baumeler S, Borovicka J, Frei R. Endoscopic full thickness resection (EFTR) of colorectal neoplasms with the Full Thickness Resection Device (FTRD): Clinical experience from two tertiary referral centers in Switzerland. United European Gastroenterol J. 2018 Apr;6(3):463-470. doi: 10.1177/2050640617728001. Epub 2017 Aug 23. PMID: 29774161; PMCID: PMC5949966.

Take home points

- Colon polyps can be considered complex for several reasons
  - NOT just size
  - Crossing multiple folds, location, previous resection, patient risk factors
- SMSA score can be used to determine the ease of resection
- Clear documentation of procedure and description of the polyp is crucial
- There are multiple modalities for safe and effect endoscopic resection of complex colon polyps (EMR, ESD, EFTR)
- Unless concerning vascular pattern or biopsy proven malignancy, always consider endoscopic resection prior to surgery referral

Thank you for your attention!