
2023 SCSG
GI SYMPOSIUM

(New) Devices for Removing Polyps

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Disclosures

- I do not have any disclosures.

Outline

- Devices for removal of diminutive and small colorectal lesions
- Distal attachment devices
- Detachable loop device
- Endoscopic powered resection device
- Full thickness resection device

Devices for Polyp Removal

- Diminutive (≤ 5 mm) and small (6-9 mm) polyps
  - Cold snare (CSP)
  - Cold biopsy forceps (CBF)
  - Hot snare (HSP)
  - Hot biopsy forceps (HBF) – limited to tissue avulsion in EMR
- Electrocoagulation → thermal injury spread to deeper submucosa → delayed hemorrhage or perforation

Cold Revolution in Polypectomy

- Dedicated Cold snare
  - Thin, braided wire pattern (0.30 mm) with robust/stiff sheath → precise and clean polyp resection
  - May be more effective in tissue capture/transection than thicker wire traditional snares (0.40 mm and 0.47 mm)
  - Studies have shown mixed results of complete polyp resection for dedicated cold snare vs traditional snare:
    - Horiuchi et. al.: 91% vs 79%; p = 0.015
    - Din et. al.: 90.2% vs. 73.3%; p < 0.05
    - Dwyer et. al.: 98.4% vs. 95.4%; p = 0.16

Din et al. *Digestive Endoscopy*. 2015;27: 603–608;Dwyer et al. *Endoscopy International Ope*. 2017; 05: E1062–E1068; Horiuchi et al. *Gastrointestinal Endoscopy*. 2015; 82(4):686-692.

Cold Snare Polypectomy Technique

- Position polyp in 5-6 o'clock position
- Optimal working distance of 2-3 cm
- Accurate snare placement with normal mucosa around polyp

		Highly Skilled	Competent and safe, no uncorrected errors	Some standards not yet met, aspects to be improved, some errors uncorrected	Accepted standards not met, frequent errors uncorrected	Not applicable/assessable
		4	3	2	1	n/a
1	Achieves optimal polyp position					
2	Optimizes view by aspiration/insufflation/wash					
3	Adjusts/stabilizes scope position					
4	Directs snare accurately over the lesion					
5	Anchors sheath of snare several mm distal to polyp					
6	Keeps tools close to scope					
7	Appropriate positioning of snare over lesion as snare closed					
8	Ensures appropriate amount of tissue is trapped within snare					
9	Ensures rim of normal tissue is resected around polyp					
10	Examines post-polypectomy site					
11	Identifies and appropriately treats residual polyp					
12	Retrieves, or attempts, retrieval of polyp					
	RATE THE OVERALL POLYPECTOMY					

Patel et al. *Gastrointestinal Endoscopy.* 2019; 89(6):1222-1230.e2.

Cold Snare vs. Hot Snare Polypectomy

- Meta-analysis of 8 RCTs for CSP vs. HSP for small polyps
  - Complete resection rate: RR 1.02; 95% CI 0.98-1.07
  - Polyp retrieval rate: RR 1.00; 95% CI 1.00-1.01
  - Increased procedure duration with HSP: mean difference 7.13 min; 95% CI 5.32-8.94
- Meta-analysis of 12 RCTs for CSP vs. HSP for diminutive polyps
  - Complete resection rate: OR 0.86; 95% CI 0.60-1.24

Qu et al. *Journal of Gastroenterology and Hepatology*. 34 (2019) 49–58; Shinozaki et al. *Digestive Endoscopy*. 2018; 30: 592–599.

Cold Snare vs. Hot Snare Polypectomy

- CSP is associated with lower rates of delayed post-polypectomy bleeding (DPPB)
- Safety endpoint of delayed hemorrhage difficult to demonstrate in RCTs of polyps < 10 mm
  - Trend toward higher rate of DPPB with HSP in one meta-analysis: RR 7.35; 95% CI 0.91-59.33
- CSP is equally effective with improved safety as compared to HSP

Qu et al. *Journal of Gastroenterology and Hepatology*. 34 (2019) 49–58; Shinozaki et al. *Digestive Endoscopy*. 2018; 30: 592–599.

Cold Snare vs. Cold Biopsy Forceps

- RCT of 54 patients (117 polyps, mean size 3.66 mm) removed with CSP vs. CFP
  - Higher rates of complete eradiation with CSP: 93.2% vs. 75.9%; $p = 0.009$
  - CSP faster: 14.3 vs. 22.0 secs, $p < 0.001$

Lee et al. *Am J Gastroenterol*. 2013; 108:1593–1600.

Cold Biopsy Forceps

- Meta-analysis of 5 RCTs of 721 polyps < 7 mm comparing CBF vs. jumbo forceps and CSP
  - Higher incomplete polyp resection rate with CBF (19.0% vs. 11.4%)
- Prospective observational cohort of 955 diminutive polyps removed with jumbo forceps
  - 99.4% endoscopic complete resection rate
  - Lesions > 3 mm significantly associated with local recurrence (OR 3.4; p = 0.02)

Raad et al. *Gastrointestinal Endoscopy*. 2016; 83(3):508-515; Kuwai et al. *Endoscopy*. 2019; 51: 253–260.

CSP vs. Jumbo Forceps Polypectomy

- RCT of 169 patients with 196 diminutive polyps
  - No difference complete resection rates (92.0% vs. 92.2%), polypectomy time, tissue retrieval rate, or AE
- RCT of 151 patients with 261 polyps < 6 mm
  - No difference in complete resection rates
  - Jumbo forceps polypectomy with higher tissue retrieval rate (100% vs. 95.7%; p = 0.02)

Huh et al. *Gastrointestinal Endo*scopy. 2019; 90(1):105-111; Desai et al. *Surgical Endoscopy*. (2020) 34:1206–1213.

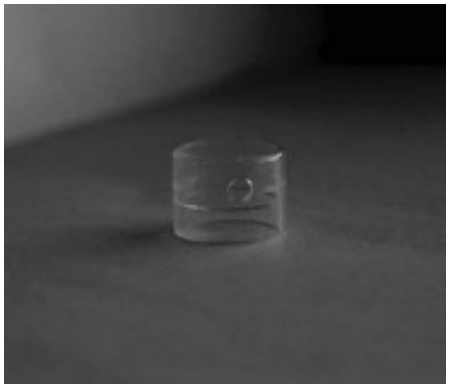
USMSTF Guidelines

- Diminutive (≤ 5 mm) and small (6-9 mm) lesions
  - Recommend using CSP due to high complete resection rates and safety profile (strong recommendation, high-quality evidence)
  - Recommend against the use of CFP to remove diminutive (≤ 5 mm) lesions due to high rates of incomplete resection (strong recommendation, moderate-quality evidence)
    - For lesions ≤ 2 mm, jumbo or large-capacity forceps may be considered if CSP is technically difficult
  - Recommend against the use of HBF due to high incomplete resection rates, inadequate histopathologic specimens, and complication rates (strong recommendation, moderate-quality evidence)

Kaltenbach et al. *Gastroenterology*. 2020;158:1095–1129.

Distal Attachment Devices

- Distal attachment transparent cap
- Distal attachment cuff
  - 1st generation: two rows of soft finger-like projections
  - 2nd generation: one row of finger-like projections with blunter tips
    - Decrease incidence of mucosal lacerations/erosions



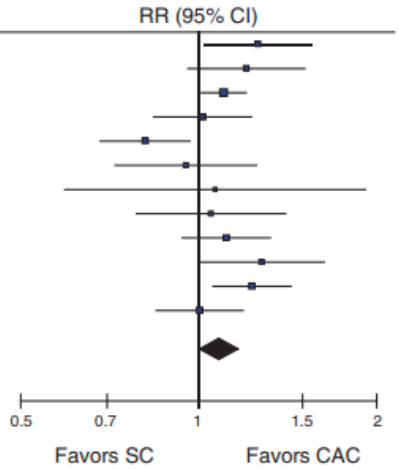
Aziz *et al. Endoscopy International Open*. 2021; 09: E41-E50;
Konda *et al. Gastrointestinal Endoscopy*. 2015; 81:1122-1129.

Cap-Assisted (CAP) vs. Standard Colonoscopy

- Marginal benefit for polyp detection (RR 1.08; 95% CI 1.00-1.17)
- Shorter cecal intubation time (MD -0.64 min; 95% CI -1.19 to -0.10)
- No difference in cecal intubation rate and total colonoscopy time

Study, year	CAC *n,N*	SC *n,N*	RR (95% CI)
Kondo (2007)	109/221	92/235	1.26 (1.02, 1.55)
Horiuchi (2008)	123/424	99/411	1.20 (0.96, 1.51)
Takano (2008)	605/1287	518/1215	1.10 (1.01, 1.20)
Harada (2009)	120/279	122/288	1.02 (0.84, 1.23)
Lee (2009)	152/499	188/501	0.81 (0.68, 0.97)
Hewett (2010)	34/52	33/48	0.95 (0.72, 1.25)
Dai (2010)	19/121	19/129	1.07 (0.59, 1.91)
Tee (2010)	63/192	61/195	1.05 (0.78, 1.40)
Takeuchi (2010)	98/141	83/133	1.11 (0.94, 1.32)
Lee (2011)	72/127	59/133	1.28 (1.00, 1.63)
Rastogi (2011)	144/210	117/210	1.23 (1.06, 1.43)
de Wijkerslooth (2011)	189/656	196/683	1.00 (0.85, 1.19)
Total (95% CI)	1728/4209	1587/4181	1.08 (1.00, 1.17)

Heterogeneity: $\tau^2 = 0.01$; $\chi^2 = 20.42$, df = 11 ($P = 0.04$); $I^2 = 46\%$
Test for overall effect: $Z = 2.05$ ($P = 0.04$)



Ng *et al. Am J Gastro*. 2012; 107:1165-1173.

Endocuff-Assisted vs. Standard Colonoscopy

- EAC improves:
  - Adenoma detection rate (ADR)
  - Polyp detection rate (PDR)
  - Sessile serrated lesion detection rate (SDR)
  - Left-side lesion detection rate (LDR)
  - # of adenomas/patient (MAP)

Outcomes	No.	EAC %	SC %	RR (95% CI)	*p*	I^2
ADR	23	44.9 (37.6–52.1)	39.1 (32.3–45.9)	**1.16 (1.08–1.24)**	< 0.00001	65%
Device						
Endocuff	11	43.3 (35.9–50.6)	36.3 (27.1–45.6)	**1.22 (1.07–1.40)**	< 0.00001	78%
Enducuff Vision	12	46.3 (35.0–57.6)	41.7 (31.5–51.9)	**1.12 (1.05–1.20)**	0.11	35%
Indication						
Screening	7	38.7 (24.3–53.1)	32.6 (20.5–44.7)	**1.20 (1.06, 1.37)**	0.001	73%
Mixed	16	47.4 (42.1–52.8)	42 (35.6–48.4)	**1.14 (1.05, 1.23)**	0.0007	61%
Baseline ADR						
< 50%	17	39.4 (31.8–46.9)	32.9 (26.4–39.4)	**1.24 (1.13, 1.36)**	< 0.0001	70%
> 50%	6	60.7 (54.7–66.8)	57.2 (52.2–62.3)	1.04 (0.97, 1.11)	0.50	0
Size						
≥ 10 mm	7	11.7 (8.2–15.1)	11.2 (7.9–14.6)	1.02 (0.91, 1.15)	0.47	0
6–9 mm	4	15 (10.9–19.1)	13.8 (8.6–18.9)	1.10 (0.96, 1.27)	0.29	20%
≤ 5 mm	5	50 (25–75)	49.9 (24.2–75.7)	1.03 (0.95, 1.11)	0.05	59%
PDR	13	54.5 (44.6–64.4)	46.5 (37.2–55.9)	**1.17 (1.09–1.25)**	0.0008	64%
AADR	7	13.7 (8.0–19.4)	12.7 (7.3–18.1)	1.11 (1.00–1.23)	0.45	0
SDR	10	8.4 (5.8–11.1)	5.9 (4.0–7.8)	**1.23 (1.05–1.43)**	0.46	0
LDR	6	30.5 (22.7–38.4)	25.5 (17.6–33.4)	**1.24 (1.08–1.43)**	0.08	43%
RDR	9	28.7 (23.3–34)	25.2 (19.7–30.7)	1.21 (1.00–1.46)	< 0.00001	83%
Ileal intubation rate	7	61 (43.6–78.5)	68 (50.9–85)	**0.89 (0.80–0.99)**	0.0001	78%
Cecal intubation rate	8	97.4 (96.7–98.2)	96.9 (95.4–98.3)	1.00 (1.00–1.01)	0.29	18%
Adverse events	16	–	–	2.6 (1.29–5.26)	0.01	51%
				MD (95% CI)	*p*	I^2
MAP	10	–	–	**0.17 (0.08–0.26)**	< 0.00001	78%
MPP	4	–	–	0.16 (0–0.32)	< 0.00001	93%
Withdrawal time	8	–	–	− 0.29 (− 0.91, 0.33)	0.004	66%
Cecal intubation time	5	–	–	− 0.60 (− 1.45, 0.26)	0.002	77%

Wang et al. *Techniques in Coloproctology*. (2023) 27:91-101.

Endocuff-Assisted (EAC) vs. Cap-Assisted Colonoscopy (CAC)

- No difference in ADR (47.0% vs. 45.1%), cecal intubation time, withdrawal time
- Small increase in cecal intubation rate with CAC vs. EAC (97.9% vs. 96.5%, p = 0.04)

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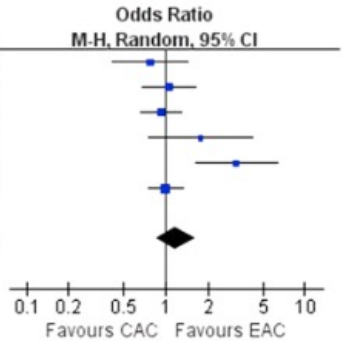
Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Odds Ratio M-H, Random, 95% CI
Bensuleiman2016	44	84	44	75	13.9%	0.78 [0.41, 1.45]
Floer2018	55	189	53	189	18.7%	1.05 [0.67, 1.65]
Imaeda2019	127	250	136	258	21.7%	0.93 [0.65, 1.31]
Marsano2019	23	42	17	42	9.5%	1.78 [0.75, 4.23]
Rameshshanker2019	40	76	20	78	12.8%	3.22 [1.63, 6.35]
Sola-Vera2019	180	357	179	354	23.4%	0.99 [0.74, 1.33]
Total (95% CI)		**998**		**996**	**100.0%**	**1.17 [0.85, 1.62]**
Total events	469		449			

Heterogeneity: $Tau^2 = 0.09$; $Chi^2 = 13.37$, $df = 5$ ($P = 0.02$); $I^2 = 63\%$

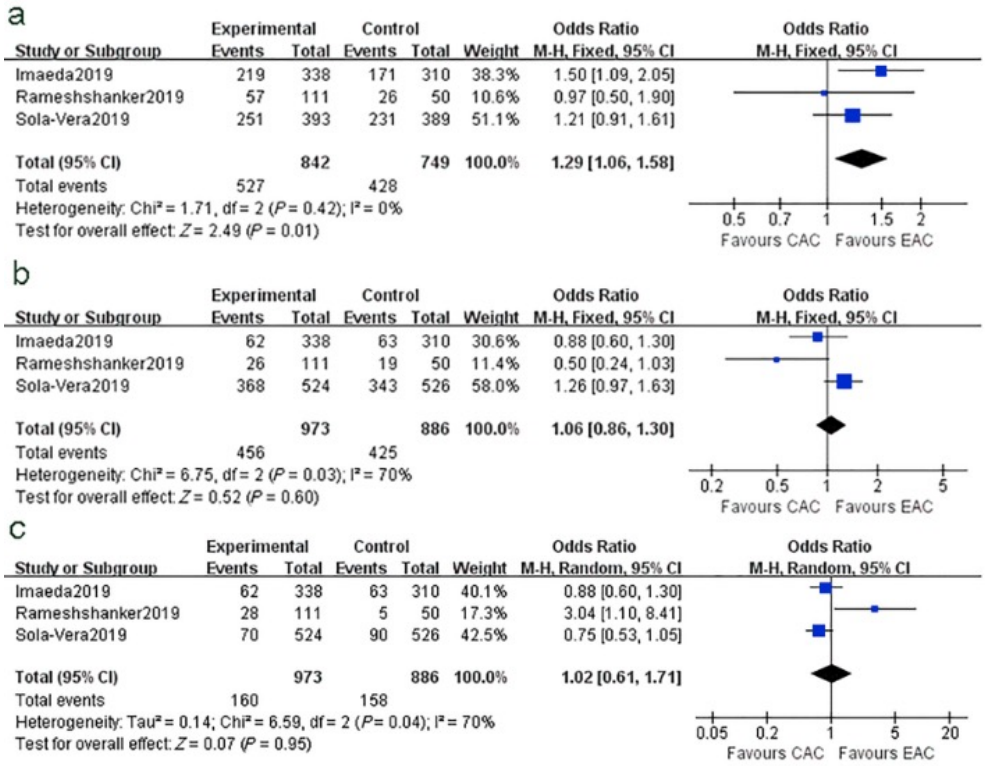
Test for overall effect: $Z = 0.97$ ($P = 0.33$)



Li et al. *Journal of Gastroenterology and Hepatology*. 35 (2020) 2066-2073.

Endocuff-Assisted (EAC) vs. Cap-Assisted Colonoscopy (CAC)

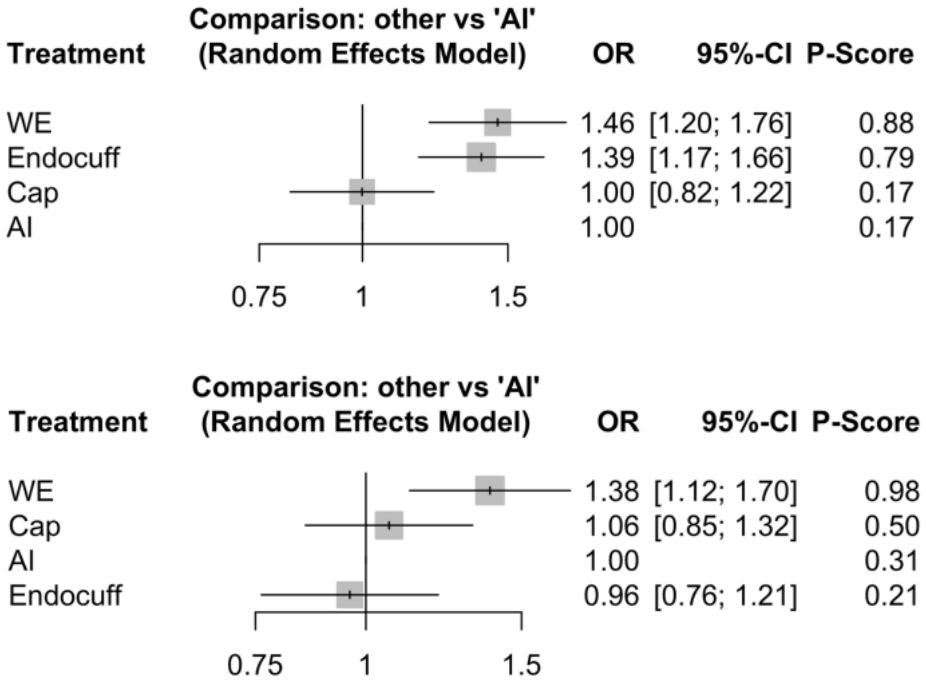
- EAC improves detection of a) diminutive polyps
- No difference for detection of b) small or c) large polyps



Li et al. *Journal of Gastroenterology and Hepatology*. 35 (2020) 2066-2073.

Water Exchange (WE) vs. Accessory Devices

- WE and Endocuff significantly improve ADR compared to air insufflation (AI)
- WE significantly improves AADR

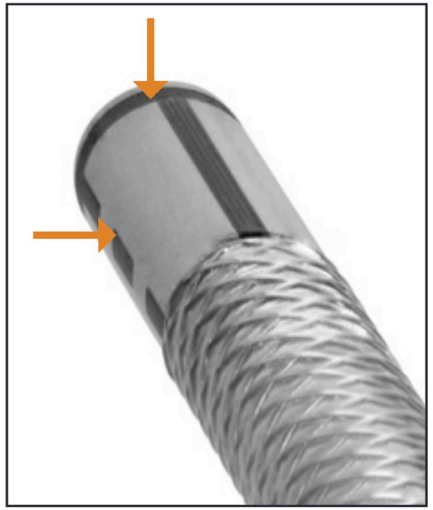


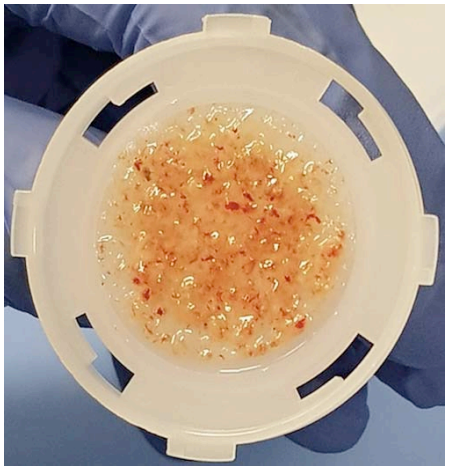
Shao et al. *Digestive Diseases and Sciences*. (2021) 66:1175–1188.

Detachable Loop Ligating Device

Chandrasekhara *et al. Gastrointestinal Endoscopy.* 2021; 7:283-293.

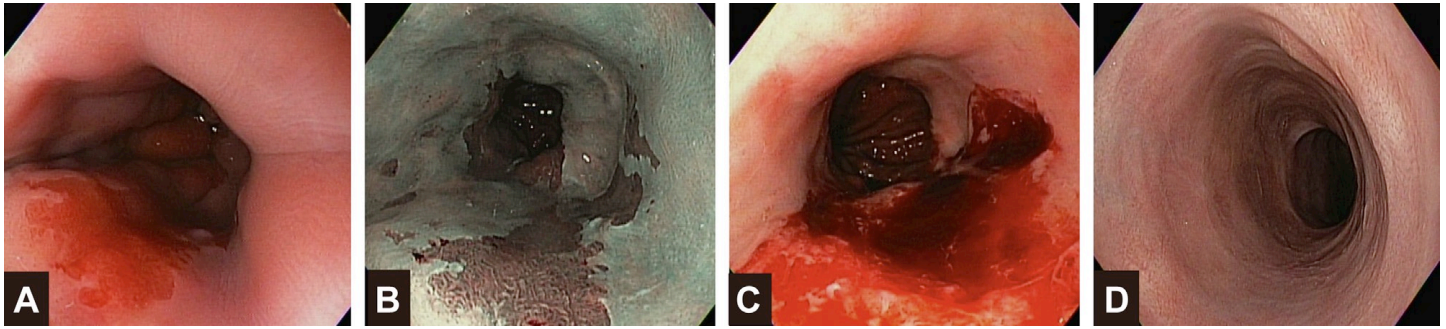
Endoscopic Powered Resection Device

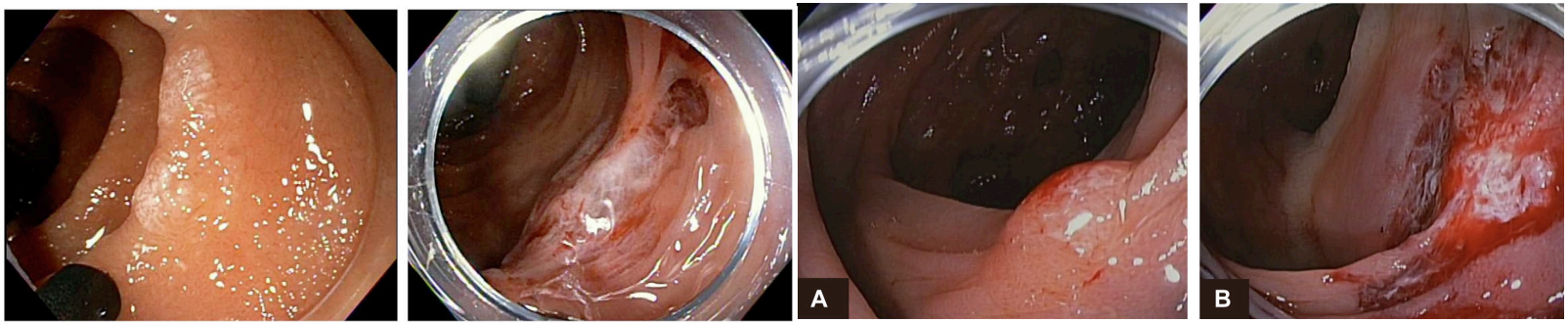




Kandiah et al. *Endoscopy International Open*. 2019; 7(8):E974-978; Kaul et al. *Gastrointestinal Endoscopy*. 2021; 93(3):640-646; Wilson et al. *VideoGIE*. 2023; 8(5):211-216.

Endoscopic Powered Resection Device





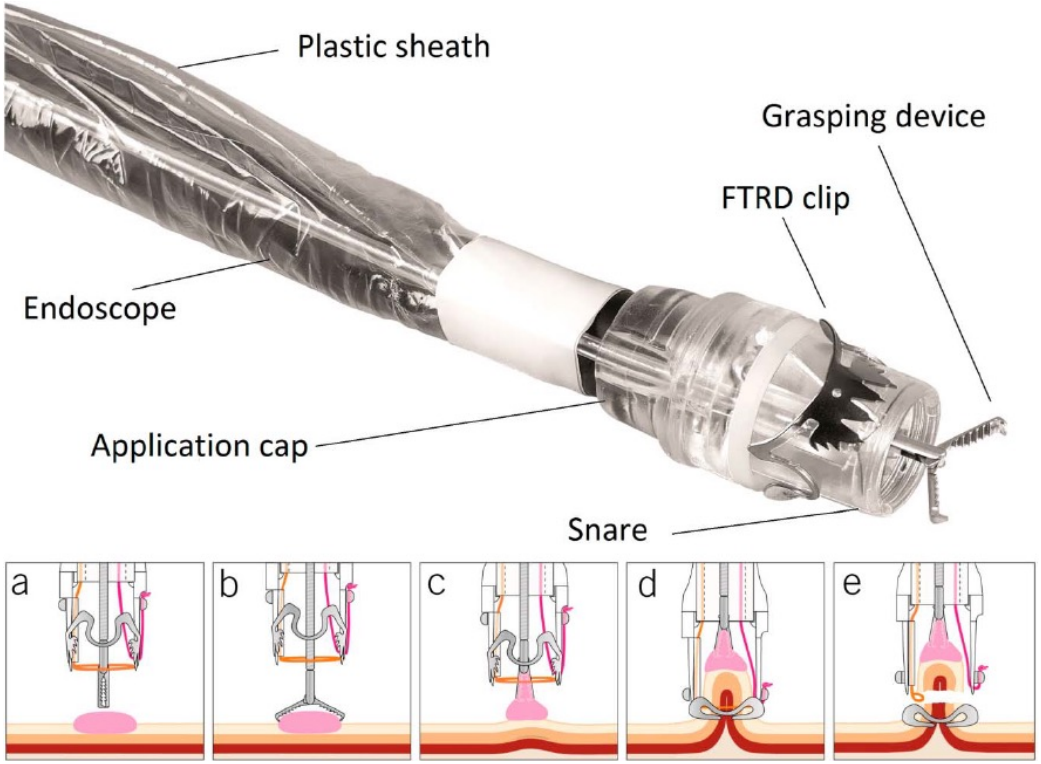
Kaul et al. *Gastrointestinal Endoscopy*. 2021; 93(3):640-646; Wilson et al. *VideoGIE*. 2023; 8(5):211-216.

Outcomes of Endoscopic Powered Resection Device

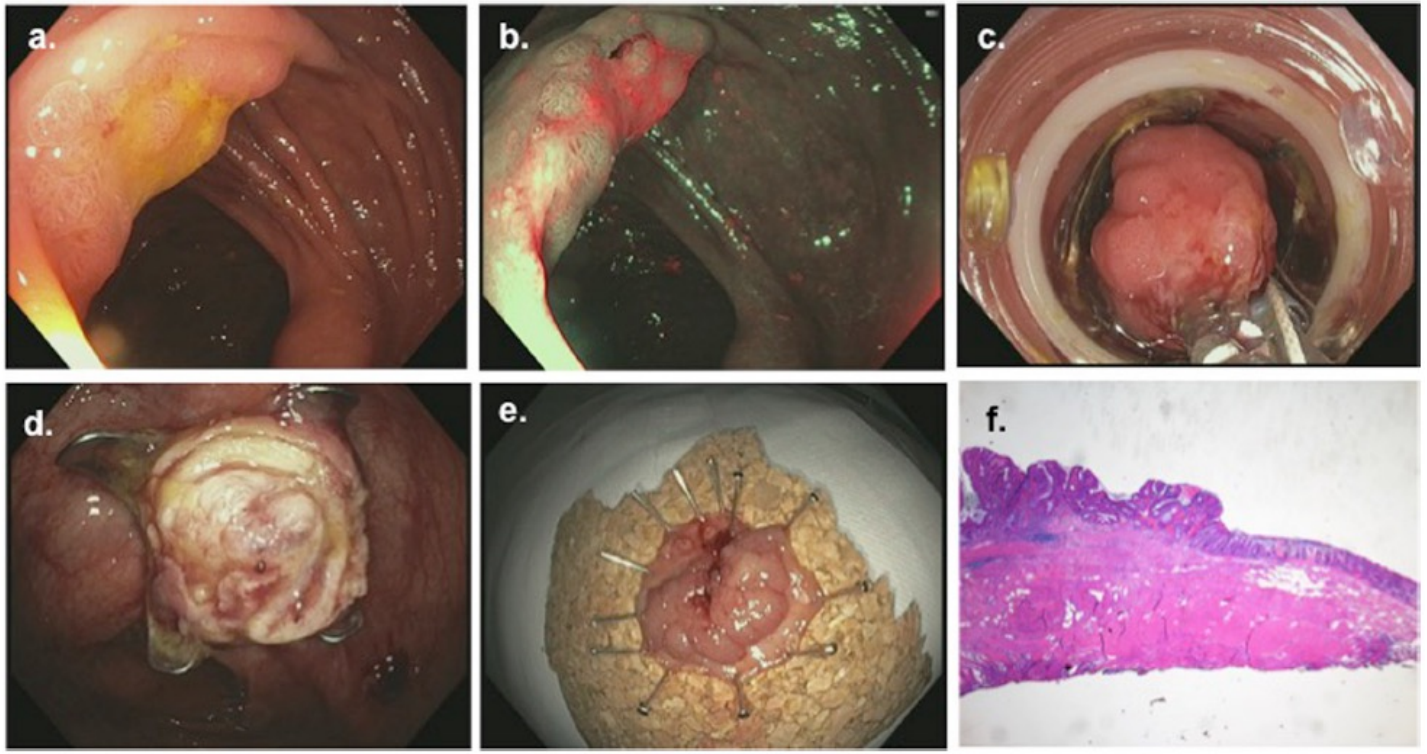
	# of cases	Lesion location	Prior resection attempts (%)	Results	Adverse events
Vivek Kaul et al[1]	41	Colorectal (21) Esophagus (8) Duodenum (5)	35/41 (85.4%)	• Technical success: 40/41 • 19/24 without histologic or endoscopic recurrence on follow up	3/41 cases • Postprocedural chest pain (n=1) • Delayed bleeding (n=2)
Kesavan Kandiah et al[2]	19	Colorectal (19)	19/19 (100%)	84% overall cure rate • 10 patients cured after 1st attempt • 6 patients required 2nd EPR procedure to achieve cure	None

Kandiah et al. *Endoscopy International Open*. 2019; 7(8):E974-978; Kaul et al. *Gastrointestinal Endoscopy*. 2021; 93(3):640-646; Wilson et al. *VideoGIE*. 2023; 8(5):211-216.

Full Thickness Resection Device

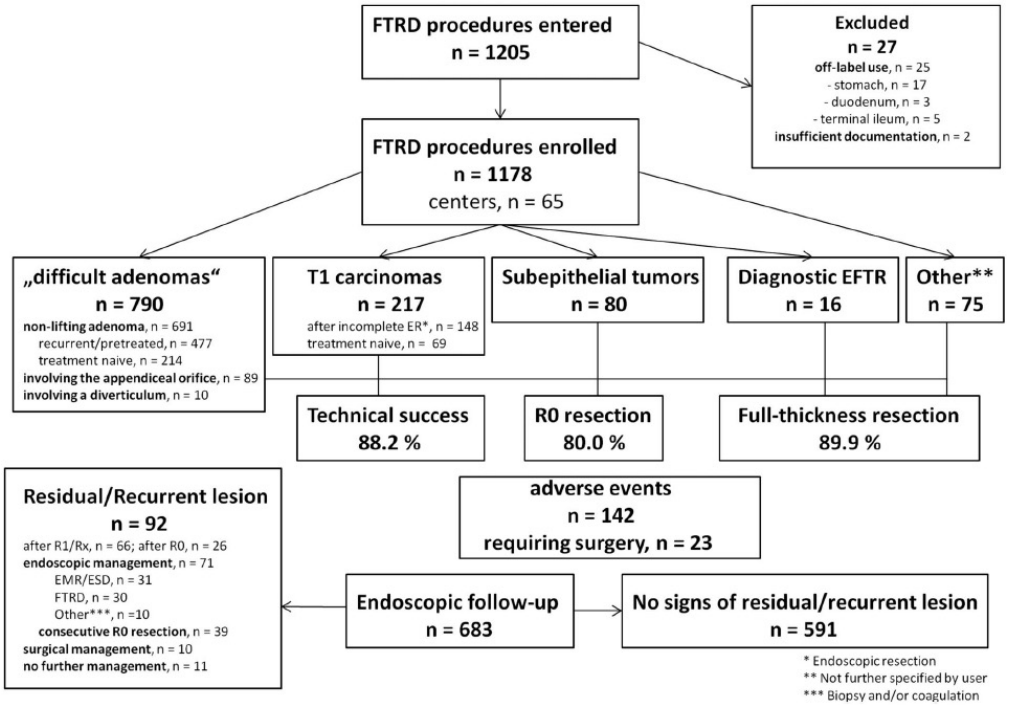


Meier et al. *Am J Gastroenterol*. 2020; 115:1998-2006.



Schmidt et al. *Gut*. 2018; 67:1280-1289.

German colonic FTRD registry



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