Polypectomy-Who, When Why and How

Disclosures

- In the past 12 months, I have had no relevant financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in this CME activity.

Learning Objectives

- Define the most common causes of polyposis in pediatrics
- Understand the recommendations for endoscopic surveillance in patients with polyposis syndromes
- Review the techniques and equipment used for polypectomy and the potential complications that may occur

Prevalence and Type

- 6.1% of 13,115 procedures with at least one recorded colorectal polyp (PEDS-CORI)
- 2083 colonoscopies with 129 having polyps. Solitary juvenile in 70%
- Multiple juvenile in 16%
- Adenoma in 11%
- Hyperplastic polyps in 3%

Thakkar K etal. Dig Dis Sci. 2012 Apr;57(4)

Who and When?

- FAP- first colonoscopy age 10
- Multicenter study (1073 patients) found no CRC age 10 or under, 2 cases ages 11-15 (Vasen et al, Gut 2008; 57:704–713)
- Yearly colonoscopy until colectomy
- Post IRA- q6-12 months depending on burden
- Post IPAA- q1-3 years depending on burden

EGD in FAP

- Duodenum is the second most common site of polyps in FAP with lifetime risk of duodenal polyposis approaching 100% Bulow S, et al. Gut. 2004;53:381–386.
- Duodenal ampullary *adenocarcinoma* can develop as early as the mid-teens and occurs in up to 4-12% of FAP patients Gallagher MC, et al. Familial Cancer 2006;5:263–273,/ Jasperson KW et al. GeneReviews® 1993-2014.
- Initial EGD recommended by age 25 years or prior to colon surgery

Who and When?

- Peutz-Jeghers- EGD and colonoscopy beginning in late teens and then q 2-3 yrs
- Juvenile Polyposis Syndrome- EGD and colonoscopy beginning around age 15 yrs. Repeat *annually* if polyps found, or q2-3 years if clear of lesions NCCN Guidelines

How Far Should I Go?

- PEDS-CORI (13,115 colonoscopies)- 11.5% of solitary polyps were in the cecum (Thakkar K etal. Dig Dis Sci. 2012 Apr;57(4))
- 5-25% of juvenile polyps located in the right colon
- In PJS and FAP, polyps can be found throughout the colon Munck A et al. J Pediatr Gastroenterol Nutr 2011;53:296–302
- Pancolonoscopy is advised. Sigmoidoscopy alone may lead to missed proximal polyps, and histology is difficult to determine visually (Erdman SH and Barnard JA. Current Opinion Pediatrics 2002 Oct;14(5):576-82)

In or Out??

- Diminutive, small polyps should typically be removed during intubation
- When planning on polypectomy during extubation,taking a biopsy of normal colon adjacent to the polyp may prevent embarrassment of “losing the polyp”
- Larger polyps often better removed during extubation, unless they are in a perfect position on insertion
- Removal on intubation may be difficult when a sigmoid loop is present

Positioning

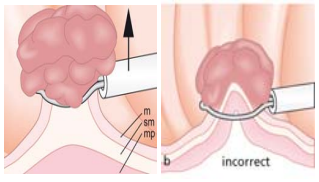
- Keep polyp head on the cecal side of the stalk
- Polyp should be placed at 5 or 6 o'clock position if possible
- Change patient position if polyp location makes positioning difficult
- Keep polyp a short distance from tip of endoscope

Snaring of Pedunculated Polyps

- Minimal opening of loop
- Advancement of the snare over the polyp using up-down control and torque as snare is slowly tightened
- At the same time, aspirate air to reduce colonic wall tension and maximize tissue capture
- Tenting of the polyp to direct diathermy away from the muscle layer and lessen risk of transmural burn

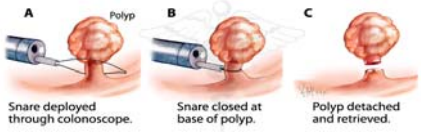
Preparing for Transection

- Ensure safe tissue capture by moving the snare catheter back and forth. There should be free movement relative to the underlying colonic wall
- If concern that MP is entrapped, loosen snare
- After snaring, aim to keep the polyp in the center of the lumen to limit thermal destruction of adjacent tissue



Transection

- Transection should be quick as the foot pedal is depressed while snare remains tight
- Prolonged transection time may suggest entrapment of the muscularis propria



Courtesy of: Colorectal Surgeons Sydney

Upping the Ante…

What Makes a Difficult Polyp?

Factor	Benchmarks	Points
Size	< 1cm	1
	1-1.9 cm	3
	2 -2.9 cm	5
	3 – 3.9 cm	7
	>4 cm	9
Morphology	Pedunculated (1), Sessile (2), Flat (3)	
Site	Left (1), Right (2)	
Access	Easy (1) Difficult (3)	

SMSA, size, morphology, site, access

Munich Polypectomy Study

- 4,000 snare polypectomies in 2,257 patients (adults)
- Mean polyp size 1.1 cm
- 72% of the polyps were sessile.
- Complications occurred in 9.7% of patients (6.1% of polyps)
- **Polyp size** was the main risk factor for complications (>1 cm in R colon or >2 cm in L colon)
- **Right-sided** polyp location was a significant risk factor for major complications

Polyps >2 cm

- Increased bleeding risk (vascularity)
- Increased risk of perforation
- Increased time of resection
- Polyps covering >1/3 of the circumference of the colon wall are more difficult to safely remove endoscopically

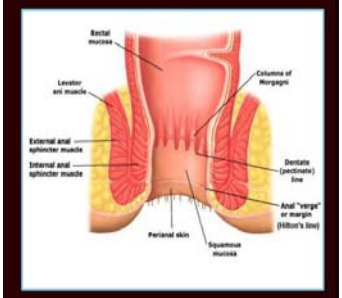
Polyps Behind Folds

- Difficult resection due to location
- Injection of the far side of the polyp near the edge of the polyp will raise the polyp toward you
- Snare may then be more easily placed
- Retroflexion may also be used

Polyps Near the Dentate Line

-Squamous epithelium is quite vascular/sensitive

- Positioning may be difficult
- Retroflexion and or use of a gastroscope (greater tip deflection)



Peri-Appendiceal Polyps

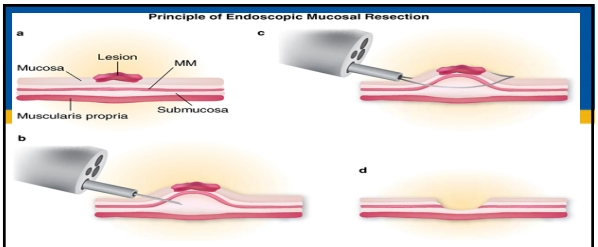
- Rarely, polyps may extend through the appendiceal orifice and into the appendix
- Peri-appendiceal mucosa does not elevate well
- Involvement of greater than 50% of the appendiceal orifice circumference is a relative contraindication to removal (Bourke MJ and Tuttucci NJ)

Multiple Polyps

- May be difficult to retrieve, requiring multiple endoscopies
- Location of each polyp may be critical if advanced dysplasia is found
- Accurate labeling is important
- Removing polyps in cecum, followed by additional polypectomies in distal colon increases risk of delayed perforation in cecum due to prolonged insufflation

Endoscopic Mucosal Resection (Sessile Polyps)

- Injection of fluid to both raise the amplitude of the lesion and increase the distance from the mucosal surface to the muscularis propria
- Reduces thermal injury and risk of perforation
- Normal saline is most commonly used but is rapidly absorbed
- Hypertonic solutions create higher mucosal elevation than NS Uraoka et al. Drug Des Devel Ther. 2008; 2: 131–138.



-Needle needs to be inserted at an angle (~30) to direct into submucosa and not peritoneum
-Non-lifting sign occurs when amplitude is not changed with injection in the correct plane
-Non-lifting may signify invasive carcinoma

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Duodenal Polyps

- Rare in general population (0.1-0.3%) Marques. World J Gastrointest Endosc. 2015 Jun 25; 7(7): 720–727.
- Most are sessile
- Most are found at or near the ampulla
- In pediatrics most common in children with FAP or PJS

EMR in Duodenum

- The narrow lumen and retroperitoneal location increase risk of complications
- EMR principles similar to those in colon
- Thinner wall and thicker submucosa may limit protrusion with EMR Hoteya. Endoscopy. International Open. 2013:E2–E7.
- In general, use of modified cutting current/blended current preferable to pure coagulation Basford. Therap Adv Gastroenterol. 2012 Mar; 5(2): 127–138.

Outcomes of Duodenal Polypectomy

- Late bleeding rates of 0-12%
- Duodenal perforation rates of 0.6% Marques et al. World J Gastrointest Endosc. 2015 Jun 25; 7(7): 720–727.
- Multi-center study (Korea) of *sessile* duodenal polyps
- 2% had bleeding requiring endoscopic intervention and 7% (4/56) had perforation Gastroenterol Res Pract. 2015; 2015: 692492

COMPLICATIONS

Transmural Burn Syndrome/Post-Polypectomy Syndrome

- Thermal energy administered during snare electrocoagulation extends into muscularis propria
- Causes necrosis of muscle fibers and local peritonitis without full perforation
- 0.5-2% of polypectomies (Monkemuller)
- More frequent in ascending colon and with excessive air
- **Symptoms-** Abdominal pain 1-4 days after polypectomy +/- fever and leukocytosis
- **Treatment-** antibiotics, IVF and bowel rest

Post-Polypectomy Bleeding (PPB)

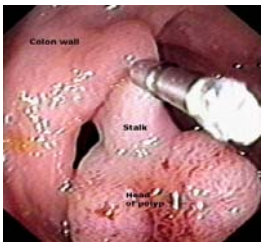
- Post-polypectomy bleeding can occur immediately or be delayed (up to 30 days)
- IPPB- 2.1-8.4% of polypectomies
- More common with pedunculated polyps
- Polyps in the rectum bleed more frequently during or after polypectomy, due to vascular supply

Post-Polypectomy Bleeding (PPB)

- Immediate Bleeding- more common when using pure cutting currents
- Delayed Bleeding- more common with coagulation currents
- Bleeding is more common after piecemeal resection or mucosectomy techniques

Prevention of Bleeding

- Clip placement (before of after)
- Endoloop
- Epinephrine



Courtesy of UpToDate

Prevention of Bleeding, Are Clips Enough?

- Adults with pedunculated polyps >10mm
- Group A- clips placed at base of stalk prior to polypectomy
- Group B- clips **plus** injection of epinephrine/hypertonic saline
- IPPB in 12% of Group A, 14% of Group B
- No DPPB or perforations in either group

Management of Bleeding

- Hemoclips- either before or after polypectomy
- Epinephrine (1:10,000) to cause tamponade
- Care with volume of epinephrine in the cecum (ischemia) or in the rectum (vascular supply could lead to rapid absorption and cardiac side effects)
- APC
- Gold Probe

Perforation

- Immediate Perforation secondary to mechanical stress, barotrauma or as complication of electrosurgery technique
- Delayed Perforation
  - *Minutes* later due to insufflation placing pressure on polypectomy site
  - *Hours to Days* later when a necrotic piece of tissue sloughs off due to coagulation necrosis

Perforation

- Risk increased with flat or sessile polyps
- Risk increased in the ascending colon
- Blended cut is recommended over pure coagulation in the ascending colon

Management of Perforation

- Symptoms of abdominal distension, delayed onset of pain should lead to abdominal radiograph and or CT
- If perforation is noted during endosocpy and is small, application of a clip or loop may be attempted
- Antibiotics are mandatory (*Escherichia coli, Bacteroides fragilis, Enterococcus faecalis,* Klebsiella *spp)*
- Immediate surgical consult

Questions