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%

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 et al. J Pediatr Gastroenterol Nutr. 2012 Apr;54(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(2):106-112)
- Pancolonoscopy is advised. Sigmoidoscopy alone may lead to missed proximal polyps, and histology is difficult to determine visually. (Elshanian SM and Bernard CA, Current Opinion Pediatrics 2002 Oct;14(5):576-582)

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

Upping the Ante…

What Makes a Difficult Polyp?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Benchmarks</th>
<th>Points</th>
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<tbody>
<tr>
<td>Size</td>
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<tr>
<td>&lt; 1 cm</td>
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<tr>
<td>1.1 - 1.9 cm</td>
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<td>2 - 2.9 cm</td>
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<td>3 - 3.9 cm</td>
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<tr>
<td>&gt; 4 cm</td>
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<tr>
<td>Morphology</td>
<td>Pedunculated (1), Sessile (2), Flat (3)</td>
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<tr>
<td>Site</td>
<td>Left (1), Right (2)</td>
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<tr>
<td>Access</td>
<td>Easy (1), Difficult (3)</td>
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G&ISA, 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


- 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

Duodenal Polyps

- Rare in general population (0.1-0.3%)
- 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

Outcomes of Duodenal Polypectomy

- Late bleeding rates of 0-12%
- Duodenal perforation rates of 0.6% Marques et al. World J Gastroenterol. 2015 Feb 26; 21(8): 2225–2231.
- 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
- 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 or after)
- Endoloop
- Epinephrine

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 endoscopy 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