

Special Considerations in Pediatric Endoscopy

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No relevant disclosures

Types of considerations

- Pre-procedure
 - Education/consent
 - NPO/bowel preparation
- Procedure-related
 - Anesthesia
 - Equipment
- Technical considerations
 - Endoscope size
 - Patient size

Pre-procedure considerations – bowel preparation

- Weight-based vs age-based
- Polyethylene glycol (PEG) with or without electrolytes
- Non-PEG bowel preparation
- With or without stimulant medication (bisacodyl, senna)
- Length of bowel preparation (1 – 4 days)

Pre-procedure considerations – bowel preparation

TABLE 7. NASPGHAN best practices cleanout regimens

Option 1: PEG-3350, 1-day cleanout	$<50 \text{ kg} = 4 \text{ g} \cdot \text{kg}^{-1} \cdot \text{day}^{-1*}$ + bisacodyl 5 mg $>50 \text{ kg} = 238 \text{ g in 1.5 L sports drink}^* + \text{bisacodyl 10 mg}$
Option 2: PEG-3350, 2-day cleanout	$<50 \text{ kg} = 2 \text{ g} \cdot \text{kg}^{-1} \cdot \text{day}^{-1*}$ + bisacodyl 5 mg $>50 \text{ kg} = 2 \text{ g} \cdot \text{kg}^{-1} \cdot \text{day}^{-1*}$ + bisacodyl 10 mg
Option 3: NG cleanout	PEG-ELS: $25 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{h}^{-1}$, maximum 450 mL/h [†] Sulfate-free PEG-ELS: $25 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{h}^{-1}$, maximum 450 mL/h [†]
Option 4: non-PEG cleanout	Magnesium citrate $4\text{--}6 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{day}^{-1}$ + bisacodyl 5–10 mg

Procedure related considerations

- Adult colonoscopy quality measures
 - Cecal intubation rate
 - Adenoma detection rate
 - Withdraw time
- Pediatric quality measures
 - Ileal intubation rate
 - Time to achieve ileal intubation

Pediatric technical considerations

- Newborn esophagus
 - 8 – 10cm in length
 - 5mm diameter
- Newborn small bowel
 - 200 – 250 cm in length (~5x length)
 - 10 – 15mm diameter
- Newborn colon 10mm (cecum ~17mm)

Crelin ES, Functional anatomy of the newborn, 1973

Equipment for pediatric endoscopy

- Weight base approach for endoscope choice

TABLE 1. Endoscope choice based on weight

Weight, kg	EGD	Colonoscopy	ERCp
<2.5	≤6-mm gastroscop	≤6-mm gastroscop	7.5-mm duodenoscop
2.5-10	≤6-mm gastroscop preferred, especially in those weighing <5 kg. Standard adult gastroscop may be considered, particularly if endotherapy required	≤6-mm gastroscop or standard adult gastroscop may be safely used in those weighing 5-12 kg. Pentax 9.6-mm colonoscop not yet evaluated	7.5-mm duodenoscop
>10	Standard adult gastroscop; will likely tolerate therapeutic gastroscop if endotherapy required	11- to 11.6-mm pediatric colonoscop or adult colonoscop	Most children weighing >10 kg will tolerate standard therapeutic duodenoscop

Barth BA, GIE 2012

Pediatric colonoscopes

TABLE 3. Pediatric colonoscopes

Manufacturer	Model	Insertion tube length/diameter, mm	Definition/magnification/color enhancement	Biopsy channel no./diameter, mm
Olympus	PCF Q180 AL	1680/11.5	High-resolution/none/NBI	1/3.2
	PCF Q180 AI	1330/11.5	High-resolution/none/NBI	1/3.2
	PCF-H180AL	1680/11.8	High-definition/none/NBI	1/3.2
	PCF-H180AI	1330/11.8	High-definition/none/NBI	1/3.2
Fujinon	EC530 LS	1690/11.5	High-definition/zoom/	1/3.8
	EC450 LS5	1690/11.5	High-definition/zoom/	1/3.8
	EC450 LP5	1690/11.1	High-definition/zoom/	1/3.2
Pentax	EC2990 Li	1700/9.8	High-definition/zoom/iSCAN	1/2.8
	EC3490 Li	1700/11.6	High-definition/zoom/iSCAN	1/3.2
	EC3490 LK	1700/11.6	High-resolution/zoom/iSCAN	1/3.8

NBI, Narrow-band imaging.

Gastroscope for colonoscopy

- At what size can you use a gastroscope for pediatric colonoscopy?
- Thirumazhisai, GIE 2008
 - ≤ 30 kg
 - Pentax gastroscope (9mm) vs. peds colonoscope (11.6mm)
 - Results:
 - Both safe and effective
 - Gastroscope easier to retroflex
 - Higher (though not statistically significant) rate of TI intubation

When is it a right time to use gastroscope for colonoscopy?

- Depends on therapy

- For polypectomy peds colonoscopy may be better to help with suctioning (both clearing out stool and polyp retrieval)
- Peds colonoscope: $\geq 12 - 15\text{kg}$
- Gastroscope (infant or standard): $\geq 5 - 12\text{kg}$
- Infant/ultraslim gastroscope: $< 5\text{kg}$

Accessories

- Special considerations for endoscopes with 2mm working channels
 - Infant/ultraslim gastroscopes
 - Infant duodenoscope
 - “diagnostic” double-balloon enteroscope (2.2mm working channel)

Accessories for 2mm working channels

TABLE 4. Accessories for endoscopes with a 2-mm channel

Device	Manufacturer	Comments
Injection needles	Boston Scientific, ConMed, Cook Medical, Hobbs Medical, Mediglobe, Olympus, Telemed	22-25 g, 4-6 mm needle length
Biopsy forceps	Boston Scientific, ConMed, Cook Medical, Hobbs Medical, Kimberly Clark, Mediglobe, Micro-Tech, Olympus, Telemed, U.S. Endoscopy	Multiple cup designs, with or without needle-spike, single use or reusable
Polypectomy snare	Boston Scientific, Hobbs Medical, Kimberly Clark, Olympus, Telemed	≤30-mm diameter
ERCP cannulation catheters	Boston Scientific, ConMed, Mediglobe, Telemed	Curved, straight, or tapered tip, 0.018-0.035 wire
Sphincterotomes	Cook Medical, Mediglobe, Olympus	Limited to double lumen, cannot take 0.035 wire
Needle-knife papillotome	Cook Medical, Mediglobe, Olympus	
Stone retrieval balloons	Boston Scientific, Horizons International, Mediglobe, Olympus	
Retrieval baskets	Hobbs Medical, Horizons International, Kimberly Clark, Mediglobe, Olympus, Telemed	3- or 4-wire, 10-30-mm diameter
Graspers and retrieval devices	Endochoice, Hobbs Medical, Kimberly Clark, Olympus, Telemed, U.S. Endoscopy	3- or 4-prong, alligator jaw, rat-tooth, single use or reusable, Roth Net
Bipolar probe	ConMed	200 cm
Argon plasma coagulation probe	ConMed, ERBE, U.S. Medical Innovation	ERBE offers 300-cm probe

Hemostasis

- What does NOT fit through a 2mm working channel
 - Endoclips
 - Hemospray®

- What does fit through a 2mm working channel
 - APC probe
 - Injection needle
 - Snare (use the tip for monopolar thermal treatment)
 - Bipolar probe (ConMed)

Capsule endoscopy

- Capsule size
 - Diameter: 10.8 – 13
 - Length: 26 – 27.9mm
- FDA approved for ≥ 2 years of age
- Youngest reported capsule pt: 10 months
- Smallest reported capsule pt: 7.9kg
- Swallow vs endoscopic placement
 - Practice swallowing with large jellybean candy*
 - Capsule deployment device difficult in smaller children



Cohen 2012; Jensen 2010; Oikawa 2013; Gibbs 2012; Nakamura 2015; Sockolow 2013

Capsule deployment device



Capsule deployment in smaller children or infants.



World Journal of
Gastroenterology

Safety and utility of capsule endoscopy for infants and young children

Manari Oikawa-Kawamoto, Tsuyoshi Sogo, Takeshi Yamaguchi, Tomoyuki Tsunoda, Takeo Kondo, Haruki Komatsu, Ayano Inui, Tomoo Fujisawa

World J Gastroenterol 2013 December 7; 19(45): 8342-8348
ISSN 1007-9327 (print) ISSN 2219-2840 (online)

