

ADVANCES IN ENDOSCOPY

Current Developments in Diagnostic and Therapeutic Endoscopy

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Accessing a Difficult Colon



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G&H What defines a difficult colonoscopy?

RW A difficult colonoscopy is any colonoscopy in which the endoscopist has trouble achieving cecal intubation without significant effort or discomfort to the patient.

G&H What factors affect the difficulty of a colonoscopy?

RW Several factors can affect how difficult a colonoscopy is. In terms of anatomic factors, the most common is a redundant or capacious colon, often described as a long colon. Some patients may have muscular hypertrophy in the sigmoid colon, which can lead to a series of sharp or fixed angulations, making navigating the area with an endoscope challenging. Prior abdominal surgery can result in adhesions, leading to fixed angulations in the colon. In addition, some patients may have hernias, and if the endoscopist is unaware, the endoscope can enter a hernia. This can lead to difficulty advancing the endoscope without patient discomfort or can even lead to perforation. Other factors include sedation-related issues. A patient may be difficult to sedate or may experience significant discomfort, even with deft maneuvers, and this can result in a difficult colonoscopy. Finally, the adequacy of the colon preparation has a direct bearing on the ability of the endoscopist to accurately identify the lumen and

relevant landmarks; thus, a suboptimal preparation may render a colonoscopy more difficult.

G&H What techniques can endoscopists use to improve their cecal intubation rates?

RW This topic has been well studied, and there are a variety of techniques available to improve cecal intubation rates. The adage “an ounce of prevention is worth a pound of cure” applies to colonoscopy, and using good basic techniques is paramount. In terms of navigating a difficult colon, the key is to prevent loop formation before it occurs or to recognize it as early as possible. The patient’s anatomy plays a role in this. If a patient has diverticulosis and tight angulations, using a smaller-caliber endoscope such as a pediatric colonoscope or an ultrathin colonoscope, if available, or even an enteroscope or an upper gastroscope, often is helpful. For patients with long or redundant colons, using a standard adult colonoscope typically works best, as it tends to loop less in a capacious colon. Another strategy is to use a balloon enteroscope to aid advancement through a longer colon.

It is also important to have nurses involved early in the process to help recognize loops and apply abdominal pressure. Clear and specific communication with the nursing staff as to where that abdominal pressure should

be applied is key. For example, when navigating through the sigmoid colon, providing pressure into the left lower quadrant is helpful vs navigating through a redundant transverse colon, where adding pressure in the upper abdomen is useful.

Repositioning patients can help increase cecal intubation rates. When trying to navigate through a redundant transverse colon, moving patients to the supine position can be helpful. Alternatively, when navigating through the right colon to intubate the cecum, placing patients in the right lateral decubitus or even prone position is beneficial.

Lastly, water immersion colonoscopy is helpful when encountering a challenging colon. Several studies have demonstrated that water immersion increases cecal intubation rates, improves the patient experience with respect to discomfort, and can facilitate an unsedated colonoscopy. The theory behind underwater colonoscopy is that when a patient is lying in the left lateral position, the sigmoid colon is weighed down, preventing mobility of that segment of the colon. The colon is also kept short, whereas air insufflation tends to enlarge and elongate the colon. In the setting of a long or redundant colon, water immersion typically keeps the colon in a natural state and prevents further elongation and loop formation.

G&H What devices or accessories are available to assist with managing a challenging colonoscopy?

RW As previously mentioned, switching scopes can help. A standard adult colonoscope is appropriate for a redundant colon, and using a distal attachment cap can help peek around turns to avoid bumping into walls and creating loops. For tight angulations or diverticulosis, downsizing to a pediatric or ultrathin colonoscope, an enteroscope, or a gastroscope may be more suitable.

Overtubes can also assist endoscopists in navigating tortuous colons. My colleagues and I recently reported on the initial use of a novel rigidizing overtube (Pathfinder, Neptune Medical) for both difficult colonoscopy and altered-anatomy endoscopy in a multicenter case series, which was published in *Gastrointestinal Endoscopy*. The device, which has been cleared by the US Food and Drug Administration and is commercially available, fits over a pediatric colonoscope. Once the overtube has passed through a tortuous sigmoid colon or through the splenic flexure, suction is applied to allow the device to rigidize in any conformation. The colonoscope can then be advanced through the rigid overtube toward the cecum without forming a loop. In addition, endoscope exchanges may be performed through the overtube when necessary.

Magnetic endoscopic imaging can also be useful if available, particularly for trainees and less-experienced colonoscopists. This technology allows the endoscopist to see colonoscope conformation at any point during the examination, thereby aiding loop detection and removal.

Finally, through-the-scope balloon devices have recently been developed and successfully used to navigate difficult colons. These devices can be used as an anchor to pull the colonoscope forward through difficult segments (NaviAid AB, SMART Medical Systems) or as a way to visualize the lumen when inserting the colonoscope without gas insufflation (Vizballoon, Visualization Balloons).

G&H What have studies shown regarding the use of these devices in terms of cecal intubation rates?

RW Across the board, all of these assistive devices have reported cecal intubation rates above 90% in previously challenging or failed colonoscopies, albeit most commonly in case series with expert endoscopists. Meta-analyses have specifically confirmed high ($\geq 95\%$) cecal intubation rates using ultrathin colonoscopes, balloon overtubes, and magnetic endoscopic imaging. In addition, these assistive devices and techniques appear quite safe, with no reported increase in significant adverse events compared with standard colonoscopy. The choice of device depends on both the reason for the difficult colonoscopy and the availability of such devices at an institution.

G&H What are the main limitations of these devices?

RW Some of the major challenges with using assistive devices are that they add cost to the procedure, they may not be widely available, and they can often add time. For example, if an endoscopist decides to use a balloon overtube for a colonoscopy, he or she has to set up the device, which can add significant time to the procedure. When performing a challenging colonoscopy, it is important to use sound technique and preventive measures early in the colonoscopy, which can obviate the need for any other devices.

G&H Are any devices or accessories currently under development?

RW The only device that has been developed recently that specifically assists with colonoscope insertion is the rigidizing overtube. A motorized spiral colonoscope that essentially pleats the colon onto the colonoscope and

allows it to passively advance through the colon with minimal input from the operator has been in development for several years, but is yet to be commercially viable.

G&H What are areas for future research?

RW Probably the most important area to look at is comparative studies of different devices and techniques in terms of achieving cecal intubation in challenging colonoscopies. It is still uncertain when to employ which technique and which techniques best suit specific situations. There have been attempts to create algorithms to help guide colonoscopists on when to use which device, but these have not been validated.

Disclosures

Dr Watson has served as a consultant for Neptune Medical, Apollo Endosurgery, and Boston Scientific Corp.

Suggested Reading

Inoki K, Yamada M, Kuwabara H, et al. Newly-developed colonoscope (PCF-PQ260L) is useful for patients with difficult colons. *Turk J Gastroenterol.* 2019;30(7):630-635.

Luo H, Zhang L, Liu X, et al. Water exchange enhanced cecal intubation in potentially difficult colonoscopy. Unsedated patients with prior abdominal or pelvic surgery: a prospective, randomized, controlled trial. *Gastrointest Endosc.* 2013;77(5):767-773.

Nemoto D, Utano K, Endo S, Isohata N, Hewett DG, Togashi K. Ultrathin versus pediatric instruments for colonoscopy in older female patients: a randomized trial. *Dig Endosc.* 2017;29(2):168-174.

Tan M, Lahiff C, Bassett P, Bailey AA, East JE. Efficacy of balloon overtube-assisted colonoscopy in patients with incomplete or previous difficult colonoscopies: a meta-analysis. *Clin Gastroenterol Hepatol.* 2017;15(10):1628-1630.

Trindade AJ, Lichtenstein DR, Aslanian HR, et al; ASGE Technology Committee. Devices and methods to improve colonoscopy completion (with videos). *Gastrointest Endosc.* 2018;87(3):625-634.

Wei MT, Hwang JH, Watson R, Friedland S. Use of a rigidizing overtube to complete an incomplete colonoscopy. *VideoGIE.* 2020;5(11):583-585.

Wei MT, Hwang JH, Watson RR, Park W, Friedland S. Novel rigidizing overtube for colonoscope stabilization and loop prevention (with video) [published online July 30, 2020]. *Gastrointest Endosc.* doi:10.1016/j.gie.2020.07.054.