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How to achieve cecal intubation in patients with angulated and redundant colons?

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ABSTRACT

Colonoscopy has many purposes, both diagnostic and therapeutic. Accepted standards indicate that the cecum should be reached in 95% of screening examinations and 90% of all procedures. Some patients may have difficult or elongated colons, which may make successful intubation more difficult. This article reviews some common strategies for achieving cecal intubation in these colons. It includes a series of rules developed and used for trainees and expert endoscopists alike to safely complete a colonoscopy with a high degree of reliability. It also includes a review of common strategies, techniques, and tools that can be used to increase success rates.

Introduction

High-quality ileocolonosocpy has been an invaluable tool for a variety of disease processes including colorectal cancer screening, therapeutic removal of precancerous polyps, and diagnosis and surveillance of inflammatory bowel disease (among others). Current guidelines suggest that a high-quality endoscopist should achieve cecal intubation in >95% screening procedures and >90% of the time for all examinations.[1] "Cecal intubation" is defined as the ability to view the medial wall of the cecum between the ileocecal valve and the appendiceal orifice. Photo documentation should be performed of this area. Other guidelines for high-quality colonoscopy metrics are listed in Table 1. It has been shown that achieving a complete colonoscopy after prior unsuccessful attempt may find additional pathology in up to 24% of cases,[2] which highlights the importance of a complete examination. The purpose of this article is to aid the reader on tips and tricks for obtaining high cecal intubation rates in the occasionally encountered difficult patient with an angulated or redundant colon.

General principles

There are several principles involved in obtaining a high cecal intubation rate. These can be categorized into a few basic strategies that include manage the left colon, reduce loops whenever possible, use pressure from a skilled assistant, reposition the patient, and use a different scope (or one with altered properties). Performing safe colonoscopy also requires avoidance of excessive insertion pressure.

Table 2 includes a series of "rules" that, if followed, can help the endoscopist achieve safe cecal intubation in the vast majority of patients. They were developed and over many years modified by one of the authors (A.B.) and have since been used successfully by both authors to teach and perform highly effective colonoscopy.

Manage the left colon

The left colon can be the most difficult part of insertion. Because the sigmoid colon is on a long mesentery and not fixed to the retroperitoneum, it can be significantly stretched (but also telescoped onto itself) so that the insertion length can vary from 25 to 80 cm depending on the degree of scope reduction. It is recommended that two-thirds of the total insertion time be spent in the left colon to properly reduce all loops as much as possible before proceeding beyond the splenic flexure.[3] At the same time, however, care must be taken not to insufflate too much air (rules 4 and 5). This can create problems. When the endoscopists gently taps on the suction tip, the colon wall should begin to collapse. As long as the lumen is in view, the colon does not need to be fully distended to advance the scope (rule 1).

Very often, a loop must be inserted in order to gain access to the descending colon. This is most often created with counterclockwise torsion and results in creation of an alpha shaped loop

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Table 1
Quality Metrics in Colonoscopy.

Metric	Measure
Cecal intubation rate (able to view medial wall of cecum between ileocecal valve and appendiceal orifice)	> 95% Of all screening evaluations and > 90% of all procedures (includes photo documentation)
Withdrawal time	> 6 Min (> 10 min for trainees)
Adenoma detection rates	In at least 30% men > age 50 years and in at least 20% women > age 50 years
Bowel prep quality	> 85% Are "adequate" = able to detect polyps > 5 mm in size.
Polyp removal	> 98% Of polyps < 2 cm in size should be removed (or attempt made) prior to surgical referral
Perforation risk	Incidence of perforation varies by procedure type: screening: < 1:1000 All exams: < 1:500

(rule 12). After appropriate advancement into the descending colon or at the level of the splenic flexure, this type of loop can be reduced by the application of counter-clockwise torsion and simultaneously pulling the scope backwards out of the patient.[4] This motion is demonstrated in Figure 1.

Once the left side loop has been reduced, further advancement should then proceed with a slight amount of counter-clockwise torsion to maintain this reduced loop. This maneuver also helps to flatten out the sigmoid along its retroperitoneal attachment and also flatten the transverse colon at the level of the splenic flexure (such that the degree of angulation at this turn is less—thereby allowing the endoscopist to travel across the transverse colon quickly with a minimal change in the force vectors). Once any loop is reduced, very often either there will be a slight "give" in the scope as it straightens out. Another clue to successful loop reduction is that the exterior portion of the scope will also straighten out (when it may have previously had a slight curl noted in it). There will also be a return of 1:1 motion of the scope and the patient will have less discomfort. These subtle clues allow the endoscopist to know that the loop has been fully reduced. Particular attention must be given to ensuring that all loops are reduced prior to proceeding beyond the splenic flexure, as this is a very common reason for an incomplete procedure.

If a polyp is noted in the left colon on insertion, do not spend a large amount of time trying to remove it, as taking a long time puts in excess air that can make subsequent advancement difficult (it creates a balloon animal effect). If it requires more than a simple forceps biopsy for complete excision, mark the area by taking a small forceps biopsy (that creates some bleeding that can later help identify the site on scope withdrawal). However, be sure to take a picture so you can see what the lesion looks like later (rule 10).

Reduce loops whenever possible

After managing the left colon as above, there are several additional points at which a loop should be reduced (splenic flexure, transverse colon, and hepatic flexure). This maintains the scope as straight as possible and allows 1:1 motion, which maximizes forward progress through changing force vectors around corners. Loops also are a common cause of excessive patient

Table 2
Colonoscopy "Rules."

Rule	Description
1. If you cannot see the lumen, do not advance the scope	This allows for safe progress and limits missed findings.
2. If you cannot turn the scope and turn the patient	Allows frame of reference shift, may reorient the colon so that the lumen once again becomes visible
3. (Sometime you have to turn without seeing the lumen, e.g., flexures)	The scope may slide along the mucosa. Avoid blanching blood vessels or "redout" which is a sign of too much pressure on the bowel wall.
4. Suck and fart	Decompress the lumen to limit pain and straighten the colon. Insufflate as little as possible during insertion, and save careful inspection of the mucosa for withdrawal when the colon is fully distended.
5. Balloon animals are bad	It is difficult to advance the scope beyond a turn if the more proximal colon is filled with air, which may increase the angulation of turns
6. Respire profundo and breathe!	Respiration moves the diaphragm, which moves liver and spleen. As the colon is fixed at these flexures, this in turn moves on the scope to get around tough corners.
7. Boli = bad	Boli means pain in Polish. Pain is a sign of too much bowel wall stretch or tension. Not only is this uncomfortable for patients, but is also potentially unsafe.
8(A) If paradoxical motion: first try to overcome it,	Stop advancing when patient has pain or resistance is high. The scope will bend at first (causing paradoxical motion), but with additional insertion it may straighten and advance the scope. The technique works for bowing, but not looping. If a loop exists, go on to the next rule.
8(B) then reduce scope and try again	When you reduce the scope turn clockwise to reduce the radial loop. This limits total length of scope in patient. Reinsertion after loop excision can allow forward progress again. There is often a "give" in the scope when a loop gets reduced.
9. Lube … if it is good for your car, it is good for the scope	Can allow the colon to slide through a loop without too much friction or pressure, which decreases the chance of tearing (particularly at the rectosigmoid junction—a common site of perforation due to the relative fixation).
10. If you see something abnormal, take a picture of it	This helps with future identification or comparison to the original lesion
11. Clean your windshield and you would not run into anything	This can help determine the direction of the colon going
12. In the rectum prior to the rectosigmoid turn, pre-emptively introduce a counter-clockwise turn. As you enter, the sigmoid turn clockwise so you are in a neutral position at the descending colon.	This can limit the amount of looping as it is done in a controlled fashion, and then purposely reduced.
13. Keep your head above water	If there is residual stool or liquid in the colon, keeping the scope above the air fluid level allows you to continually keep the lumen in view and make quick progress without introducing loops.