

How I Teach My Trainees “Water Navigation Colonoscopy”

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Abstract

Colonoscopy is a difficult examination for inexperienced examiners, often due to over-insufflation of air, causing elongation of the colon and patient pain. Sedation medications relieve pain, which is a warning sign of perforation. We describe the water navigation method. With the patients in the left lateral position, air removal from recto-sigmoid allows the injected water to flow into the descending colon through the ‘collapsed’ lumen, improving the view. The “cork-screw twist” maneuver facilitates the passage of the colonoscope through the “straightened” sigmoid colon without pain. Under supervision by the author, six novices were allowed to insert the colonoscope within ten minutes by this method in one patient per week, as long as the patients did not complain of pain. The average number of attempts for the first cecal intubation within ten minutes was 3.3, and the average success rate during the first three months was 58.6%.

Introduction

Colonoscopy is a difficult examination to conduct for inexperienced examiners. To improve the view, there is often a tendency to over-insufflate air, which makes passage of the scope difficult and causes patients to experience pain and discomfort. Sedatives and analgesics relieve this pain or discomfort during colonoscopy but also mask the warning signs of colon perforation. In addition, sedative use requires a patient to be accompanied by an escort, time for recovery, and activity restrictions. Sedative-free painless colonoscopy is the best way, if possible.

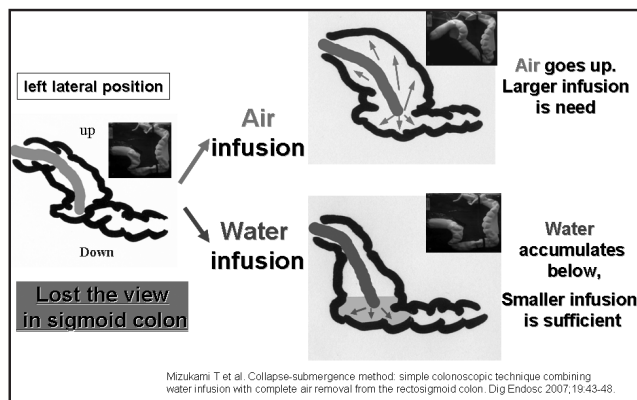
Most of the pain during colonoscopy insertion is felt at the passage of the sigmoid colon. The sigmoid colon suspended in the abdominal cavity by mesentery is not fixed directly to the

retroperitoneum. It is mobile, and, in the left lateral position, infused air collects in the sigmoid colon and pulls it up to the right side of the body. So a larger amount of air is needed for keeping the view to pass through the sigmoid-descending junction (SDJ) (the left side of body), and it stretches the mesentery and causes patient pain (Figure 1).

Sakai was the first to describe the “Water Pouring Method,”²¹⁻³ a simple colonoscopic technique using water infusion instead of air insufflation. The method allows easier negotiation of the scope and does not cause so much pain to the patients, but in this method, complete air suction in the recto-sigmoid colon was not mentioned. The debris in the recto-sigmoid colon and the boundary can partially or completely obscure the view.

We have modified this technique by combining water infusion with complete air suction from the rectum to the descending colon as “Water Navigation Colonoscopy”²⁴ (Figure 2). With the pa-

Figure 1: 200 ml of water is sufficient to improve the view by water infusion



tients in the left lateral position, complete air removal from recto-sigmoid allows the injected clear water to flow straight down into the descending colon through the ‘collapsed’ lumen (Figure 3). This improves the view during passage through the recto-sigmoid by “shortening and straightening” the sigmoid colon.

The sigmoid colon is a helical structure. The “cork-screw twist” maneuver facilitates the passage of the colonoscope through the “SHORTENED and STRAIGHTENED” helical sigmoid colon (Figure 4).

Figure 2: Technical procedures of “Water Navigation Colonoscopy”

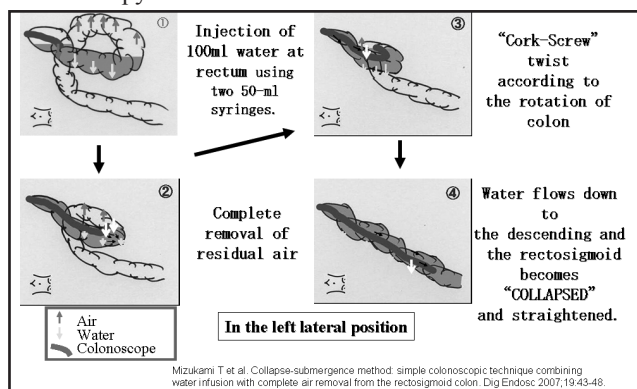


Figure 3: Complete air suction from the recto-sigmoid makes the sigmoid colon “short” and “straight”

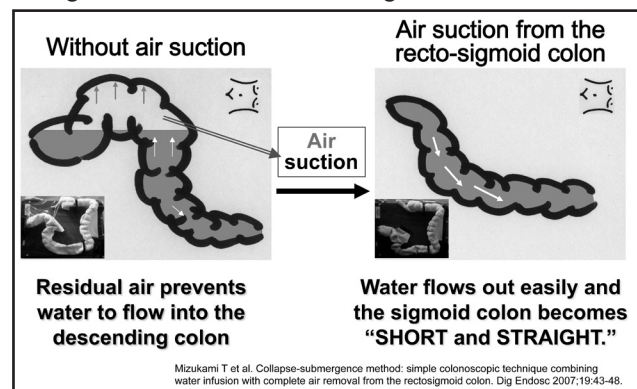
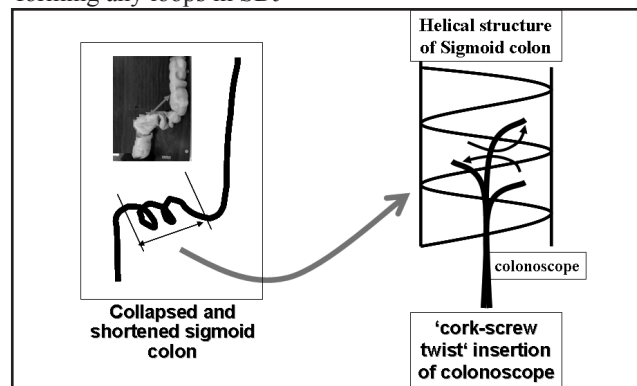


Figure 4: “Cork-screw twist” realizes the intubation without forming any loops in SDJ



The change in colonic volume during colonoscopy with this method was measured and had been shown not to increase.⁴ Patients self-reported pain showed that they hardly experienced any pain during this sedative-risk free “Water Navigation Colonoscopy.”⁴

Training Program in our Hospital

Training target:

The beginner house officer and gastroenterology residents. Previous training of gastroscopy is not necessary in my hospital. In most cases, the training of colonoscopy and gastroscopy proceeds in parallel.

Training principle:

- The main purpose of colonoscopy is detection of neoplasms. Insertion of colonoscopy is just a way to do that.
- Training program should not cause any inconvenience to patients.
- Training program should not disturb the medical routine.

Training program (once a week):

1. Before the training program starts, the trainees observe five cases of colonoscopy.
2. Learn how to manipulate the colonoscope with the help of the colon model (one hour for the first training day and 10 minutes for every training day thereafter).
3. Training to recognize the colon as a helical structure based on appearance of the colonic folds during observation of the colonoscopies performed by the supervisor.
4. Under supervision, trainees are allowed to insert the colonoscope within 10 minutes in one patient per week, as long as the patients do not complain of pain.
5. After five months of training, examination during withdrawal of the colonoscope is permitted.

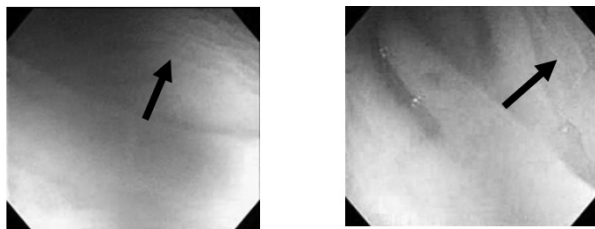
Training with colon model:

First, proper endoscope manipulation is essential for colonoscopy. In training with the colon model, trainees learn the functions and capabilities of the colonoscope. Practice with the colon model is more difficult than the human colon for colonoscopy insertion, because “water navigation” cannot be used.

Training to recognize the helical structure of the colon:

The folds of colon mucosa show the way. The sigmoid colon is a helical structure. “Cork-screw twist” inserts the scope as if it ascends the spiral stair. The view obtained during “cork-screw twist” insertion resembles the view that one sees looking up while ascending a spiral staircase. The bends of the colon folds show the direction of insertion (Figure 5), and “cork-screw twist” in this direction achieves the intubation without forming any loops. Training to recognize the helical structure of the colon from the colon folds is essential to this “cork-screw twist” insertion.

Figure 5: The bend of the colon folds shows the direction of insertion



Training outcome⁴ (training parallel with gastroscopy):

Six trainees from 2002 to 2005:

- The average trial number for the first passage of SDJ was 1.4.
- The average trial number for the first cecal intubation within 10 min was 3.3.
- The average success rate of cecal intubation during the first three months was 58.6%.

Latest two trainees (without training of gastroscopy) (from November 2009 to March 2010)

Trainee No. 1: A 26-year-old resident of surgery

- At the first trial, she passed through SDJ without pain
- At the second trial, she intubated to the cecum
- The success rate of the passage of SDJ was 91.6% (11/12)
- The success rate of Total Colonoscopy was 50% (6/12)

Trainee No. 2: A 25-year-old house officer

- At the first trial, he passed through SDJ without pain
- At the second trial, he intubated to the cecum
- The success rate of the passage of SDJ was 100% (14/14)
- The success rate of total colonoscopy was 66.7% (8/14)

Discussion

The insertion of the colonoscope without sedatives and analgesics by Japanese masters does not cause any pain. I myself have experienced the sedative-free colonoscopy twice. The first one was performed by the famous Japanese colonoscopist Dr. Mitsuhashi with conventional method. I felt a very slight different feeling at the passage of the sigmoid colon but did not feel any pain. The second one was performed by my second-year trainee with “water navigation colonoscopy.” I did not feel any pain at all compared with the first time.

Most of the pain during colonoscope insertion occurs during the passage of the SDJ, due to over-distension of the sigmoid colon and stretching of the sigmoid mesentery. Over-insufflation of air for keeping the view by beginners causes excessive distention. Japanese masters of colonoscopy can insert the colonoscope with minimal insufflation of air without stretching the sigmoid colon. “Water navigation colonoscopy,” a colonoscopy insertion technique with water infusion and complete air removal from recto-sigmoid, hardly changes the volume of the colon. The “cork-screw twist” technique does not stretch the

sigmoid colon and does not cause any pain or discomfort to the patients, even when performed by the beginner.⁴

This “cork-screw twist” technique means the continuous application of “RIGHT OR LEFT TURN AND SHORTENING”⁵ during insertion, following the helical structure of the colon. The technique enables the scope to pass through the SDJ without forming any loops. The essential points in teaching the technique are the manipulation of colonoscope and the recognition of the colon helical structure from the colon folds. Insertion without touching the wall at the tip of the colonoscope is also necessary for this technique. If the tip touches the wall, the colon stretches during the “cork-screw twist” maneuver.

Training outcome shows that the passage of SDJ is very easy in “water navigation colonoscopy.” The latest two trainees passed through SDJ at the first trial and succeeded at almost every trial, without causing any pain to the unsedated patients. This means “water navigation colonoscopy” can facilitate the success of training.

Acknowledgements

Figures 1-3 Mizukami T, Yokoyama A, Imaeda H, et al. Collapse-submergence method: simple colonoscopic technique combining water infusion with complete air removal from the rectosigmoid colon. *Dig Endosc.* 2007;19:43-48. Permission to republish these has been requested from the publisher. Dr. Felix Leung provided assistance in revising drafts of this manuscript.

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References

1. Sakai Y. Colon examination and diagnosis with colonoscopy. *Gastroenterological Endoscopy.* 1988;30(Suppl.1):2925-7 (in Japanese).
2. Abe K, Hara S, Takada Y, et al. A Trial on water pouring method during colonoscopic insertion. *Yakuri to Chiryō.* 1986;14 (Suppl.1):108-12 (in Japanese with English abstract).
3. Sekioka T, Kosuga T, Endou K, et al. A new insertion technique of the colonoscopy: The submarine method. *Gastroenterol Endosc.* 1990;32:1461-8 (in Japanese with English abstract).
4. Mizukami T, Yokoyama A, Imaeda H, et al. Collapse-submergence method: simple colonoscopic technique combining water infusion with complete air removal from the rectosigmoid colon. *Dig Endosc.* 2007;19:43-48.
5. Shinya H, Wolff WI. *Colonoscopy Surg Annu.* 1976;8:257-95.