How I Teach My Trainees “Water Navigation Colonoscopy”

Takeshi Mizukami, MD, PhD
Toshifumi Hibi, MD, PhD

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,”¹⁻³ 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”⁴(Figure 2). With the pa-
patients 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).

The change in colonic volume during colonoscopy with
this method was measured and had been shown not to in-
crease.\(^4\) 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 hospi-
tal. In most cases, the training of colonoscopy and gastroscopy
proceeds in parallel.

**Training principle:**

- The main purpose of colonoscopy is detection of neo-
plasms. 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 obser-
vation 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 with-
drawal of the colonoscope is permitted.

**Training with colon model:**

First, proper endoscope manipulation is essential for colonos-
copy. In training with the colon model, trainees learn the func-
tions and capabilities of the colonoscope. Practice with the
colon model is more difficult than the human colon for colo-
scope 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 form-
ing any loops. Training to recognize the helical structure of
the colon from the colon folds is essential to this “cork-screw
twist” insertion.
The “cork-screw twist” technique means the continuous application of “RIGHT OR LEFT TURN AND SHORTENING” 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


Takeshi Mizukami, MD, PhD, is head doctor, Endoscopy Center, Yokohama Municipal Citizens Hospital, Yokohama, Japan.

Toshifumi Hibi, MD, PhD, Professor, Gastroenterology, Keio University, Japan.

Potential Financial Conflicts of Interest: By AJCM® policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article that might create any potential conflict of interest. The authors have stated that no such relationships exist.

### References