

# Comparison of rectal suction versus rectal tube insertion for reducing abdominal symptoms immediately after unsedated colonoscopy

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## Bibliography

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**Background and study aims:** Abdominal discomfort and bloating are common symptoms after colonoscopy. We aimed to compare the effects of direct rectal suction with insertion of a rectal tube on reducing abdominal symptoms after unsedated colonoscopy.

**Patients and methods:** Consecutive patients undergoing colonoscopy were randomized to have direct rectal suction or placement of a rectal tube immediately after colonoscopy. Post-procedure abdominal pain and bloating were measured with a 0–100 visual analogue scale. All participants ranked their satisfaction with either direct rectal suction or insertion of a rectal tube.

**Results:** Abdominal pain and bloating were significantly reduced by direct rectal suction and placement of a rectal tube at 1 minute (both  $P < 0.05$ ) and 3 minutes (both  $P < 0.05$ ) after the colonoscopy.

Direct rectal suction significantly reduced abdominal pain at 1 minute ( $P = 0.001$ ) and 3 minutes ( $P = 0.005$ ) after colonoscopy compared with rectal tube insertion. Bloating was significantly lower in patients with direct rectal suction compared to those with rectal tube insertion at 1 minute ( $P = 0.03$ ) after colonoscopy. Greater satisfaction was found in patients with direct rectal suction compared to those with rectal tube insertion ( $P = 0.009$ ).

**Conclusion:** Direct rectal suction is more effective than rectal tube placement in reducing abdominal symptoms immediately after colonoscopy. Our study suggests that direct rectal suction is useful in providing relief of symptoms when patients are having difficulty expelling air or are experiencing abdominal symptoms following colonoscopy.

## Introduction

Abdominal discomfort and bloating are frequently encountered in patients who have undergone colonoscopy [1]. Abdominal discomfort has been reported to be the most common symptom after colonoscopy [2], and may lead to absence from work after colonoscopy due to abdominal pain and bloating [3]. There are some factors that might influence post-procedural abdominal symptoms, including the duration of the procedure, the degree of technical difficulty, and the expertise of the endoscopist. Insufflation of air during the colonoscopy is the most important factor that causes abdominal discomfort because many patients have difficulty expelling air after the procedure. Patients with abdominal discomfort may require extensive monitoring and observation after the procedure, which could influence medical costs by increasing the length of hospital stay and nursing care requirements. Patient compliance and satisfaction with the colonoscopy may impact their future willingness for repeated

colonoscopy in terms of surveillance for colon malignancy.

Previous studies have shown that insertion of a rectal tube immediately after colonoscopy helps reduce abdominal discomfort and increase satisfaction with the procedure [3]. However, another study, a prospective randomized trial, failed to show any reduction in abdominal discomfort or pain at discharge from the endoscopy unit and within 48 hours after the procedure [4]. Other studies with total colon decompression were shown to reduce abdominal pain and bloating, but did not demonstrate any improvement in abdominal symptoms as evaluated 24 to 48 hours after the procedure [5].

In order to improve and enhance patients' acceptance and satisfaction for undergoing future colonoscopy, we hypothesized that rectal suction immediately after the procedure might improve satisfaction and reduce abdominal discomfort and bloating. We believe that the improvement in patients' symptoms after the procedure may reduce the accumulation of patients to be observed in the

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department and enhance the efficiency of the endoscopy unit. Therefore, we performed a prospective randomized study to compare direct rectal suction with rectal tube placement immediately after colonoscopy with the ultimate purpose of reducing abdominal symptoms and improving patient satisfaction.

## Patients and methods

### Study population

We prospectively evaluated 186 consecutive adult patients undergoing an elective, screening, or diagnostic colonoscopy at Hualien Tzu Chi Hospital from 28 March 2013 to 24 December 2013. Patients with the following conditions were excluded: past history of major abdominal or colonic surgery, obstructive lesions of the colon, advanced abdominal cancer, or allergy to medication (hyoscine butylbromide and/or meperidine). The study design was approved by the Human Ethics Review Committee of the hospital and informed consent was obtained from each participant.

### Protocol and design

Randomization of the patients was performed using a computer-generated list. All patients were blinded to the procedure and divided into two groups for direct rectal suction or placement of a rectal tube. Direct suction in the rectum was performed by keeping the finger on the suction button on the endoscope shaft until visual collapse of the rectum with discontinuation of air suction just before complete withdrawal of the endoscope, whereas a rectal tube was placed in the rectum for 3 minutes immediately after complete withdrawal of the endoscope. In the group with rectal tube placement, we did not perform exsufflation at the end of the colonoscopy. The rectal tube (30F polyvinyl chloride with a single sidehole) (Symphon Chemical Corporation, Taiwan) was advanced to a distance of 10–15 cm from the anus and kept there for 3 minutes. During this 3-minute period, patients were encouraged to change their position.

### Colonoscopy

All participants underwent bowel cleaning with ingestion of 90 mL of sodium phosphate followed by a glycerin enema before the colonoscopy examination. Colonoscopy procedures were performed using a standard colonoscope (CF-240I, Olympus Optical Co. Ltd., Tokyo, Japan) by four experienced endoscopists who had each performed at least 1000 colonoscopic procedures. All procedures in this study were performed without sedation. All patients were given 20 mg of hyoscine butylbromide, if they had no history of symptomatic prostatic hyperplasia, narrow-angle glaucoma, or tachyarrhythmia. Air insufflation was kept at a low setting while the colonoscope was inserted as far as the cecum. A small amount (10–30 mL) of water at room temperature was instilled through the accessory channel when the lumen could not be seen clearly. If the lumen was not identifiable after water instillation, the low-air insufflation setting was shifted to the high-insufflation setting. During the withdrawal phase, sufficient air was insufflated to maintain an adequately distended lumen when each segment of the colon was inspected. Before this study, all of the operators were in agreement about the performance of the procedure in order to minimize procedure related variation among the colonoscopists.

When insertion of the colonoscope was difficult due to scope looping, manual abdominal pressure was applied by the assistant

nurse. However, if manual abdominal pressure failed to overcome the looping, we asked the patient to change position. The examination was complete when the cecum was seen and imaged. The quality of colon preparation was evaluated using published criteria [6]. The assessment was made from a combination of the amount and consistency of residual stool and the percentage of bowel wall visibility. There are four grades from excellent (small with clear liquid) to poor (semisolid or solid stool). We recorded all procedures and related parameters, including biopsy, polypectomy, time to reach the cecum, total procedural time, use of abdominal pressure, use of position changing, and adequacy of colon cleansing.

### Outcome measurements

In all patients, abdominal pain and feeling of bloating were rated immediately after the procedure using a Visual Analogue Scale (VAS, 0–100). A trained nurse evaluated the symptoms of the patient with VAS immediately after the procedure, 1 minute, and 3 minutes after commencement of rectal suction or insertion of the rectal tube. At the end of the study, patients were asked about the satisfaction with rectal suction or placement of the rectal tube to alleviate their post-procedural symptoms using VAS (0=not satisfied, 100=very satisfied). Due to potential differences in individual subject's patience with the procedure, we also determined the relative change in subjective symptoms as per subject calculation with their symptoms at 1 minute or 3 minutes divided by those at baseline (%).

### Statistical analysis

All results were expressed as mean  $\pm$  standard deviation (SD). The main outcome measurement was to determine the differences in post-procedural symptoms between rectal suction and placement of the rectal tube as measured by VAS. We also assessed any group difference with regard to demographic characteristics and procedural parameters. Therefore, for continuous variables, the Mann–Whitney *U* test and Student's *t* test were used when appropriate, whereas categorical outcome variables were analyzed with Fisher's exact test. A *P* value of 0.05 or less indicated the presence of a statistically significant difference between the groups.

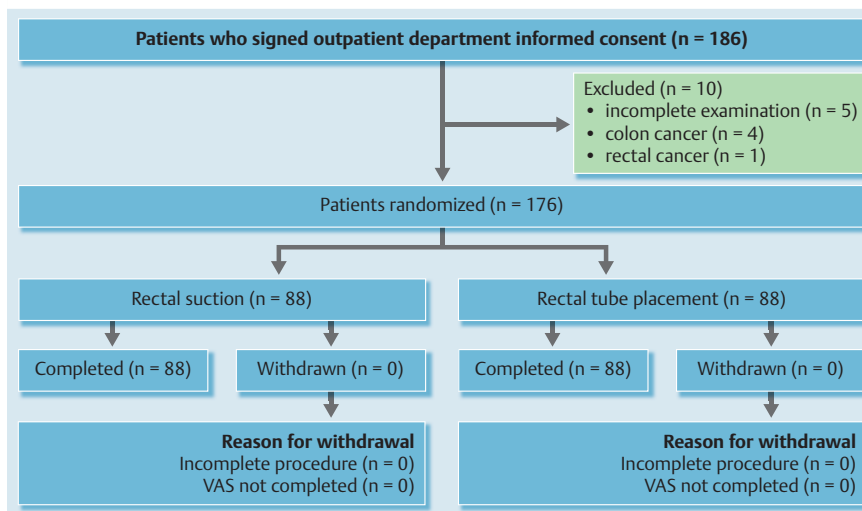
### Sample size calculation

The calculation of the sample size was based on detecting a difference in main effects (i.e., percentage change of pain or bloating) between the two groups (rectal tube vs. rectal suction). The primary outcome measure was the relative change (%) between pain score at 1 minute after the procedure and that at baseline. It can be indicated as the difference in abdominal pain between baseline and 1 minute after the procedure. Using a two-sided test of two proportions with  $\alpha=0.05$ , a target sample size of 82 participants per group provided 80% power to detect a difference of 20% between the two groups. We chose 20% for the sample size calculation because it was recognized to represent a potential clinically meaningful difference.

## Results

### Patient characteristics

Between 28 March 2012 and 24 December 2012, 186 patients from the outpatient department were scheduled for screening or surveillance colonoscopy. Of these, 176 patients consented to



**Fig. 1** CONSORT diagram shows flow chart for patient enrollment. The number of patients at each stage of the procedure is provided.

be randomized. Ten patients were excluded due to incomplete examination or colorectal cancer (Fig. 1). All of the patients who were randomized for rectal suction or rectal tube procedures successfully completed the procedure (Fig. 1). There were no significant differences between rectal suction and rectal tube groups with regard to age, gender, body mass index, patient number treated by different investigators, or final diagnosis (Fig. 1).

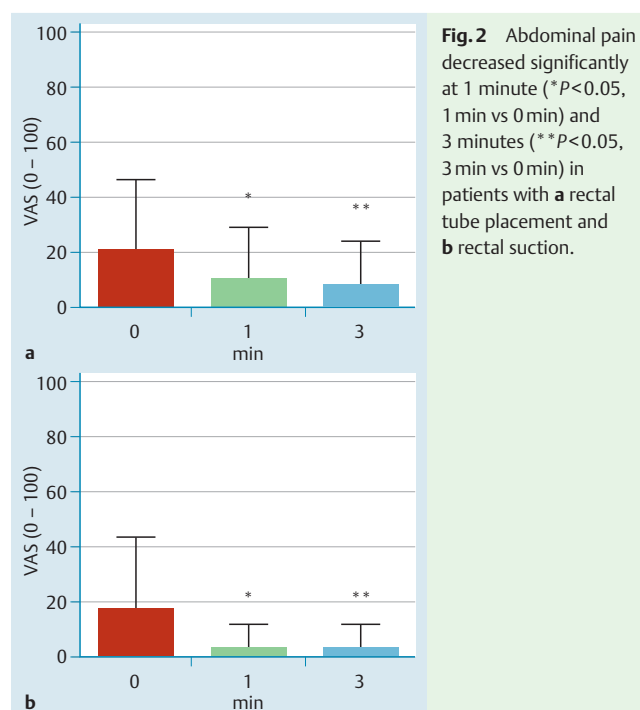
### Colonoscopic characteristics

Table 2 shows the colonoscopic parameters. The time required for intubation to the cecum ( $P=0.91$ ) and total procedure time ( $P=0.95$ ) were similar between the rectal suction and rectal tube groups. There was no significant difference in the number of endoscopic biopsies ( $P=0.76$ ) or polypectomies ( $P=0.50$ ) between rectal suction and rectal tube groups. There was no significant difference between the two groups with regard to use of abdominal compression ( $P=0.62$ ) or use of body turning ( $P=0.50$ ). The quality of pre-procedural preparation was similar between rectal suction and rectal tube groups ( $P=0.14$ ).

### Post-procedural abdominal symptoms

For both groups, abdominal pain was significantly reduced at 1 minute (both  $P<0.05$ ) and 3 minutes (both  $P<0.05$ ) after colonoscopy (Fig. 1). Similarly, bloating was also significantly reduced at 1 minute (both  $P<0.05$ ) and 3 minutes (both  $P<0.05$ ) after the colonoscopy (Fig. 2). Table 3 shows the differences in post-procedural abdominal symptoms between the rectal tube and rectal suction groups. Patients in the rectal suction group had significantly lower abdominal pain than those in the rectal tube

group at 1 minute ( $P=0.001$ ) and 3 minutes ( $P=0.005$ ) after colonoscopy (Table 3). Similarly, the relative change in abdominal pain was significantly greater in the rectal suction group compared with the rectal tube group within 1 minute ( $P=0.001$ ) and 3 minutes ( $P=0.019$ ) after colonoscopy (Table 3). Bloating was significantly lower in patients with rectal suction compared with those with rectal tube at 1 minute ( $P=0.03$ ) after colonoscopy (Table 3). The difference in bloating was found to be significant within 1 minute ( $P=0.007$ ) after colonoscopy (Table 3). Greater satisfaction (VAS) was found in patients with rectal suction than in those with rectal tube placement ( $P=0.009$ ) (Table 3).



**Fig. 2** Abdominal pain decreased significantly at 1 minute ( $*P<0.05$ , 1 min vs 0 min) and 3 minutes ( $**P<0.05$ , 3 min vs 0 min) in patients with a rectal tube placement and b rectal suction.

**Table 1** Baseline characteristics of patients.

	Rectal tube	Rectal suction	P value
Age, years	52.6 (11.4)	53.4 (10.7)	0.68
Gender (male/female)	65/23	60/28	0.51
BMI, mean $\pm$ SD	25.2 $\pm$ 3.6	25.6 $\pm$ 3.8	0.51
Doctor A/B/C/D	30/6/45/7	33/20/19/16	0.45
Diagnosis			0.82
Normal (%)	47 (53.4)	48 (54.5)	
Polyps (%)	41 (46.6)	40 (45.5)	

Data are expressed as mean  $\pm$  SD or percentage (%).

**Table 2** Characteristics of colonoscopic procedures in patients.

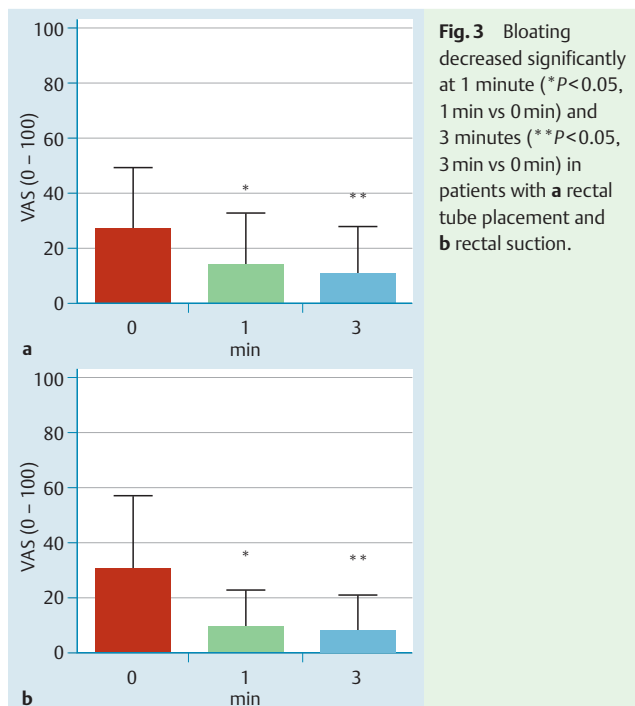
	Rectal tube	Rectal suction	P value
Cecal intubation time, mean $\pm$ SD, s	391 $\pm$ 289	396 $\pm$ 280	0.91
Procedure time, total, mean $\pm$ SD, s	758 $\pm$ 369	762 $\pm$ 385	0.95
Biopsy performed (%)	37 (42)	34 (39)	0.76
Polypectomy performed (%)	11 (13)	12 (14)	0.5
Use of compression (%)	64 (72.7)	60 (68.2)	0.62
Use of body turning (%)	20 (22.7)	19 (21.6)	0.5
Preparation quality (%)			0.14
Excellent	37 (42.1)	30 (34.1)	
Good	50 (56.8)	54 (61.4)	
Fair	1 (1.1)	3 (3.4)	
Poor	0	1 (1.1)	

Data are expressed as mean (standard deviation) or percentage (%).

## Discussion

This study showed that application of both rectal suction and rectal tube placement can significantly reduce post-procedural abdominal pain and bloating after colonoscopy. Rectal suction provides greater improvement in abdominal pain and bloating sensation compared to rectal tube placement. In addition, patients were more satisfied with the application of rectal suction than rectal tube placement. The results confirm for the first time that additional use of rectal suction and rectal tube placement helps improve abdominal symptoms immediately after colonoscopy.

It has been demonstrated that about 60% of patients undergoing colonoscopy develop post-procedural abdominal pain [7], which is likely due to air retention in small and large intestines with gaseous dilatation [7]. Therefore, a variety of different methods have been proposed to reduce post-procedural discomfort, including application of carbon dioxide [7], colon decompression [5], rectal tube placement [8], limited air insufflation [9], and warm water infusion [10]. It has been reported that the placement of a rectal tube after colonoscopy may improve procedure-related satisfaction and discomfort symptoms, suggesting its utility for the management of abdominal distension following colonoscopy [8]. However, further work failed to find the advantage



of reducing post-procedural abdominal discomfort or bloating by the placement of a rectal tube [4]. Our study shows that application of direct rectal suction is more effective than rectal tube placement in reducing abdominal discomfort and bloating, and thus provides better overall satisfaction after colonoscopy.

Despite improvement in abdominal symptoms by decompression of the rectum and sigmoid colon [5], applying a rectal tube after unsedated colonoscopy may not be ideal to achieve symptomatic reduction because most of the insufflated air is proximal to the sigmoid. It has been shown that total colonoscopic decompression helps reduce abdominal bloating and discomfort after colonoscopy [5], but the effect was not realized until 24 hours after the procedure [5]. These findings can be explained by the notion that these patients may have intraabdominal adhesions that decrease the mobility of the colon and mesentery, making the procedure more difficult [4]. In contrast to these findings, we observed a significant reduction in abdominal pain and bloating at 1 minute and 3 minutes after direct rectal suction. It should be

Post-procedure symptoms (VAS, 0–100)	Rectal tube	Rectal suction	P value
Pain, 0 min	21.2 $\pm$ 25.2	17.1 $\pm$ 25.7	0.28
Pain, 1 min	10.5 $\pm$ 18.5	3.1 $\pm$ 8.6	0.001
Pain, 3 min	8.3 $\pm$ 15.7	2.9 $\pm$ 8.6	0.005
Pain change, 0–1 min	0.70 $\pm$ 0.27	0.87 $\pm$ 0.16	0.001
Pain change, 0–3 min	0.77 $\pm$ 0.23	0.87 $\pm$ 0.16	0.019
Bloating, 0 min	27.5 $\pm$ 21.7	30.4 $\pm$ 26.7	0.43
Bloating, 1 min	14.6 $\pm$ 18.4	9.3 $\pm$ 13.4	0.03
Bloating, 3 min	11.0 $\pm$ 17.1	8.1 $\pm$ 12.8	0.19
Bloating change, 0–1 min	0.65 $\pm$ 0.26	0.71 $\pm$ 0.26	0.134
Bloating change, 0–3 min	0.74 $\pm$ 0.24	0.75 $\pm$ 0.25	0.784
Difference between time intervals			
Pain, 0–1 min	10.7 $\pm$ 19.7	14.0 $\pm$ 23.9	0.32
Pain, 0–3 min	12.9 $\pm$ 21.5	14.1 $\pm$ 23.8	0.71
Bloating, 0–1 min	12.9 $\pm$ 14.4	21.1 $\pm$ 24.3	0.007
Bloating, 0–3 min	16.5 $\pm$ 16.7	22.4 $\pm$ 24.7	0.07
Satisfaction (VAS, 0–100)	60.6 $\pm$ 34.5	73.2 $\pm$ 28.6	0.009

Data are expressed as mean  $\pm$  standard deviation; VAS = Visual analogue scale.

**Table 3** Comparison of post-procedure outcome.

noted that since we excluded those patients with prior abdominal surgery, the beneficial effects of direct rectal suction in this study may not be applied to patients who have had previous abdominal surgery.

A potential limitation of the current study is that we did not evaluate abdominal pain and bloating for longer intervals such as 24 hours after colonoscopy. It has been reported that patients may still have abdominal pain and distension 24 hours after colonoscopy [4]. However, none of the patients in this study reported having any abdominal symptoms before leaving the department or 24 hours later during follow-up phone contact.

In summary, direct immediate rectal suction does improve abdominal symptoms compared to insertion of a rectal tube following unsedated colonoscopy. This study has also demonstrated that patients are more satisfied with direct rectal suction in the management of post-procedural abdominal symptoms. Therefore, when patients are having difficulty expelling air or experiencing abdominal symptoms immediately after colonoscopy, direct rectal suction can be recommended to be used empirically in an attempt to provide relief of symptoms.

**Competing interests:** None

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