

## Retrospective Cohort Study

## Comparison of two types of colectomy in treating slow transit constipation with or without melanosis coli

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**Data sharing statement:** Technical appendix, statistical code, and dataset available from the corresponding author at [xinhuawmz1@126.com](mailto:xinhuawmz1@126.com). Participants gave informed consent for data sharing. No additional data are available.

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### Abstract

**AIM:** To compare the follow-up outcomes of ileosigmoidal anastomosis (ISA) and caecorectal anastomosis (CRA) in patients with slow transit constipation (STC) with or without melanosis coli (MC).

**METHODS:** We collected the clinical data of 48 STC patients with or without MC from May 2002 to May 2007. Twenty-six patients underwent CRA (14 with MC) and 22 cases received ISA (14 with MC). A 3-year postoperative follow-up was conducted.

**RESULTS:** CRA improved the quality of life [evaluated by the gastrointestinal quality of life index (GIQLI)] in patients without MC, but was inferior to ISA in stool frequency and Wexner and GIQLI scores for MC patients. In the CRA group, patients with MC suffered worse outcomes than those without MC.

**CONCLUSION:** CRA is more suitable for STC patients without MC; however, for STC patients with MC, ISA is a better choice.

**Key words:** Constipation; Melanosis coli; Caecorectal anastomosis; Ileosigmoidal anastomosis; Prognosis

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**Core tip:** The optimal surgical treatment for slow transit constipation (STC) is controversial. Based on our study, caecorectal anastomosis is more suitable for STC without melanosis coli (MC). However, for STC with MC, ileosigmoidal anastomosis, with a lower postoperative recurrence rate, is a better choice.

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## INTRODUCTION

Slow transit constipation (STC) is characterized by delay in the transit of stool in the presence of a morphologically normal colon and rectum<sup>[1,2]</sup>. Most patients experience long-term use of anthraquinone laxatives such as senna, aloe capsules, and maren pills, which may damage colonic epithelial cells and cause irreversible injury to organelles, finally resulting in colonic melanosis coli (MC)<sup>[3,4]</sup>.

When medical treatment fails, surgery becomes the final effective choice<sup>[5,6]</sup>. Since Lane first reported that colectomy was an effective treatment in 1908, many different types of colectomy have been developed<sup>[7]</sup>. For example, ileosigmoidal anastomosis (ISA), caecorectal anastomosis (CRA) and colonic exclusion, a modified Duhamel procedure, have been developed. Currently, ISA and CRA are the most frequently adopted procedures, although there is still debate about which procedure is best<sup>[8-10]</sup>. In addition, whether MC is an important factor in choosing a surgical procedure has not been explored previously.

For this retrospective study we analyzed 3 years of follow-up data, investigated the post-operative outcomes regarding stool frequency per day, Wexner scores and gastrointestinal quality of life index (GIQLI) scores following colectomy for 48 STC patients with or without MC, with the aim of comparing the two procedures.

## MATERIALS AND METHODS

### Patients

We performed a retrospective study on 48 patients with STC diagnosed in the Department of Colorectal Surgery, Xinhua Hospital affiliated with the Shanghai University School of Medicine from May 2002 to May 2007 (Table 1).

All patients underwent pre-operative tests including: (1) repeated colonic transit time (CTT) study; (2) colonoscopy and multi-mucosa biopsy; (3) defecography; (4) anorectal manometry; and (5) radiopaque

marker studies. Slow transit was defined as retention of more than 12 of 20 radiopaque markers.

Patients were enrolled in this study after satisfying the following criteria: (1) diagnosed as having chronic constipation according to Rome III diagnosing criteria and preoperative tests<sup>[11]</sup>; (2) chronic constipation lasting for more than 3 years; and (3) failed conservative treatment for at least 2 years, such as oral laxatives, bowel cleansing solutions, and enemas or suppositories.

The exclusion criteria were as follows: (1) suspicion of organic colon diseases such as tumor, ankylosing enteron or congenital megacolon; and (2) patients with absolute surgical contraindication, for example, acute myocardial infarction within 6 mo, cardiac and respiratory failure, severe pulmonary infection and arrhythmia, diabetic ketoacidosis with blood glucose exceeding 11.1 mol/L, and mental disorder.

MC was diagnosed according to colonoscopic and histopathologic appearance, *i.e.*, brown or black pigmentation located in the colon mucosa and lamina propria.

All operations were performed by the same colorectal surgical team. Each patient who was accepted for colectomy signed an informed consent form and the study was approved by the Ethics Committee of Xinhua Hospital.

### Data collection and follow-up

Clinical data regarding the Wexner constipation score (WCS)<sup>[12]</sup> and GIQLI score<sup>[13]</sup> were obtained by telephone interviews 3 years postoperatively. The Wexner constipation scale is a validated and internationally adopted questionnaire used to quantify the severity of constipation. It consists of questions examining the various clinical expressions of constipation, with scores ranging from 0 (best) to 30 (worst). The GIQLI is a validated quality-of-life questionnaire designed to evaluate specific gastrointestinal symptoms and the impact of the disease on the physical, psychological, and social spheres of the patient.

### Statistical analysis

Statistical analyses were performed using SPSS 19.0 (SPSS, Inc., Chicago, IL, United States). Non-parametric analysis was performed by using a Wilcoxon signed rank test. A  $\chi^2$  criterion and a Fisher exact test were utilized to analyze contingency data.  $P < 0.05$  was considered statistically significant. Values are expressed as mean  $\pm$  SD.

## RESULTS

### Patient characteristics

A total of 48 patients were enrolled in the study, of whom 27 (56.2%) were female. The average age was 54.2 years. Constipation was the primary

**Table 1 Patient characteristics**

Variable	<i>n</i>	Gender (M/F)	Age (yr)	Duration of constipation (yr)	Number of stools per week (preoperative)
ISA	22				
With MC	14	6/8	54.8 ± 12.3	12 ± 3	1.1 ± 0.3
Without MC	8	4/4	52.6 ± 11.3	10 ± 2	1.2 ± 0.4
CRA	26				
With MC	14	7/7	53.1 ± 10.5	9 ± 2	1.0 ± 0.3
Without MC	12	4/8	55.8 ± 13.0	8 ± 2	1.1 ± 0.4

ISA: Ileosigmoidal anastomosis; MC: Melanosis coli; CRA: Caecorectal anastomosis.

**Table 2 Three-year postoperative follow-up of ileosigmoidal anastomosis and caecorectal anastomosis**

Variable	ISA			CRA		
	With MC ( <i>n</i> = 14)	Without MC ( <i>n</i> = 8)	Total ( <i>n</i> = 22)	With MC ( <i>n</i> = 14)	Without MC ( <i>n</i> = 12)	Total ( <i>n</i> = 26)
Number of stools (per day)	4.5 ± 1.8	5.5 ± 2.4	4.9 ± 2.0	1.7 ± 1.3 <sup>a</sup>	3.0 ± 1.4 <sup>ac</sup>	2.3 ± 1.5 <sup>b</sup>
Wexner scores	5.0 ± 1.5	4.9 ± 1.2	5.0 ± 1.4	3.1 ± 1.4 <sup>a</sup>	3.3 ± 1.5 <sup>a</sup>	3.2 ± 1.4 <sup>a</sup>
GIQLI	106 ± 9	103 ± 12	105 ± 10	100 ± 6 <sup>a</sup>	116 ± 6 <sup>ac</sup>	107 ± 10

<sup>a</sup>*P* < 0.05, ISA group vs CRA group; <sup>b</sup>*P* < 0.05, MC group vs no-MC group in respective subgroups. ISA: Ileosigmoidal anastomosis; MC: Melanosis coli; CRA: Caecorectal anastomosis; GIQLI: Gastrointestinal quality of life index.

symptom of all patients with an average duration of 9.8 years before the operation. The mean preoperative frequency of stools was 1.1 times per week and all patients had enema and laxative use history. No significant differences were detected between the two groups regarding gender, age, duration of constipation and number of stools per week (Table 1). Finally, 26 patients underwent CRA and 22 patients underwent ISA.

The mean follow-up was 3 years. No mortality was found. According to interviews, patients who underwent ISA had higher postoperative defecation frequencies (4.9 ± 2.0 vs 2.3 ± 1.5, *P* < 0.01), higher Wexner scores (5.0 ± 1.4 vs 3.2 ± 1.4, *P* < 0.01) and equal GIQLI scores (*P* > 0.05; Table 2). Focusing on STC with MC patients, the ISA group was superior to the CRA group based on the three criteria. However, in STC patients without MC, the ISA group had a higher stool frequency per day (5.5 ± 2.4 vs 3.0 ± 1.4, *P* < 0.01), higher Wexner scores (4.9 ± 1.2 vs 3.3 ± 1.5, *P* < 0.01), but lower GIQLI scores (103 ± 12 vs 116 ± 6, *P* < 0.05). In patients who underwent ISA, no significant difference was found between the MC and no-MC groups. Oppositely, a statistical difference was detected regarding defecation frequency (1.7 ± 1.3 vs 3.0 ± 1.4, *P* < 0.05) and GIQLI score (100 ± 6 vs 116 ± 6, *P* < 0.01) between the MC and no-MC groups.

## DISCUSSION

The surgical treatment for constipation has long been a subject for debate. In China, the most frequently practiced procedure for STC is subtotal colectomy with CRA but not ISA, because former procedure preserves the ileocecal valve and reduces the possibility of

postoperative diarrhea and malnutrition<sup>[14-17]</sup>. However, some surgeons have reported a higher recurrence rate with CRA<sup>[18-20]</sup>. In this study, we compared the 3-year follow-up outcomes of CRA with ISA and found that CRA improved the quality of life (evaluated by GIQLI scores) in patients without MC compared with ISA, but was inferior to ISA for patients with MC evaluated by stool frequency, Wexner and GIQLI scores. Two of MC patients undergoing CRA suffered from constipation recurrence. Further analysis showed that there were significant differences between MC and no-MC patients who underwent CRA regarding defecation frequency and GIQLI score. According to our results, it is recommended that CRA is suitable for STC without MC, and ISA is a better choice for STC with MC. It is hoped that this conclusion will provide a helpful suggestion when making clinical choice between CRA and ISA.

Feng *et al.*<sup>[21]</sup> have compared CRA and ISA by functional outcomes, and they draw the conclusion that ISA is the superior method because it generates increased patient satisfaction, while the CRA procedure can be performed for selected patients with distal colonic inertia. Certainly, differences in the specific criteria (with or without MC) used to define subgroup could contribute to the differences between the present study and that of Knowles *et al.*<sup>[22]</sup>. What's more, the standard evaluation system such as Wexner and GIQLI scores was more objective and accurate than counting single symptom<sup>[23,24]</sup>.

Since first reported by Freeman *et al.*<sup>[25]</sup> in 1829, MC has been found to be associated with constipation and use of laxatives. The incidence of MC was 44.4% in STC patients<sup>[26]</sup>, which was in accord with our colonoscopic findings. The abnormal brown or black pigmentation was most intense and most readily

detected in the cecum and ascending colon<sup>[27-29]</sup>, which appear to be the remaining part of colon after CRA. This may be the reason for unfavorable clinical outcomes and constipation recurrence. In addition, MC may contribute to colonic vegetative nerve dysfunction, especially at the ileocecum<sup>[30]</sup>. CRA is not a good choice to solve this problem.

This study preliminarily probed the choice of surgical procedures in treating STC with or without MC and had some limitations. First, the precise mechanism to determine which STC patients with MC were prone to recur remains unknown. Second, a larger sample size and further research are necessary to validate our conclusions. Lastly, this research was a retrospective study with limited clinical credibility and randomized clinical trials are necessary to confirm the conclusion.

## COMMENTS

### Background

Slow transit constipation (STC) is characterized by delay in the transit of stool in the presence of a morphologically normal colon and rectum. Currently, ileosigmoidal anastomosis (ISA) and caecorectal anastomosis (CRA) are the most frequently adopted procedures, although there is still debate about which procedure is best. Establishing the respective indication of the two procedures (ISA and CRA) is of clinical need.

### Research frontiers

The surgical treatment for constipation has long been a subject for debate. In China, the most frequently practiced procedure for STC is subtotal colectomy with CRA but not ISA, because the former procedure preserves the ileocecal valve and reduces the possibility of postoperative diarrhea and malnutrition. However, some surgeons have reported a higher recurrence rate of STC with CRA. An important research hotspot in this area is to establish the respective indication of each procedure to reach better clinical outcome.

### Innovations and breakthroughs

Studies have been conducted to compare CRA and ISA by functional outcomes. Some believed that ISA is the superior method because it generates increased patient satisfaction, however, some demonstrated that CRA would be more suitable for selected patients with distal colonic inertia. This study is the first to utilize the diagnosis of melanosis coli (MC) as the crucial role when choosing CRA or ISA. In this study, the standard evaluation system instead of functional or subjective symptom was used as the evaluation criterion, and it was found that CRA improved the quality of life [evaluated by gastrointestinal quality of life index (GIQLI) scores] in patients without MC compared with ISA, but was inferior to ISA for patients with MC evaluated by stool frequency, Wexner and GIQLI scores. We first recommend that STC with MC is the indication for ISA while CRA is the better choice for STC without MC.

### Applications

It is recommended that STC with MC is the indication for ISA while CRA is the better choice for STC without MC. This conclusion will provide a helpful suggestion when making clinical choice between CRA and ISA in treating STC.

### Terminology

Slow transit constipation is characterized by delay in the transit of stool in the presence of a morphologically normal colon and rectum. Melanosis coli is a disorder of pigmentation of the wall of the colon, often identified at the time of colonoscopy and it is benign, and may have no significant correlation with disease.

### Peer-review

The authors retrospectively assessed the clinical outcomes of 48 patients

diagnosed with STC over a 5 year timeframe to determine a better clinical choice in treating STC. After comparing the 3-year follow-up outcomes of CRA with ISA, it was found that CRA improved the quality of life (evaluated by GIQLI scores) in patients without MC compared with ISA, but was inferior to ISA for patients with MC evaluated by stool frequency, Wexner and GIQLI scores. So it is recommended that CRA is suitable for STC without MC, and ISA is a better choice for STC with MC. This paper addressed the question thoroughly. All methods were sound. Authors did not overreach with the data analysis. A very sound paper with valid conclusions.

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