

Early removing gastrointestinal decompression and early oral feeding improve patients' rehabilitation after colectostomy

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Abstract

AIM: To evaluate the feasibility, safety, and tolerance of early removing gastrointestinal decompression and early oral feeding in the patients undergoing surgery for colorectal carcinoma.

METHODS: Three hundred and sixteen patients submitted to operations associated with colectostomy from January 2004 to September 2005 were randomized to two groups: In experimental group ($n=161$), the nasogastric tube was removed after the operation from 12 to 24 h and was promised immediately oral feeding; In control group ($n=155$), the nasogastric tube was maintained until the passage of flatus per rectum. Variables assessed included the time to first passage of flatus, the time to first passage of stool, the time elapsed postoperative stay, and postoperative complications such as anastomotic leakage, acute dilation of stomach, wound infection and dehiscence, fever, pulmonary infection and pharyngolaryngitis.

RESULTS: The median and average days to the first passage of flatus (3.0 ± 0.9 vs 3.6 ± 1.2 , $P < 0.001$), the first passage of stool (4.1 ± 1.1 vs 4.8 ± 1.4 $P < 0.001$) and the length of postoperative stay (8.4 ± 3.4 vs 9.6 ± 5.0 , $P < 0.05$) were shorter in the experimental group than in the control group. The postoperative complications such as anastomotic leakage (1.24% vs 2.58%), acute dilation of stomach (1.86% vs 0.06%) and wound complications (2.48% vs 1.94%) were similar in the groups, but fever (3.73% vs 9.68%, $P < 0.05$), pulmonary infection (0.62% vs 4.52%, $P < 0.05$) and pharyngolaryngitis (3.11% vs 23.23%, $P < 0.001$) were much more in the control group than in the experimental group.

CONCLUSION: The present study shows that application

of gastrointestinal decompression after colectostomy can not effectively reduce postoperative complications. On the contrary, it may increase the incidence rate of fever, pharyngolaryngitis and pulmonary infection. These strategies of early removing gastrointestinal decompression and early oral feeding in the patients undergoing colectostomy are feasible and safe and associated with reduced postoperative discomfort and can accelerate the return of bowel function and improve rehabilitation.

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Key words: Gastrointestinal decompression; Feeding; Colectostomy

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INTRODUCTION

At present, gastrointestinal decompression after abdominal operations is still widely practiced in clinic. Routine use of nasogastric tubes after excision and anastomosis of digestive tract is aimed to hasten the return of bowel function, prevent pulmonary complications, diminish the risk of anastomotic leakage, and increase patients' comfort and shorten hospital stay. But nasal insertion of a gastric tube for prolonged gastrointestinal decompression causes extreme discomfort, and can be easily dislodged. Several complications of nasogastric intubation have been described, including sinusitis, injury to the vocal cords, and iatrogenic gastric perforation, nasal trauma, nasal hemorrhage, laryngeal injury, esophageal ulceration, gastroesophageal reflux, fluid and electrolyte imbalances, aspiration pneumonia, feeding dysfunction, and psychological problems^[1-4]. Indeed, a unique randomized study by Hoffman *et al* reaffirms that patients find nasogastric tube more inconvenient and uncomfortable than gastrostomy tubes, even though gastrostomy tubes are left *in situ* for up to 4 wk^[2]. Some researches have shown that the postoperative nasogastric tube could increase postoperative complications and furthermore, affect the

nutrient intake. Recent evidence seems to indicate that immediate postoperative feeding is feasible and safe after either laparoscopic surgery or laparotomy, including gastrointestinal tract surgery^[5,6].

In the light of these evidence, we conducted a randomized study to evaluate the feasibility, and safety as well as the tolerance of early removing gastrointestinal decompression and early oral feeding in the patients undergoing colectomy for colorectal tumor in West China Hospital of Sichuan University from January 2004 to September 2005. It is hoped that this study will help to clarify strategies to accelerate postoperative recovery and to reduce patients' complications.

MATERIALS AND METHODS

Cases selection

Between January 2004 and September 2005, three hundred and sixteen consecutive patients receiving excision and anastomosis for colorectal tumor were entered the study. All patients were randomly chosen to undergo early and or late nasogastric tube removal. Nasogastric tubes were routinely placed following anesthetic induction. Patients were divided into two groups. In the experimental group, nasogastric tubes were removed within 12-24 h after the operation. The patients were provided immediately water and gradually to a liquid fiberless diet after one day, and a semi-liquid fiber diet after three days. In the control group, nasogastric tubes were removed upon report of passage of flatus by the patient, usually within three-five days after surgery.

Methods

A nasogastric tube was placed in all patients during operation. The tube was removed in control group with gastrointestinal decompression after passage of gas by intestines with continuous vacuum aspiration. The nasogastric tubes in the experimental group without gastrointestinal decompression were removed from 12 to 24 h after operation. Then, the patients were monitored prospectively, for time to first passage of flatus, time to first passage of stool, postoperative stay, and complications. Febrile morbidity was defined as two armpit temperatures greater than 38.5°C, taken at least 4 h apart, starting 24 h after operation. For the control group patients, we also recorded the time to removal of the nasogastric tube and the postoperative complications. Postoperative stay was calculated from the first postoperative day to the day of hospital discharge. Criteria for hospital discharge included: absence of nausea, vomiting, and abdominal distention; ability to tolerate oral feeding; spontaneous micturition; adequate healing, and absence of fever. Those suffering from anastomotic leaks were subjected to treatments such as anti-infective treatment, nutritional support or colostomy. Correspondingly, acute dilatation of stomach was subjected to placement of nasogastric tubes.

Statistical analysis

The χ^2 test was used for analysis of qualitative variables and Student's *t* test for continuous variables. Results of the

Table 1 Patient characteristics

General data	Experimental group (n = 161)	Control group (n = 155)
Gender(M/F)	92/69	83/72
Mean age (yr)	55.3±16.7	57.1±19.8
Range	21-78	24-85
Type of tumor		
Colon cancer	29	28
Rectal cancer	132	127
Type of operation		
Right hemicolectomy	17	15
Left hemicolectomy	12	13
Anterior rectal resection	132	127

two groups were compared using Student's *t* test. $P < 0.05$ indicated significant difference. Analyses were performed using SPSS statistical software (SPSS for Windows Ver.11.5).

RESULTS

General data

It was shown that there were no significant differences between two groups in terms of sex ($P > 0.05$), and age ($P > 0.05$) (Table 1). No significant difference was found between two groups in case distributions ($P = 1.000$).

The time to first passage of flatus, stool and the length of postoperative stay and the incidence of complications after operation are shown in Table 2. The time to first passage of flatus was seen, on average, on postoperative day 3.0 in the early removing gastrointestinal decompression and early oral feeding group and on day 3.6 in the control group ($P < 0.001$). The first defecation was 0.7 d sooner in the experimental group (postoperative day 4.1) than in the control group (4.8 d; $P < 0.001$). The postoperative hospital stays for the experimental and control groups were 8.4 ± 3.4 d and 9.6 ± 5.0 d, respectively. The postoperative complications for the experimental group and control group were seen in 23 cases and 70 cases, respectively. Compared with the control group, the total incidence of complications in the experimental group was evidently higher ($P < 0.001$). But the anastomotic leakage (1.24% vs 2.58%), acute dilation of stomach (1.86% vs 0.06%) and wound complications (2.48% vs 1.94%) were similar in the two groups. Symptoms as fever and leakage of intestinal contents were diagnosed as anastomotic leakage. Six cases suffered from the lesion in the two groups. All the leakages occurred during excision and anastomosis of lower or ultra-lower rectal tumor and healed after clinical therapy. Those who suffered from abdominal distension, emesis and succussion splash of stomach were diagnosed as acute dilatation of stomach and then subjected to gastrointestinal decompression. Two cases suffered from the wound infection and 2 cases suffered from the wound dehiscence in the experimental groups, and 3 cases suffered from wound infection but no wound dehiscence in the control group. The fever (3.73% vs 9.68%, $P < 0.05$), pulmonary infection (0.62% vs 4.52%, $P < 0.05$) and pharyngolaryngitis (3.11% vs 23.23%, $P < 0.001$) were much more in the control group

Table 2 Clinical features and complications of experimental and control groups

Parameters	Experimental group	Control group (n = 161)	P value (n = 155)
Time to first passage of flatus (d)	3.0±0.9	3.6±1.2 ^b	0.000
Time to first passage of stool (d)	4.1±1.1	4.8±1.4 ^b	0.000
Postoperative stay (d)	8.4±3.4	9.6±5.0 ^a	0.016
Total complication			
Anastomotic leakage (n%)	2(1.24)	4(2.58)	0.441
Acute dilation of stomach (n%)	3(1.86)	1(0.06)	0.623
Wound complication (n%)	4(2.48)	3(1.94)	1.000
Fever (n%)	6(3.73)	15(9.68) ^a	0.042
Pulmonary infection (n%)	1(0.62)	7(4.52) ^a	0.034
Pharyngolaryngitis (n%)	5(3.11)	36(23.2) ^b	0.000

^aP<0.05 vs experimental group; ^bP<0.001 vs experimental group.

than in the experimental group. Eight cases of pulmonary infection were found in the two groups by chest X-ray and cured with anti-inflammatory therapy. Any symptom associated with throat discomfort or pain was diagnosed as pharyngolaryngitis; 23.23% of patients suffered from pharyngolaryngitis in the control group and only 3.11% in the experimental group.

DISCUSSION

There are several traditional dicta that are transmitted from generation to generation of surgeons but lack any clear scientific foundation. These include performing gastric decompression after abdominal surgery and delaying oral feeding until the resolution of ileus, as commonly observed in daily surgical practice. In China at present, 97.5% of surgeons routinely place and keep the nasogastric tube until the passage of gas through anus after excision and anastomosis of lower digestive tract, while 2.5% of surgeons discard gastrointestinal decompression 2-3 d after operation before the passage of gas through anus^[7]. Indeed, the nasogastric tube can cause moderate to severe discomfort in 88%, severe discomfort in 70% of the patients and significantly delay the return of normal gastrointestinal function^[8,9].

Recently, a meta-analysis shows that routine nasogastric decompression does not accomplish any of its intended goals. The analysis included 28 studies fulfilling the eligibility criteria and 4194 patients. It was found that those not having a nasogastric tube routinely inserted experienced an earlier return of bowel function, a marginal decrease in pulmonary complications, and a marginal increase in wound infection and ventral hernia. Anastomotic leakage was similar in the two groups. For this reason, the authors suggest that the routine nasogastric decompression should be abandoned in favor of selective use of the nasogastric tube^[10].

We believe that the omission of routine postoperative gastrointestinal decompression may be an important first step in improving the rate of gastrointestinal recovery and shortening hospital stay. Anastomotic disruption after surgical intervention is an infrequent complication,

and may lead to severe morbidity and mortality when it occurs. Of the various gastric procedures, the Roux-en-Y gastric bypass (RYGB) has one of the highest risks for anastomotic leakage. Consequently, a nasogastric tube is frequently placed when these operations are performed. But in Italy, a prospective multicenter randomized trial showed that routine placement of a nasogastric tube after Roux-en-Y oesophagojejunostomy is unnecessary in elective total gastrectomy for gastric cancer^[11]. Huerta *et al* also suggest that routine placement of a nasogastric tube after RYGB is unnecessary; on the contrary, elimination of postoperative nasogastric decompression decreased postoperative fever and pulmonary problems, and improved patient comfort by decreasing sore throat and nausea^[6,12]. In colorectal surgery, the average volume of gastric juice in the group with gastrointestinal decompression was 200 mL daily after operation. Because the total volume of digestive juice is 6 000-10 000 mL, the gastrointestinal decompression following excision and anastomosis of lower digestive tract can not reduce the pressure of gastrointestinal tract and has no obvious preventing effects on postoperative complications^[7,13].

Compared with the control group, the removal of routine gastrointestinal decompression did not increase the postoperative probability of anastomotic leakage ($P=0.441$), acute dilation of stomach ($P=0.623$) and wound complication ($P=1.000$). The data from the present study not only confirmed that placement of a nasogastric tube can be safely omitted in colectomy but also demonstrated that routine gastrointestinal decompression may increase the postoperative complications, such as the fever, pulmonary infection, pharyngolaryngitis.

Surgery is a traumatic procedure. The metabolic response of the body is a physiological mechanism that, according to the magnitude and duration of the event, can impact on the patient's morbidity and survival. Early enteral feeding can help to improve energy and protein intake, decrease the negative impact of the metabolic response to injury, stimulate motor, resorption, synthetic, and barrier functions of the small intestine, improve the return of gastrointestinal function and reduce the duration of postoperative ileus, and reduce the risk of serious complications^[5,14,15]. Traditionally, tolerance of oral feeding is based on the passage of flatus. However, an in-depth review of the physiology of postoperative ileus suggested that such an approach is excessively conservative. It has been shown that paralysis of the small bowel is transient; the gastric paralysis lasts 24 h, and paralysis of the colon lasts 48-72 h^[16]. The gastrointestinal tract motility of the patients undergoing major abdominal surgery is transiently impaired, leading to the so-called postoperative ileus (POI). It not only causes patient discomfort, but is also related to abdominal complications and worsening of the nutritional status, as well as increases length of hospital stay and costs^[15].

POI is characterized by a transient impairment of bowel function and reduced motility sufficient to disrupt effective transit of intestinal contents^[17-19]. It is a transient bowel dysmotility that occurs following abdominal surgery. Multiple factors are thought to contribute to the pathogenesis of POI, including physical manipulation

of the bowel, surgical stress and inflammatory mediators (including endogenous opioids), changes in electrolyte and fluid balance, neural reflex and inflammatory changes, pharmacologic agents such as inhalation anesthetics, and use of opioids for postoperative analgesia^[20-22]. In animal experiments, it shows that the pathogenesis of postoperative gastric ileus induced by intestinal manipulation involves viscerosympathetic pathways. Intestinal manipulation causes impaired gastric motility via inhibitory sympathetic efferent pathway. Feeding may improve the postoperative gastric motility^[22]. Chan *et al*^[23] suggest that metoclopramide not only prevents prolonged POI at an early postoperative stage, but also can be used as a safe prokinetic drug for post-operative intestinal dysmotility.

Oral intake after intestinal anastomoses has traditionally been prescribed only after the resolution of ileus. de Aguiar-Nascimento JE *et al*^[24] suggest the return of oral feeding on the first postoperative day in patients submitted to intestinal anastomoses is safe, not associated with the occurrence of anastomotic dehiscence and moreover, related to a quicker resolution of ileus. A clinical trial showed that gastrografin not only facilitates early oral feeding but also reduces hospitalization after elective colorectal surgery. It can decrease bowel-wall edema and enhance bowel peristalsis^[25]. Even, gum-chewing might be beneficial for short hospital stay because it can stimulate bowel motility and should be added as an adjunct treatment in postoperative care^[26]. In our study, the time to first passage of flatus ($P < 0.001$), the time to first passage of stool ($P < 0.001$) and the time of postoperative stay ($P < 0.05$) were sooner in the experimental group than in the control group. Our study showed that early oral feeding can be administered safely to patients undergoing major laparotomy for colorectal carcinoma. At the same time, oral feeding can improve the return of gastrointestinal function and shorten hospital stay.

The goal of this study was to determine whether a clinical approach including early removing gastrointestinal decompression and early oral feeding is safe and shows the potential to decrease the length of postoperative stay and reduce complications after colectomy. Our data provide preliminary evidence that routine gastrointestinal decompression cannot reduce the pressure of gastrointestinal tract and has no obvious preventing effects upon postoperative complications. Contrary to expectations, routine gastrointestinal decompression may increase the incidence rate of fever, pulmonary infection and pharyngolaryngitis. These strategies of early removing gastrointestinal decompression and early oral feeding in the patients after colectomy are feasible and highly safe and are associated with reduced postoperative discomfort and can accelerate the return of bowel function and shorten postoperative stay.

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