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# Elective Colon and Rectal Surgery Without Nasogastric Decompression

*A Prospective, Randomized Trial*

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Nasogastric (NG) decompression after colorectal surgery is practiced commonly. Our aim was to determine whether routine NG decompression benefitted patients undergoing this type of surgery. Five hundred thirty-five patients were randomized prospectively to either NG decompression or no decompression. Stratification was by type of operation and patient age. Excluded were patients who had emergency surgery with peritonitis, extensive fibrous adhesions, enterotomies, previous pelvic irradiation, intra-abdominal infection, pancreatitis, chronic obstruction, prolonged operating times, or difficult endotracheal intubation. Two hundred seventy-four patients received NG decompression (Salem sump™, Argyle Co., Division of Sherwood Medical, St. Louis, MO) and two hundred sixty-one did not. There were 33 protocol violations included in the 535 patients. Patients who were not decompressed experienced significantly more abdominal distention, nausea, and vomiting than did those patients who were. Moreover, 13% required subsequent NG decompression as opposed to a reinsertion rate of 5% for patients routinely decompressed. The mean length of hospitalization for both groups was 11 days. There were no significant differences in nasopharyngeal or gastric bleeding, inability to cough effectively, respiratory infections, wound disruptions, reoperation, and wound infection rates (5%) between the two groups. We conclude that even though there is an increase in the rate of minor symptoms of nausea, vomiting, and abdominal distention, routine nasogastric decompression is not warranted after elective colon and rectal surgery.

**R**OUTINES IN SURGERY have evolved as a way of eliminating as many variables as possible in effecting safe outcomes. One such routine practiced for the last 50 years has been postoperative nasogastric decompression.

After celiotomy, coordinated small bowel contractile activity returns rapidly within hours, followed by the return of gastric propulsivity after 24 hours.<sup>1</sup> Coordinated colonic motility returns after two to four days.<sup>1</sup> The mag-

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nitude of small bowel secretory output immediately following surgery, however, is unknown. After operation, salivary and gastric secretions are minimal, and without such secretory stimuli, pancreatic and biliary secretions are diminished. It has been thought that secretions and gas accumulating as a result of postoperative ileus distend the bowel and that these could be removed or reduced by the use of an indwelling nasogastric tube.

Our study was designed to examine the routine use of nasogastric decompression in patients undergoing elective colon and rectal surgery and to compare this practice with a group of patients in whom similar operative procedures had been performed but who did not receive routine nasogastric decompression. Moreover, we hoped that a subset of patients might be identified by some preoperative or intraoperative factor or factors, which would benefit from routine postoperative nasogastric decompression.

## Materials and Methods

All patients undergoing elective colon and rectal surgery were considered eligible for this study. All patients gave verbal consent and this was noted in the patient history. The study was approved by the Mayo Institutional Review Board. After consideration of exclusionary criteria, patients were randomized to Group I, if they received postoperative nasogastric decompression or to Group II if they did not receive postoperative decompression. All patients had a nasogastric tube placed during operation and, if they were randomized to Group II, the tube was removed in the recovery room. Randomization using a random-

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Presented at the 100th Annual Meeting of The Southern Surgical Association, December 5-7, 1988, Boca Raton, Florida.

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ization table was performed at a site remote from the operating room. Patients were stratified by age (< 60 years, ≥ 60 years) and type of procedure (Table 1) and randomizations were done within each of the four strata. Subsets I and II operations had a similar result in that little or no colon remained following resection, whereas Subsets III and IV operations had at least one half of the colon in place after operation.

Patients with acute or chronic small or large bowel obstruction were excluded. Other criteria for exclusion were a history of full-dose abdominal and/or pelvic irradiation, multiple (more than 3) serosal tears, peritonitis, pancreatitis, abdominal or pelvic abscess, extensive fibrotic adhesions, prolonged mask ventilation or difficult endotracheal intubation at the beginning of the procedure, and an operating time longer than six hours. Obviously, surgical judgment entered into the decision for exclusion of patients with multiple dense fibrotic adhesions, prolonged operating time, or with 'complicated' surgery.

Salem sump tubes™, French sizes #16 and #18, were used as the standard decompression tubes. Patients who received nasogastric decompression had the tube left in place for at least 72 hours or until the passage of flatus or stool signified resumption of bowel activity. Failure was defined as the need to insert a nasogastric tube in the group not decompressed or to reinsert a nasogastric tube in the group that was decompressed. Insertion or reinsertion was prompted by repeated emetic episodes, nausea or abdominal distention, or patient discomfort, as determined by the attending surgeon. Respiratory compromise, because of gastric or abdominal distention, was also a criteria for insertion of a tube.

Patients were seen by a study nurse coordinator every other day, until hospital discharge, and were contacted four to six weeks after operation to complete the follow-up. Data were recorded concerning time to return of postoperative bowel function, length of hospital stay, incidence of gastric bleeding, respiratory infection, difficulty in coughing, severe pharyngitis requiring antibiotic treatment, distention, nausea and vomiting, wound disruption, perforation, death, wound infection, postoperative small bowel obstruction, and steroid medication.

### Statistics

Before beginning this trial it was determined that with at least 250 patients in each arm of the study there would be at least a 90% chance (statistical power) of detecting a 15% difference in complication rates, or at least an 80% chance of detecting a 10% difference in complication rates if those rates were less than 25% (for example, 15% versus 25%). A two-sided chi-square test with a Type 1 error rate of 5% was used to assess these differences.

TABLE 1. Stratification Scheme

Operation Subset	Type of Operation Performed	Age
I	Ileorectostomy, proctocolectomy, ileoanal procedure, Kock pouch	<60
II	Ileorectostomy, proctocolectomy, ileoanal procedure, Kock pouch	>60
III	Ileocolostomy, colocolostomy, AP resection	<60
IV	Ileocolostomy, colocolostomy, AP resection	>60

## Results

### All Patients

Between February, 1986, and August, 1988, 1391 elective colon and rectal procedures were performed by the seven participating surgeons.

Many of these 1391 patients were excluded by the criteria mentioned above. About 15% of patients refused to enter the study, and they received routine NG decompression. The remaining patients simply were not approached about the study. We reviewed mean ages, sex distribution, wound infection rates, wound disruptions, and anastomosis complications from our institution from other recent prospective surgical studies, and we have concluded that this series of patients is very representative of our elective colon and rectal surgical practice. Five hundred thirty-five patients were enrolled in the study. There were 33 (6.2%) protocol violations, which consisted of patients having tubes removed when they were randomized to nasogastric decompression or patients not having postoperative nasogastric decompression who were randomized to do so. Because of the "intent to treat" issue in randomized trials, all of the protocol violations were included in the treatment arm to which they were randomized for the purposes of data analysis. Two hundred ninety-five patients were male and 240 patients were female. The mean age was 54 years, with a range from 15 to 95 years. Almost 60% of the patients were under the age of 60. Major infections, consisting of intra-abdominal abscesses, occurred in four patients (0.8%). No patient died within 30 days of operation and there were no significant episodes of bleeding. The reoperation rate for small bowel obstruction was 1%; in addition, there were 2 anastomotic leaks, 1 wound disruption, 1 perforation, and 1 rectovaginal fistula during hospitalization after the primary procedure (three in Group I, two in Group II). Two other Group I patients underwent reoperation for small bowel obstruction, at 3 and 8 months, respectively, after the primary procedure. Extreme difficulty in coughing was noted in 1.4% of all patients and severe pharyngitis was only noted in five (1%) patients.

Vomiting occurred in 15% of the 535 patients in the entire study group, and abdominal distention occurred in

TABLE 2. *Complications*

Patient Group	Abdominal Distention %	Nausea %	Vomiting %	Tube Replacement or Placement %
Group I NG Decompression (n = 274)	16	17	11	5
Group II No Decompression (n = 261)	28*	27*	19*	13*

\* Differs from NG decompressed group,  $p < 0.05$ .

21%. Nausea occurred in 22%. A nasogastric tube was either placed in Group I patients, or replaced in patients in Group II, in 46 patients, or 9% of the entire series.

#### Comparison of Group I (NG Decompression) Versus Group II (No Decompression)

Two hundred seventy-four patients (51%) were randomized to receive postoperative nasogastric decompression. Two hundred sixty-one patients (49%) were randomized to receive no postoperative nasogastric decompression. The mean time to return of bowel function was 94 hours in both groups. Postoperative stay was a mean of 11 days for both groups. No difference in ability to cough after operation was found between either group. There were no significant differences between groups in the number of patients enrolled, in patient age, time to return of bowel function, or length of hospital stay.

Even though there were no differences in major life-threatening complications between Group I and Group II, there were significant differences in the minor postoperative complications of abdominal distention, nausea, and vomiting, as shown in Table 2. Five per cent of the patients in Group I required nasogastric tube replacement after the initial period of routine postoperative decompression. Thirteen per cent of the patients who did not receive nasogastric decompression initially required postoperative insertion of a tube based on criteria described for failure.

The 46 patients who required nasogastric tube insertion or reinsertion were carefully examined for factors that might lead to predictive criteria for postoperative nasogastric decompression. No factors, including steroid use, history of cardiac or renal disease, hepatitis, diabetes, smoking, or seizure medication could be determined to be predictive of the need for postoperative nasogastric decompression.

#### Discussion

Ileus occurs after almost every intra-abdominal operation and is characterized by lack of coordinated propulsive gastrointestinal contractions. This is likely to be caused by the disappearance of cyclic interdigestive myoelectric complexes (IMC) that originate in the stomach

and move aborally through the small intestine to end in the ileum. These complexes have been hypothesized to serve a "housekeeper" function; that is, to sweep the bowel clean of debris, gas, and nondigestible solids.<sup>2</sup> When such complexes are abolished, secretions, gas, and debris accumulate within the bowel lumen, the bowel distends, and passage of stool and flatus cease. With the introduction of the nasogastric tube by Levin in 1921,<sup>3</sup> a significant improvement was believed to have been achieved in the treatment of patients following operation. Furthermore, McIver et al.,<sup>4</sup> in 1926, theorized that postoperative abdominal distention was due to swallowed air, which in turn might be prevented by an indwelling nasogastric tube. Since that time, most surgeons have routinely used nasogastric decompression after most abdominal procedures largely due to accepted tradition.

In 1963, however, Gerber challenged this practice by stating that nasogastric decompression was overused and that complications occurred from its use.<sup>5</sup> He made several observations: the loss of salivary and digestive secretions occurred after operation; adynamic ileus was a physiologic response to an operation; and the nasogastric tube did not stimulate peristalsis. This implied that the return of bowel function might, indeed, be delayed by nasogastric suction.

Subsequently, several reports have appeared that address this controversy. Burg,<sup>6</sup> in a nonrandomized and retrospective study, found that 4% of patients required decompression to relieve distention after elective intestinal operations. In addition, the author estimated that 63% of patients in his study could have been spared the discomfort and minor problems associated with nasogastric tubes. In a similar retrospective study involving elective colon resection, Ibrahim et al.<sup>7</sup> managed 53 patients with decompression and 23 without. Morbidity and mortality rates were low in both groups and the length of hospital stay did not differ.

In several randomized, prospective studies of NG decompression performed in 100 to 200 patients undergoing abdominal surgery,<sup>8-11</sup> no significant differences in morbidity rates were found and no patient benefit to routine decompression was noted.

A prospective study of prophylactic postoperative nasogastric decompression was done by Cheadle et al.,<sup>12</sup> with

the intent of studying Cimetidine™ (Smithkline and French Labs, Philadelphia, PA). The results of this study indicated that prophylactic decompression was unnecessary, and that Cimetidine lowered nasogastric output on the first postoperative day, but did not prevent vomiting.

Recently, two additional studies have been published. One hundred thirty-eight consecutive patients undergoing elective colon and rectal resections were randomly assigned to have a long intestinal ("Cantor") tube before operation, a nasogastric tube placed during operation, or no gastrointestinal tube at all. There were no significant differences in number of postoperative complications, length of hospital stay, or duration of postoperative ileus found in these three groups.<sup>13</sup> Racette,<sup>14</sup> in a randomized, prospective study of 56 patients undergoing elective colon and rectal surgery, with 28 patients receiving nasogastric tubes, and 28 patients who did not, found more abdominal distention in the nondecompressed group, but found that 46% of the decompressed patients had atelectasis *versus* 17% of the patients who were not decompressed. Other parameters were not significantly different.

Our study differs from previous studies in several ways. A large number of patients were enrolled, and only one variable (tube or no tube) was studied. No drugs promoting return of bowel activity were used.

We have computed a cost (tube, suction apparatus, nursing time) of \$150 for nasogastric decompression. In Group II, using this cost basis, \$36,000 was saved in 221 patients not routinely receiving postoperative nasogastric decompression. In the entire series, almost \$65,000 could have been saved by eliminating routine decompression. If needed, a tube can be placed fairly easily without untoward patient discomfort by first anesthetizing the nasopharynx and oropharynx with Lidocaine spray (Roxane Labs, Columbus, MO) and Cetacaine spray (Cetylite Industries, Pennsauken, NJ).

In summary, while there was a significant increase in nausea, vomiting, and abdominal distention in the group of patients who did not undergo postoperative nasogastric decompression, there was no difference in major complications. Indeed, 87% of patients not having routine postoperative nasogastric decompression never required postoperative nasogastric intubation. Five per cent of pa-

tients undergoing routine postoperative nasogastric decompression required reintubation, for a differential of 8% between the two groups. Therefore, most patients after colon and rectal surgery do not require postoperative nasogastric decompression. We were unable, however, to discern any predictive factors for the small group of patients who would require NG decompression. We concluded that routine use of a nasogastric tube is uncomfortable for the patient, expensive, and unnecessary in the great majority of patients and, therefore, should be eliminated as a routine procedure in elective colon and rectal surgery.

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## DISCUSSION

DR. FORREST DEAN GRIFFEN (Shreveport, Louisiana): It is my pleasure to discuss this landmark work and to support the concept that nasogastric decompression is frequently unnecessary in colon and rectal surgery.

My mentor and associate, Dr. Charles Knight, and I have been using nasogastric decompression selectively for some time now, but we have been a little concerned that the colon or rectal anastomosis without nasogastric suction might be at increased risk for complications. The data presented here today at last reassures us that our concern has no basis.

Stimulated by this manuscript, I decided to review our most recent

100 consecutive circumferential colon and rectal anastomoses without protective colostomy, emergent and elective, to focus on what one might expect to occur out of protocol in a typical surgical practice. You will notice that I have changed the exclusion criteria to focus on the anastomosis rather than the ileus. Our cases are slightly weighted toward low anterior resection because of our interest in the double stapling technique (Slide 1). There were 27 cases treated with nasogastric decompression as part of their initial care, leaving 73 without tubes (Slide 2). All but 5 of the 27 patients with tubes would have been excluded from randomization in the Mayo series because of the presence of perforation (7), obstruction (5), GI bleeding (1), fistula (2), adhesions (2), gangrene (1), and prior