



Comparison of one-stage resection and anastomosis of acute complete obstruction of left and right colon

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Manuscript received February 6, 2004; revised manuscript June 23, 2004

Abstract

Background: Although acute obstruction of the right colon is usually handled by primary anastomosis following resection, many surgeons are reluctant to offer one-stage resection and anastomosis to patients with obstructive lesions of the left colon. The aim of the study is to compare the immediate result of one-stage resection and anastomosis for patients with acute complete obstruction of the right colon versus left colon.

Methods: From January 1986 to December 2003, 214 cases of acute colonic obstruction were managed with one-stage resection and anastomosis by a single surgeon. Eighty patients were operated on for obstructive lesions of the right colon, 71 of them for carcinoma of the colon. Operative mortality was 10% (8/80); all except 2 patients died of respiratory failure. There were 2 cases (2.5%) of anastomotic leakage. One hundred thirty-four patients were operated on for obstructive lesions of the left colon, 127 of them for carcinomas of the colon and rectum. Operative mortality was 1.5% (2/134); both patients died of metastasis from the colorectal cancer following surgery. There were 3 cases (2.3%) of anastomotic leakage.

Conclusion: This experience suggests that an anastomosis can be performed as safely in patients with acute obstruction of the left colon as in those with acute obstruction of the right colon. Mortality following resection and anastomosis is actually lower in left than right colonic obstruction. Neither intraoperative irrigation nor routine subtotal colectomy was found to be necessary in patients with acute colonic obstruction. Intraoperative decompression should be considered in left and also right colonic obstruction prior to the anastomosis following colonic resection. © 2005 Excerpta Medica Inc. All rights reserved.

Keywords: Colonic obstruction; Resection and anastomosis; Carcinoma

Although acute obstruction of the right colon is usually handled by primary anastomosis following resection [1–20], many surgeons are reluctant to offer one-stage resection and anastomosis to the patients with obstructive lesions of the left colon due to safety concerns. Intraoperative irrigation (antegrade or retrograde), subtotal colectomy, and intraoperative decompression have been recommended to decrease the fecal load before resection and anastomosis of an obstructive bowel. The author has experienced a series of one-stage resections and anastomoses for acute obstruction of the left colon with acceptable rates of mortality and anastomotic leakage [18]. This report is a single surgeon's experience of one-stage resection and anastomosis for patients with acute obstruction of the right and left colon.

Methods

From January 1986 to December 2003, 214 cases of acute complete obstruction of colon were managed with one-stage resection and anastomosis by a single surgeon. All of the patients had plain abdominal x-ray films, which universally showed dilated colons. Computed tomography scans were obtained in some patients, but were rarely used for determination of necessity of surgery. This series only included patients with complete colon obstruction either by tumor mass itself or by associated intussusception. Although suture granuloma, leiomyoma, lipoma, and Dukes' A colon cancer are rare causes of complete obstruction, they did cause complete obstruction in this series. Those patients with partial or chronic colonic obstruction were excluded from the study. In fact, during this period, one-stage resection and anastomosis were performed for every patient regardless of age, gender, or the nature of the obstruction,

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Table 1
Causes of colonic obstruction

Cause	Right colon	Left colon
Colon carcinoma	71	127*
Dukes A	1	3
Dukes B	19	51
Dukes C	24	43
Dukes D	27	30
Diverticulitis	2	1
Tuberculosis	2	
Crohn's disease	1	
Stitch granuloma	1	
Leiomyoma	1	
Lipoma	1	
Carcinoma of pancreas	1	
Stromal sarcoma		1
Sigmoid volvulus		2
Pancreatitis		1
Metastatic cancer		2

* Two patients had multiple cancers.

except for those patients who were hemodynamically unstable or had general peritonitis.

Eighty patients were operated on for obstructive lesions of the right colon. There were 36 males and 44 females. Ages ranged from 14 to 91 years (mean 62.5 years). Colon cancer was the main cause of the right colon obstruction in 71 patients, with more than 70% of cases in the advanced stages. Other causes included diverticulitis in 2 patients, tuberculosis in 2 patients, and Crohn's disease, stitch granuloma, leiomyoma, lipoma, and carcinoma of pancreas in 1 patient each (Table 1). Seventy-five patients underwent right hemicolectomy, 4 patients had subtotal colectomy, and 1 patient had synchronous right hemicolectomy and sigmoid colectomy (Table 2). Several patients had unfavorable clinical factors for intestinal anastomosis, including 18 patients with a serum albumin level less than 3 g/dL, among which 12 patients had a serum albumin level of less than 2.5 g/dL. Three patients had associated intra-abdominal abscess. Associated procedures included 2 resections of jejunum, and 1 each of left lateral hepatectomy, choledocholithotomy, cholecystectomy, and liver biopsy (Table 3).

One hundred thirty-four patients were operated for obstructive lesions of left colon. There were 70 males and 64

Table 2
Types of colectomy for colonic obstruction

Type of colectomy	Right colon	Left colon
Right hemicolectomy	75	
Right hemicolectomy and sigmoid colectomy	1*	
Subtotal colectomy	4	22
Left hemicolectomy		29
Sigmoid colectomy		54
Anterior resection		29

* One patient had an obstructing ascending colon cancer and a nonobstructing sigmoid colon cancer.

Table 3
Associated procedures in one-stage resection and anastomosis in colonic obstruction

Associated procedures	Right colon	Left colon
Left lateral hepatectomy		
Liver biopsy	1	
Choledocholithotomy	1	
Cholecystectomy	1	
Resection of jejunum	2	5
Partial gastrectomy		1*
Splenectomy with pancreatectomy		1
Omental flap		8
Left salpingo-oophorectomy		1
Abdominal total hysterectomy and bilateral salpingo-oophorectomy		1

* One patient had two primary colon cancers and a gastric cancer.

females. Ages ranged from 22 to 92 years (mean 61.7 years). Colon cancer was the main cause of the left colon obstruction in 127 patients, with most cases in the advanced stages. Other causes included metastatic cancer in 2 patients, sigmoid volvulus in 2 patients, and stromal sarcoma, diverticulitis, and pancreatitis in 1 patient each (Table 1). Subtotal colectomy was often used early in the series because past experience and publications favored this procedure. However, drawing from personal experience and reports in the literature of successful segmental colectomy, and also because of worse functional results with ileorectostomy, the majority of cases were managed by segmental resection as experience accumulated. Subtotal colectomy was reserved for those patients who were young, had multiple lesions, or had a family history of colorectal cancers. Overall, 22 patients underwent subtotal colectomies, of which 4 patients had their ileocecal valves preserved, 29 patients had left hemicolectomies, 54 patients had sigmoid colectomies, and 29 patients had anterior resection for rectal lesions. Of the individuals with anterior resections, 12 had anastomosis below the peritoneal reflection (Table 2). In patients with segmental resections, a technique of intraoperative decompression prior to the anastomosis described previously by the author was used. Basically it involves a complete mobilization of the sigmoid colon, descending colon and splenic flexure; dividing the colon distal to the tumor; bringing the colon outside the peritoneal cavity and placing it in a basin; and adequately decompressing the colon and small intestine by the removal of a large amount of feces through a colotomy made proximal to the tumor mass. The specimen was removed after division of the colon proximal to the colotomy. End-to-end anastomosis was then performed. No distal rectal washout was used prior to anastomosis for left side lesion. The majority of the anastomoses were hand sewn anastomosis. Accumulated experience showed that stapled anastomosis was associated with high leakage rate and was abandoned following several tries. Drains were inserted if the presacral space was entered and in patients with associated intra-abdominal abscess. Prophylactic antibiotics were routinely given intravenously. Sev-

Table 4
Complications of one-stage resection and anastomosis in colonic obstruction

Complications	Right colon	Left colon
Respiratory failure	10 (12.5%)	4 (3.0%)
Wound infection	6 (7.5%)	15 (11.2%)
Intestinal obstruction	3 (3.8%)	9 (6.7%)
Anastomotic leakage	2 (2.5%)	3 (2.2%)
Stroke (cerebrovascular accident)	2 (2.5%)	
Retroperitoneal abscess	1 (1.3%)	
Urinary tract infection	1 (1.3%)	7 (5.2%)
Catheter sepsis	1 (1.3%)	1 (0.7%)
Cholangitis		1 (0.7%)
Epididymitis		1 (0.7%)
Retroperitoneal abscess		1 (0.7%)
Lung abscess		1 (0.7%)
Pathologic fracture of humerus		1 (0.7%)

eral patients had unfavorable clinical factors for intestinal anastomosis, including 29 patients with a serum albumin level less than 3 g/dL, among which 17 patients had a serum albumin level of less than 2.5 g/dL. Five patients had associated intra-abdominal abscess. One patient had peritonitis with colonic perforation caused by preoperative colonoscopy. The perforation was distal to the obstructing cancer, so the contamination was minimal. An anastomosis was judged to be safe in that patient and proved to be so following one-stage resection and anastomosis. Associated procedures included 5 resections of jejunum or ileum, and 1 each of abdominal total hysterectomy with bilateral salpingo-oophorectomy, left salpingo-oophorectomy, partial gastrectomy for synchronous gastric cancer, and splenectomy with distal pancreatectomy. An omental flap to wrap and protect the anastomosis was used frequently early in the series; however, it was abandoned after enough experience had accumulated (Table 3). Neither antegrade nor retrograde colonic irrigation was used in this series. A nasogastric tube was always inserted prior to surgery for decompression of the stomach. The anesthesiologist always aspirated the stomach before giving anesthesia.

Results

The most frequent complication of patients with obstruction of right colon was respiratory failure, which occurred in 10 patients, followed by wound infection in 6 patients, intestinal obstruction in 3 patients, stroke in 2 patients, and a retroperitoneal abscess, urinary tract infection, and catheter sepsis in 1 patient each. Anastomotic leakages occurred in 2 (2.5%) patients, who both underwent emergency laparotomy and ileostomy. Both patients recovered with parenteral nutrition and appropriate antibiotic therapy (Table 4). Operative mortality was 10% (8/80); 6 patients died of respiratory failure. One each died of massive upper gastrointestinal bleeding and liver metastasis from the colon cancer.

The most frequent complication of the obstruction of left colon was wound infection, which occurred in 15 patients, followed by intestinal obstruction in 9 patients, urinary tract infection in 7 patients, respiratory failure in 4 patients, a retroperitoneal abscess, cholangitis, epididymitis, lung abscess, pathologic fracture of humerus, and catheter sepsis in 1 patient each. Anastomotic leakages occurred in 3 (2.3%) patients, all following autostitch anastomoses (one each following biofragmentable anastomotic ring, entero entero anastomosis, and intraluminal stapling). Two patients with leakage underwent emergency laparotomy and colostomy. One patient had a transient fecal fistula that healed after parenteral nutrition and appropriate antibiotic therapy. All patients survived (Table 4). Two patients died of metastasis from the colorectal cancer following surgery.

Comments

It is generally accepted that patients who have an intestine full of feces at the time of an operation usually have a higher incidence of postoperative septic complications [21]. Therefore, if the intestine can be cleaned thoroughly and is relatively or completely empty before the surgery, operations on the bowel should be safer [22]. During urgent or emergent surgery, however, intestines are frequently filled with feces. Resection and anastomosis in obstructive colon is generally believed to increase the chances of disruption of intestinal anastomoses, intra-abdominal abscesses, and wound infection.

Resection with anastomosis is not frequently considered for obstructive lesions of the colon, especially in left colon obstruction. Instead, most patients in this situation are traditionally handled by a diverting stoma or resection with a stoma, which necessitates a second or even a third operation in the future for bowel continuity to be restored. However, one-stage resection and anastomosis have several advantages, including the following: 1) saving of time and reduction in hospital costs; 2) avoidance of the risk of a second operation; 3) elimination of the waiting period because of a second operation; 4) avoidance of the trouble and embarrassment resulting from a temporary colostomy; 5) offering a better quality of the remaining life for patients with incurable malignancies.

The literature suggests several ways to decrease the fecal load before resection and anastomosis of an obstructive bowel, including intraoperative irrigation [1,2,7,9–12,16,19,20] (antegrade or retrograde) and subtotal colectomy [3,6,8,13–15,17,19]. The author also reported a series of one-stage resection and anastomosis following intraoperative decompression [18]. The decompression procedure used has advantages over intraoperative irrigation, either antegrade or retrograde, because of the following: 1) it takes only less than 30 minutes to perform, which is a much shorter time than that required for intraoperative irrigation; 2) it requires less manipulation and decreases the chances of contamination; and 3) it avoids troublesome tubes and apparatus for intraoperative irrigation. This procedure also results in a lower incidence of

postoperative diarrhea than subtotal colectomy. Mortality and anastomotic leakage rates were also both relatively low and acceptable in that series. The author continues to use the technique for patients with obstructing lesion of the left colon and has again proven that it is feasible and relatively safe with low mortality and leakage rates.

It is the author's desire to compare whether resection and anastomosis is safer in the acute obstruction of right than left colon. To minimize bias, a series involving a single surgeon's experience with one-stage resection and anastomosis was analyzed. It was found that leakage rates were similar. It was also found, surprisingly, that the mortality rate was higher in the patients with acute obstruction of right colon. There were more respiratory failures, causing additional mortality in the colonic obstruction of right. The difference is difficult to explain because of the similarity of patients' age, sex, nutritional status, and underlying diagnosis. There were no noted occurrences of aspiration during anesthesia; however, the pneumonia of 1 patient was believed to be caused by aspiration several days after surgery. One speculation is that this patient with right colonic obstruction did not undergo routine intraoperative decompression prior to the anastomosis of the bowel. In such patients, a distended abdomen might compromise the movement of the diaphragm and cause respiratory insufficiency, or it might predispose to bacterial translocation and cause multiple organ failure and eventual mortality.

There were multiple associated procedures during colectomy, but none of them were associated with significant morbidity, so they were not likely to be correlated with mortality. Although albumin levels were always determined, many operations were performed before data on the albumin level were available. Thus, the decision of whether anastomosis can be performed was not dependent on albumin level. There was no direct correlation between albumin level with complications and mortality. It should be stressed that a safe colorectal anastomosis depends on appropriate judgment, a good blood supply, a tensionless anastomosis, and meticulous technique, but it does not depend on a well-prepared colon [23]. One-stage resection and anastomosis is feasible in most patients with acute obstruction of the right and left colon, except in those patients who are hemodynamically unstable or who have severe peritonitis.

Intraoperative irrigation is time-consuming and carries a risk of contamination. In this study, it was found to be unnecessary. Subtotal colectomy increases the incidence of postoperative diarrhea and is also not necessary for every patient with left-side obstruction. The author suggests that intraoperative decompression should be a procedure of choice while managing patients with acute obstruction of colon, no matter whether it is right or left colon.

Conclusion

This experience suggests that an anastomosis can be performed as safely in patients with acute obstruction of the left colon as in the right colon. Mortality following resection and anastomosis is actually lower in left than in right colonic

obstruction. Intraoperative decompression should be considered in left and also right colonic obstruction prior to the anastomosis following colonic resection.

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