

Intestinal Obstruction in Patients with Previous Laparotomy for Non-Malignancy

Nan-Hua Chou*, Nan-Song Chou¹, King-Tong Mok, Shih-Inn Liu, Being-Whey Wang, Ping-I Hsu², Cheng-Chung Tsai, I-Shu Chen, Ming-Hsin Yeh, Yu-Chia Chen

Departments of Surgery and ²Internal Medicine, Kaohsiung Veterans General Hospital, Kaohsiung, and ¹Department of Surgery, Chi Mei Foundation Hospital, Tainan, Taiwan, R.O.C.

Background: Intestinal obstruction is one of the most common surgical emergencies. The aim of this study was to identify important management information from the evaluation of patients with intestinal obstruction who had undergone previous laparotomy for non-malignancy.

Methods: Data from 176 patients with previous laparotomy for non-malignancy, and who were operated on for intestinal obstruction, were collected and analyzed retrospectively.

Results: Gastroduodenal operations, appendectomy, and obstetric/gynecologic procedures were the 3 most common previous abdominal surgeries. More than half of all bowel obstructions developed within 10 years after previous laparotomy, and particularly within the first 5 years. Most obstructions were related to adhesion, although their etiologies were diverse. The rate of bowel strangulation was much higher in patients with internal herniation, volvulus, intussusception, closed loop, and diaphragmatic hernia than in patients with simple adhesion, bezoar, tumor, and inflammation (48.3% vs 12.2%). The surgical mortality rate correlated significantly with bowel strangulation: the overall rate was 6.8%, that in patients with strangulation was 18.8%, and that in patients without strangulation was 4.2%.

Conclusion: The etiologies of intestinal obstruction were not only significantly related to bowel strangulation, but were also an important determinant of therapeutic strategy. [*J Chin Med Assoc* 2005;68(7):327–332]

Key Words: etiologies, intestinal obstruction, mortality, non-malignancy, strangulation

Introduction

Intestinal obstruction is one of the most common surgical emergencies, for which the therapeutic strategy has progressed through several evolutions.¹⁻³ In recent decades, various contentious management issues have continued to be debated, with particular attention focusing on how to avoid bowel strangulation or how to detect it as early as possible. The purpose of the present study was to investigate the spectrum of intestinal obstruction in patients who had undergone previous laparotomy for non-malignancy, with a view to finding valuable pointers for managing these patients.

Methods

Study population and protocol

The medical charts of all adult patients who were admitted and operated on for intestinal obstruction, between 1991 and 1999 at Kaohsiung Veterans General Hospital, were reviewed retrospectively. Patients with incarcerated external hernia, mesenteric vascular disease, obstruction within 30 days of previous laparotomy, no history of an abdominal surgical procedure, or a history of an abdominal surgical procedure for malignancy, were excluded. One-hundred and seventy-six patients remained for analysis.

*Correspondence to: Dr. Nan-Hua Chou, 222, Ming-Cherng 2nd Road, Kaohsiung 813, Taiwan, R.O.C.
E-mail: nhchou@isca.vghks.gov.tw • Received: August 17, 2004 • Accepted: April 4, 2005

Generally, initial conservative treatments, including fluid resuscitation and nasogastric tube decompression, were used. If, after 48–72 hours, there was no improvement or further deterioration, the need for surgical intervention was decided on by an on-duty attending physician. Bowel strangulation, with the supplying vessels compromised, is defined by operative findings of changed color, compared with the normal part of the bowel, or necrosis.

Only patients with complete intestinal obstruction were included in the study. The clinical diagnosis of obstruction was confirmed by the surgical finding of proximal dilation and distal collapse of the intestine at laparotomy. Mean follow-up time was 64 months (range, 17–126 months).

Statistical analysis

Statistical analysis was carried out using the Chi-squared test for categorical data, and the Mann-Whitney U test for ordinal data. A *p* value of less than 0.05 was considered statistically significant.

Results

Previous surgical history

Among the 176 patients, previous abdominal operations had been performed on 1 (*n* = 131), 2 (33), 3 (10), 4 (1), or 5 occasions (1); thus, a total of 236 previous abdominal operations had been performed in the 176 patients. Gastroduodenal operations (*n* = 60; 25.4%), appendectomy (55; 23.3%), and obstetric/gynecologic procedures (40; 16.9%) were the 3 most common previous abdominal surgeries leading to intestinal obstruction.

Etiologies of obstruction

One-hundred and seventy-two patients (97.7%) had obstruction of the small bowel, whereas the remaining 4 patients (2.3%) had obstruction of the large bowel. Simple adhesion was the most common cause of obstruction, and there were only a few neoplasms: 1 mucinous cystadenoma of the appendix, and 2 cases of colon cancer. The etiologies of obstruction were classified into 2 groups, according to the presence (group A) or absence (group B) of strangulation of the mesentery vasculature. Thus, the causes of obstruction in group A comprised internal herniation, volvulus, intussusception, closed loop, and diaphragmatic hernia, whereas those in group B comprised simple adhesion, bezoar, tumor, and inflammation (Table 1). The rate of bowel strangulation was much higher in group A than B (48.3% vs 12.2%).

Treatment

Initial treatment, which was directed towards fluid and electrolyte replacement, and gastric decompression with a nasogastric tube, had a duration of 2–168 hours (median, 19 hours). The commonly performed operations were lysis of adhesion, bowel resection, reduction of internal herniation and volvulus, and various procedures for fecal diversion.

Temporal relationship

The time from the last laparotomy to the current operation for intestinal obstruction ranged from 1 month to 50 years (mean, 11 years; median, 7 years). Most obstruction developed within 10 years of the last laparotomy, and particularly within 5 years of the previous procedure (Figure 1).

Table 1. Etiologies of bowel obstruction

	Total number of patients	Patients with bowel strangulation, <i>n</i> (%)
Group A	29	14 (48.3)
Internal herniation	16	6 (37.5)
Volvulus	7	5 (71.4)
Closed loop	3	1 (33.3)
Intussusception	2	1 (50.0)
Diaphragmatic hernia	1	1 (100.0)
Group B	147	18 (12.2)
Simple adhesion	131	18 (13.7)
Bezoar	10	0 (0.0)
Tumor	3	0 (0.0)
Inflammation	3	0 (0.0)
Total	176	32 (18.2)

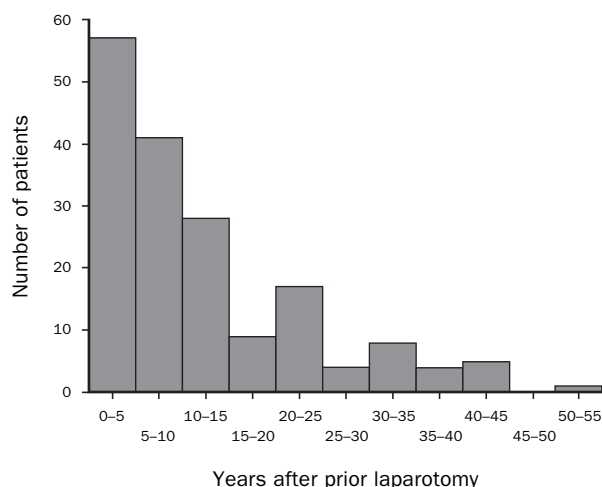


Figure 1. Time from the previous laparotomy to the current procedure for intestinal obstruction.

Follow-up

Intestinal obstruction recurred in 16 patients (9.1%), of whom 10 were managed with surgery, and 6 with non-operative management. The time from the initial operation to recurrence ranged from 10 to 3,830 days (median, 40 days).

Clinical and laboratory findings

The time from symptom onset to hospitalization, or from hospitalization to operation, did not correlate with bowel strangulation (Table 2). Nine patients (3 from the strangulation group, 6 from the non-strangulation group) had a temperature of more than 38°C; 99 (17 from the strangulation group, 82 from the non-strangulation group) had leukocytosis ($> 10\,000/\text{mm}^3$); 47 (9 from the strangulation group, 38 from the non-strangulation group) had tachycardia (> 100 beats/min); and 107 (18 from the strangulation group, 89 from the non-strangulation group) had abdominal tenderness. These 4 findings were not significantly related to bowel strangulation (Table 3).

Table 2. Factors contributing to strangulation in 176 patients with intestinal obstruction

	Strangulation (n = 32)	Non-strangulation (n = 144)	p
Age, yr (mean \pm SD)	62 \pm 18	60 \pm 18	0.508*
Etiology, n			
Group A (n = 29)	14	15	< 0.001 [†]
Group B (n = 147)	18	129	
Coexisting medical illness, n			
Yes	8	37	0.935 [†]
No	24	107	
Time from symptom onset to hospitalization, hr			
Median	24	36	0.437*
Range	2-312	1-336	
Time from hospitalization to operation, hr			
Median	17	19	0.538*
Range	3-277	2-360	

*Mann-Whitney U test; [†]Chi-squared test. SD = standard deviation.

Table 3. Incidence of toxic findings and bowel strangulation in 176 patients with intestinal obstruction*

	Total patients (n = 176)	Bowel strangulation (n = 32)	Non-strangulation (n = 144)	p [†]
Fever ($\geq 38^\circ\text{C}$)	9 (5.1)	3 (9.4)	6 (4.2)	0.211
Leukocytosis ($\geq 10,000/\text{mm}^3$)	99 (56.3)	17 (53.1)	82 (56.9)	0.694
Tachycardia (≥ 100 beats/min)	47 (26.7)	9 (28.1)	38 (26.4)	0.841
Abdominal tenderness	107 (60.8)	18 (56.2)	89 (61.8)	0.560

*Data shown are number (%) of patients; [†]Chi-squared test.

Table 4. Surgical mortality rate in 176 patients with intestinal obstruction

	Number of patients	Mortality, <i>n</i> (%)	<i>p</i>
Non-strangulated intestinal obstruction	144	6 (4.2)	0.008*
Strangulated intestinal obstruction	32	6 (8.8)	
Overall	176	12 (6.8)	

*Chi-squared test.

Complications

Fifteen patients (8.5%) developed 17 complications. Most postoperative complications (10/15) were wound infections, pneumonia developed in 3 patients, and other minor complications comprised leakage of anastomosis ($n = 1$), short bowel syndrome (1), re-obstruction within 30 days of operation (1), and enterocutaneous fistula (1).

Mortality

The surgical mortality rate correlated significantly with bowel strangulation: the overall rate was 6.8%, that in patients with bowel strangulation was 18.8%, and that in patients without strangulation was 4.2% (Table 4).

Discussion

In this study, we found that in most patients with intestinal obstruction and previous laparotomy for non-malignancy, the cause of obstruction was adhesion-related; only a few patients (3/176) had tumor-related obstruction (Table 1). However, carcinomatosis or a focal malignant deposit should be kept in mind as a potential cause of intestinal obstruction in patients with such obstruction who have had previous laparotomy for malignancy.⁴ In patients with intestinal obstruction who have had no previous laparotomy, colon cancer is the most common cause of obstruction.⁵ Thus, a patient's previous surgical background is an important therapeutic consideration when a surgeon is faced with a case of intestinal obstruction.

We also noted that more than half of all intestinal obstructions occurred within 10 years of previous abdominal surgery, and particularly within the first 5 years. The incidence of obstruction decreased gradually year by year, but cases were still occurring even 50 years after previous surgery (Figure 1). A major concern has been whether adhesion formation after initial surgery causes subsequent re-obstruction. In this study, re-obstruction occurred in 16 patients (9.1%), of whom 10 underwent further surgery, and 6 were

managed non-operatively. Thus, most adhesions after laparotomy were harmless, although some still caused re-obstruction.

The results of treating bowel obstruction have improved greatly during the last century.⁶ However, the mortality rate in patients with bowel strangulation has been much higher than that in patients with non-strangulated obstruction.⁷ In our series, the overall surgical mortality rate was 6.8%, with a surgical mortality rate of 18.8% in patients with strangulation and 4.2% in patients without strangulation. The timing of surgery has always proved a challenge for surgeons managing intestinal obstruction, both because of the high mortality rate (15–30%) related to delayed operative intervention in patients with bowel strangulation, and because of the high success rate (20–73%) of non-operative management with gastrointestinal tube decompression with other supportive treatments in patients with simple obstruction.^{3,7–10} This controversy stemmed mainly from difficulties in distinguishing accurately between bowel strangulation and simple obstruction on the basis of conventional clinical criteria, plain abdominal radiography, or laboratory data.

How to avoid bowel strangulation, or to detect it early, has been the key issue in managing patients with intestinal obstruction. The findings associated with bowel strangulation have long been regarded as fever, leukocytosis, tachycardia, and abdominal tenderness.^{11–13} In this study, 90% of patients with strangulated obstruction were afebrile, whereas 96% of those with simple obstruction were afebrile. Leukocytosis was noted in 55% of patients with strangulation versus 57% of those with simple obstruction. Twenty-nine percent of patients with strangulated obstruction had tachycardia, as did 26% of those with simple obstruction. Abdominal tenderness was present in 62% of patients with simple obstruction compared with 56% of those with strangulated obstruction (Table 3). None of these differences was statistically significant. In addition, we considered it difficult to differentiate strangulation from simple adhesive obstruction by clinical and/or laboratory findings, thus corresponding well with results from previous studies.^{7,14,15}

The median time interval between symptom onset and hospitalization was shorter in patients with strangulated versus non-strangulated obstruction (24 vs 36 hours; Table 2). Patients with bowel strangulation had more acute and severe discomfort, and sought medical help more urgently, than patients without strangulation. The median time interval between hospitalization and operation in patients with bowel strangulation was also shorter than that in patients without strangulation (17 vs 19 hours). Bowel strangulation was not significantly related to delayed treatment by the patient or by surgeons.

The rate of bowel strangulation in group A, which comprised patients with internal herniation, volvulus, closed loop, diaphragmatic hernia, and intussusception, was much higher than that in group B, which comprised patients with simple adhesion, bezoar, tumor, and inflammation (Table 2). Blood vessels supplying the obstructed intestine were compromised in group A, but not in group B. Once the condition causing blood-vessel compromise occurred, the intestinal segment supplied by the compromised vessels would soon be strangulated. Whenever the predisposing factors for bowel strangulation identified in this study (i.e. internal herniation, volvulus, closed loop, intussusception, diaphragmatic hernia) are encountered, an emergency operation is advocated to avoid delayed treatment. If simple adhesion is obvious, non-operative treatment for an appropriate period is recommended to minimize unnecessary surgery. If tumor or bezoar is noted, early surgery after resuscitation should be performed. Importantly, the etiology of intestinal obstruction in our study was not only significantly related to bowel strangulation, but was also a major determinant of therapeutic strategy.

The data in this study were retrospective and post-operative but, in the past few years, steady advances in technology, image resolution, and clinical experience, have increased the value of computed tomography in diagnosing and evaluating intestinal obstruction.¹⁶⁻²³ Such advances could provide valuable preoperative information, including the etiology of intestinal obstruction, and thus help surgeons decide how to treat patients.

In conclusion, most cases of intestinal obstruction in this study resulted from adhesion, although the causes of such obstruction were diverse. The causes were not only significantly related to bowel strangulation, but were also an important determinant of therapeutic strategy.

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