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A retrospective study of laparoscopic surgery for small bowel obstruction

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HIGHLIGHTS

- Surgical treatment for small bowel obstruction in 48 patients were retrospectively reviewed.
- Laparoscopic surgery was performed in 14 patients, and 4 cases were converted to open surgery.
- Laparoscopic surgery is less invasive than open surgery and is equally feasible in selected patients.
- Band occlusion may be a preferable indication to laparoscopic surgery.

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ABSTRACT

Background: Open laparotomy is widely accepted as the standard surgical treatment for small bowel obstruction (SBO). However, laparoscopic surgery has recently become a treatment option. There is no consensus on the appropriate settings for the laparoscopic treatment of SBO. The purpose of this study is to evaluate the outcomes of laparoscopic surgery for SBO.

Patients and methods: From January 2012 to May 2016, 48 consecutive patients underwent surgical treatment for SBO in our department. We retrospectively reviewed these cases and compared the features and the outcomes between laparoscopic and open surgery.

Results: Thirty-four and 14 patients underwent open surgery and laparoscopic surgery, respectively. Four of the laparoscopic cases (28.6%) were converted to open surgery. Laparoscopic surgery tended to be associated with a shorter operative time than open surgery ($p = 0.066$). The first postoperative oral intake was significantly earlier in patients who underwent laparoscopic surgery ($p = 0.044$). The duration of hospitalization after surgery and the rates of postoperative complications did not differ to a statistically significant extent. Laparoscopic treatment was accomplished in 7 out of 8 cases (87.5%) with SBO due to band occlusion.

Conclusion: Laparoscopic surgery for SBO is less invasive than open surgery and is equally feasible in selected patients. SBO due to band occlusion may be a preferable indication for laparoscopic surgery. In order to confirm the safety of laparoscopic treatment, and to clarify the appropriate settings for laparoscopic surgery for SBO, it will be necessary to perform further studies in a larger population and with a long follow-up period.

1. Introduction

Small bowel obstruction (SBO) is one of the most common causes of hospital admission for acute abdominal pain. The most frequent etiology, adhesion due to previous laparotomy, is responsible for 65–80% of SBO cases [1–3]. The incidence of adhesive SBO after laparotomy has been estimated to be 12–17% [4–6]. Moreover, open laparotomy treatment for SBO is associated with postoperative adhesion and the recurrence of SBO. Open laparotomy is widely accepted as the standard approach for SBO in patients in whom conservative treatment fails or who present symptoms that suggest a clinical and physiological emergency such as toxemia or ischemia.

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Laparoscopy has taken the place of traditional laparotomy as an elective treatment for a number of conditions. It is associated with a lower rate of morbidity and shorter hospitalization. As laparoscopic surgery is becoming a treatment option in emergency surgery for acute cholecystitis, acute appendicitis, and peptic ulcer perforation, SBO could be a candidate for adaptation to laparoscopic surgery.

Bastug et al. first reported the successful performance of laparoscopic adhesiolysis in 1991 [7]. Since then, the laparoscopic approach to SBO has been expanded and carefully investigated. SBO was previously considered to be a contraindication to laparoscopic surgery because of the narrow working space and difficulties in manipulating the dilated bowel loops, which increase the risk of enterotomy. In these two decades, several cohort studies have shown that the laparoscopic approach has advantages over open laparotomy, including reduced pain, faster recovery, and reduced morbidity [3,8–13]. Moreover, laparoscopy is thought to be associated with a reduced incidence of postoperative adhesion in comparison to laparotomy [8,14,15], and the laparoscopic approach has been shown to significantly reduce the incidence of SBO in comparison to laparotomy [16]. Thus, the laparoscopic approach to SBO is an attractive alternative to laparotomy.

In surgery for SBO, the open and laparoscopic approaches have their own advantages and disadvantages. When deciding the surgical approach, the condition of the patient and the complexity of the procedure must be considered. There is no consensus on the appropriate settings for laparoscopic surgery. The purpose of this study is to evaluate the outcomes of laparoscopic surgery for SBO.

2. Patients and methods

This retrospective study is a case series performed in single center. From January 2012 to May 2016, 48 consecutive patients underwent surgery for SBO in our department. Conventional open surgery and laparoscopic surgery were performed in 34 and 14 cases respectively. Four of the 14 patients who underwent laparoscopic surgery required conversion to open laparotomy. The clinical features and short-term outcomes of the patients who underwent laparoscopic surgery were retrospectively compared with those of the patients who underwent open surgery. We also compared the clinical features of the converted cases and the cases in which laparoscopic surgery was accomplished.

In deciding the surgical approach, the condition of the patient, the surgeon's experience and preference, and the complexity of the procedure were considered. Among laparoscopic cases, an extended port site short incision was made in 6 patients for intestinal resection, anastomosis and to check the bowel. In these cases, laparoscopic surgery was considered to have been accomplished. With regard to the etiology of SBO, band obstruction was considered independent from adhesion in the present analysis, because the complexity of the surgical procedure for releasing the band is generally very different from adhesiolysis. The diameter of the small bowel was measured by CT or a small bowel series taken just before surgery. Postoperative complications that were greater than class II (according to the Clavien-Dindo classification) were taken into account.

The categorical data were compared using the chi-squared test and Fisher's exact test. Continuous variables were compared using the Mann-Whitney *U* test. The statistical analyses were performed using the JMP software program (version 12.0 SAS Institute Inc., Cary, NC, USA). P values of <0.05 were considered to indicate statistical significance.

The study protocol was approved by the local ethics committees of the University of Tokyo (reference number: 3252-(1)), which thus met the standards of the Declaration of Helsinki in its revised version of 1975 and its amendments of 1983, 1989 and 1996. Written informed consent was obtained from all of the patients. This work has been reported in line with the PROCESS criteria [17].

3. Results

We experienced 48 consecutive SBO patients who underwent surgical treatment. The patients' demographic characteristics and clinical features are summarized in Table 1. Forty-two patients (87.5%) had previous abdominal surgery; among them, 19 (39.6%) had colorectal surgery, 15 (31.3%) had appendectomy, 11 (22.9%) had gastro-duodenal surgery, and 5 (10.4%) had gynecological surgery (including overlap patients). Only 1 patient (2.1%) had previously undergone surgery for SBO. Preoperative decompression of the bowel was performed in 41 patients (85.4%), 27 (56.3%) underwent the insertion of an ileus tube and 14 (29.2%) underwent insertion of a nasal-gastric tube. Surgical treatment was performed in an emergency setting in 31 patients (64.6%), and electively in 17 patients (35.4%). The duration between admission and surgery was 0–1 days in patients who needed emergency surgical treatment; other patients had conservative treatment first. The median duration before surgery was 9 days (range, 0–103 days).

In the present study, 34 patients (70.8%) underwent open surgery and 14 (29.2%) patients underwent laparoscopic surgery. Laparoscopic surgery was accomplished in 10 patients (71.4%); the remaining 4 (28.6%) were converted to open surgery. According to the intraoperative diagnosis, the etiologies of SBO were as follows: band occlusion (n = 13; 27.1%), adhesion (n = 11; 22.9%), neoplasm (n = 12; 25.0%), abdominal wall hernia (n = 5; 10.4%), internal hernia (n = 5; 10.4%), volvulus (n = 1; 2.1%), and intussusception

Table 1
The demographic characteristics and clinical features of the patients.

Age (years)		72 (37–95)
Sex	Male	25 (52.1%)
	Female	23 (47.9%)
Previous abdominal surgery	Yes	42 (87.5%)
Preoperative decompression	Ileus tube	27 (56.3%)
	Nasal-gastric tube	14 (29.2%)
	No	7 (14.5%)
Duration before surgery (days)		9 (0–103)
Surgery	Emergency	31 (64.6%)
	Elective	17 (35.4%)
Approach	Open	34 (70.8%)
	Laparoscopic	14 (29.2%)
	Accomplished	10 (20.8%)
	Converted	4 (8.3%)
Etiology of obstruction	Band	13 (27.1%)
	Adhesion	11 (22.9%)
	Neoplasm	12 (25.0%)
	Abdominal wall hernia	5 (10.4%)
	Internal hernia	5 (10.4%)
	Volvulus	1 (2.1%)
	Intussusception	1 (2.1%)
Intestinal resection	Yes	19 (39.6%)
Complication	Yes	13 (27.1%)
	Wound infection	5 (10.4%)
(Duplication included)	Aspiration pneumonia	3 (6.3%)
	Recurrence of obstruction	3 (6.3%)
	Interstitial pneumonia	1 (2.1%)
	Others	6 (12.5%)
Hospitalization after surgery (days)		21 (6–154)
Follow-up time (months)		8.5 (0.5–52.1)

The total number of patients was 48. The age, duration before surgery, hospitalization after surgery and follow-up time are shown as the median (range). The other data are shown as the number of patients. Postoperative complications that were greater than class II (according to the Clavien-Dindo classification) were taken in account. The data on the number of complications included duplications.