

Early laparoscopic adhesiolysis versus conservative treatment of recurrent adhesive small intestinal obstruction: a prospective randomized controlled trial

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Background

Adhesive small bowel obstruction (ASBO) represents a common clinical problem following previous abdominal surgery. The recurrence rate after an ASBO admission is high, especially after conservative treatment. Retrospective studies suggest that laparoscopic approach shortens hospital stays and reduces complications in these patients. However, there are no prospective randomized, controlled trials comparing early laparoscopic adhesiolysis with conservative treatment of recurrent ASBO.

Patients and methods

A prospective, randomized, controlled study was conducted on 51 patients admitted with the diagnosis of recurrent postoperative ASBO to compare early laparoscopic adhesiolysis with conservative treatment in patients with computed tomography-diagnosed ASBO. The outcome of the study was evaluated depending on the length of postoperative hospital stay, passage of stool, commencement of enteral nutrition, 30-day mortality, complications, the length of sick leave, and recurrence of small bowel obstruction during follow-up for 2 years.

Results

A total of 51 patients with a diagnosis of recurrent small bowel obstruction were identified and divided into two groups. A total of 26 patients were treated with laparoscopic adhesiolysis (23 patients were successfully treated and three patients needed open surgery) and showed significantly low recurrence, short hospital stay, and early regain of bowel movement. A total of 25 patients underwent conservative treatment, which was filed in three cases that needed surgical interference. There was no significant difference between the two groups as regards morbidity and mortality.

Conclusion

Laparoscopically treated patients with recurrent ASBO had a lower frequency of recurrence and a longer time interval to recurrence. They also had a shorter hospital stay and early start of oral feeding compared with patients treated nonoperatively. Laparoscopy in well-trained hand may help in the treatment of recurrent ASBO with fewer complications.

Keywords:

adhesion, laparoscopic adhesiolysis, small bowel obstruction

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Introduction

Small bowel obstruction (SBO) is a common surgical emergency most frequently caused by adhesions. A large proportion of the adhesive SBO cases resolve with nonoperative methods such as fasting and ingestion of an oral contrast-media; however, a significant number of patients will need emergency surgery [1].

Because adhesive obstruction commonly follows previous abdominal surgery, surgical treatment may seem like a paradox [2,3].

The recurrent nature of adhesive small bowel obstruction (ASBO) represents a major clinical problem. The recurrence rate after an ASBO admission given in previous studies varies from 19 to 53%. Recurrence rates vary depending on whether or not the patients were operated on, how the recurrence

rates were calculated (i.e. whether or not the length of follow-up for each patient was considered), the selection of patients in each study, and the treatment policy of the institution, early operation versus watchful waiting [4,5].

The number of previous ASBO episodes was a significant factor influencing the risk for having a recurrent ASBO admission. Others have found that the method of treatment (surgical or conservative) significantly influenced the risk for recurrence, with patients treated conservatively having the highest recurrence rate [6].

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Now, laparoscopic surgery has been established as a first-line option in many elective indications such as colorectal surgery, fundoplication, and cholecystectomy – for example, laparoscopy is also emerging as a viable alternative in emergency surgery [7].

Laparoscopic adhesiolysis in ASBO was used first time in the 1990s. The laparoscopic approach had less complications and faster return of bowel function [8].

The focus of this study was to compare laparoscopic adhesiolysis with conservative treatment in recurrent ASBO as regards the length of postoperative hospital stay, passage of stool, commencement of enteral nutrition, 30-day mortality, complications, pain, the length of sick leave, and recurrence of SBO during follow-up for 2 years.

Patients and methods

This study was conducted in the General Surgery, Emergency Department of the Zagazig University Hospital, from January 2012 to March 2015 after ethical approval of the institutional ethics committee. This study was designed as a prospective randomized controlled trial to compare immediate laparoscopic adhesiolysis with conservative treatment. Fifty-one patients were admitted to our Emergency Department with recurrent adhesive small intestinal obstruction. Our patients gave a history of hospital admission for the same cause in our hospital or other hospitals and they received conservative treatment in the form of nasogastric intubation, intravenous fluid administration, and clinical observation. Complete history with regard to the underlying cause of ASBO was taken from patients and full examination was

carried out. All investigations were carried out, including full laboratory investigations, plain erect abdominal radiograph (Fig. 1), abdominal ultrasound, and ECG. The diagnosis of ASBO was confirmed with computed tomography (CT)-scan in all patients of study sample (Fig. 2).

All patients gave history of one or more attacks of ASBO with hospital admission and receiving medical treatment without surgical interference. The previous issue was considered as inclusion criteria of our study sample. The exclusion criteria were as follows: other causes for obstruction other than adhesions in CT-scan, contraindication for laparoscopy, strong suspicion of strangulation, previously confirmed diffuse peritoneal disorders (generalized peritonitis, carcinosis, endometriosis, and diffuse adhesion), abdominal radiotherapy, Crohn's disease, and previous laparotomy for aorta or iliac vessels.

Fifty-one patients admitted to the emergency unit consented to participate in the study and were randomly divided into two groups. The first group included 26 patients (group A) who were scheduled for immediate laparoscopic adhesiolysis within 24 h after full investigations. The second group included 25 patients (group B) who were treated by means of conservative measurement, including nothing by mouth (NPO), insertion of nasogastric tube, intravenous fluids, and correction of electrolyte imbalance. Usually, conservative treatment in the absence of signs of strangulation or peritonitis can be prolonged up to 72 h of adhesive SBO. After 3 days without resolution, surgery is recommended. If ileus persists for more than 3 days and the drainage volume on day 3 is more than 500 ml, surgery for ASBO is recommended.

Patients of group A received prophylactic intravenous 1 g ceftriaxone and 500 mg metronidazole 1 h before

Figure 1



Plain erect radiograph of the abdomen.

Figure 2



Computed tomography (CT) of the abdomen.

surgery. Fluid balance and electrolyte disturbance were corrected with nasogastric tube insertion before surgery.

One team of three expert laparoscopic surgeons operated all cases, even the one filed in group B to respond to conservative treatment. They followed all usage guidelines of laparoscopy in adhesiolysis to avoid the technical problem of confined working space in the presence of dilated loops. We inserted the first port using optic port or open approach. Ideally, the initial trocar should be placed 5–10 cm away from the patient's previous scar. Under direct vision, the other ports were inserted according to initial telescopic evaluation of the abdominal cavity and sites of adhesions to make it accessible for cutting. Anatomical landmarks were identified, such as ileocecal junction and ligament of Treitz. Complete examination of the small intestine was carried out to locate the dilated loop (Fig. 3) and site of obstruction with noncrushing forceps. Once the transition site was identified, the obstructing adhesions were divided using sharp scissors (Fig. 4) and the bowel was inspected for vitality. We did not use diathermy for cutting adhesions to avoid the thermal effect on the wall of the intestine and recurrence of adhesions; except there was uncontrolled bleeding. Small perforation occurred in the wall of the intestine in three cases, which was identified and closed by means of intracorporeal stitches using 3/0 vicryl and 3/0 silk. Ports were removed under vision with closure fascial openings and patients were kept NPO until intestinal sound was audible.

Some cases needed open surgery due to small bowel perforation, which was confirmed or suspected and could not be sutured by means of laparoscopy. Other causes of open surgery were diffuse adhesions, cause of obstruction cannot be identified and bowel resection anastomosis.

Figure 3



Laparoscopic view of dilated small bowel.

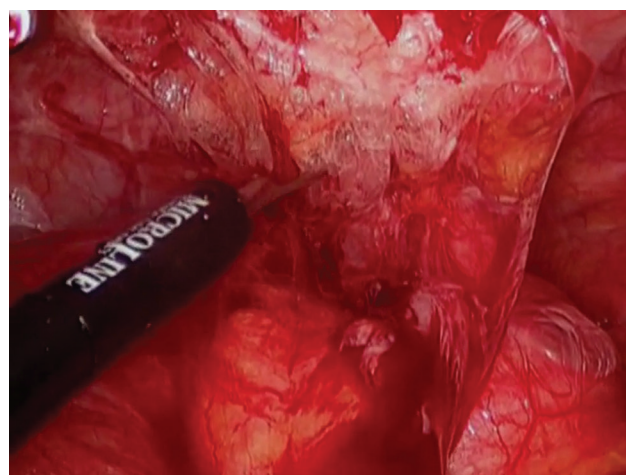
The evaluation of the patients depends on the duration of hospital stay, stool passage, oral feeding, mortality, morbidity, pain, sick leave, and recurrence of intestinal obstruction with 2 years.

Results

Demographic data were collected for age and sex. Data obtained from evaluation of each case included data on first seen, last seen, follow-up, related symptoms, abdominal pain, distension, nausea, vomiting, and bowel sound. Other data on treatment method, duration of hospital stay, and rate of conversion from conservative treatment to surgical procedure by means of laparoscopy or open surgery. The history of previous operations was recorded with regard to the number of prior operations, type, and time-interval between last operations to incidence of SBO. The number of recurrences, treatment, and time-interval to recurrence was documented. Follow-up was based on representation of patients at the Zagazig University Emergency Department or outpatient surgery clinic for any medical condition and ascertainment of the presence or absence of a subsequent SBO. Patients who did not return were not documented as a recurrence. Early recurrent SBO was defined as SBO in patients with prior operations or hospitalization with conservative therapy for SBO.

The data were entered into a computerized database and analyzed using SPSS software (IBM, SPSS Statistics 19 core system user Chicago, USA). Difference in continuous variables between nonoperative and operative patients were compared using Student's *t*-test. The χ^2 -test was used for assessing proportion between these groups of patients. Those patients who had no recurrence noted on their chart at the time of the review were censored at that timepoint. The time in days to

Figure 4



Laparoscopic adhesiolysis.

recurrence for nonoperative and operative patients was evaluated through survival analysis (Table 1).

There was no significant difference between the two groups as regards sex, but group A showed a significant increase in the number of second episode of ASBO after previous hospital admission for conservative treatment.

On admission of patients of both groups, we evaluated them as regards symptoms and previous operation performed as a cause of the 1st episode of ASBO (Table 2).

Patients in both groups had a similar clinical presentation. Most of the patients had abdominal pain, distension, and constipation. Vomiting was noted in more than 70% of patients. All of the patients had undergone previous abdominal surgery (Table 2), two of whom had undergone more than one operation.

Table 3 shows the outcome of the two groups. The number of recurrences of ASBO after conservative treatment was significantly higher than that in the laparoscopically operated group within 2 years of that hospital admission. The mean length of hospital stay was significantly longer in group B than in group A. Stool passage and start of enteral nutrition were significantly earlier in group A than in group B with improving abdominal distension.

Three patients of group A had complications (two intestinal perforation and one urinary tract infection). In the conservative group, two patients had complications in the form pneumonia and other two patients had nostril erosion. Both groups had no significant difference as regards complications and 30-day mortality.

Group B patients requested a significant duration of sick leave in comparison with the patients of group A. We observed a significant recurrence of ASBO attacks in group B in relation to group A and required open or laparoscopic adhesiolysis except three cases. In operated cases, the indications of surgery were peritonitis, fever, failure of treatment, leukocytosis, and intractable pain. All recurrent cases of group A showed good response to conservative treatment without recurrence within the period of observation.

Discussion

SBO due to postoperative adhesions develops in 6–11% of all patients undergoing laparotomy [9]. It may occur at any time after the initial laparotomy and results in frequent readmissions in subsequent years [10,11].

Open surgical treatment of ASBO may lead to additional formation of adhesions, possibly

contributing to recurrent episodes of ASBO [12,13]. As laparoscopic surgery is becoming more common in emergency surgery, adhesive SBO is the obvious next target for a laparoscopic approach [1].

This trial aimed to evaluate early laparoscopic adhesiolysis as a minimal invasive technique in the treatment of recurrent ASBO. As regards recurrence of ASBO after the first attack, our series showed a significant increase in the incidence of hospital admission for a second attack of an ASBO, which was not obvious in the study by Fevang *et al.* [8].

Abdominal pain was the main symptom in our series during attack ASBO. This was different from the series

Table 1 Summary of data analysis

	Laparoscopy-operated group (group A) (n=26) (n (%))	Conservative group (group B) (n=25) (n (%))	P value (<0.05)
Mean age (years)	47.5	56.1	NS
Male	12 (46.1)	12 (48)	NS
Female	14 (53.9)	13 (52)	NS
2 ASBO episodes	20 (77)	16 (64)	0.007*
3 ASBO episodes	2 (8)	3 (12)	NS
4 ASBO episodes	4 (15)	6 (24)	NS

ASBO, adhesive small bowel obstruction. *Significance difference ($P<0.05$)

Table 2 Symptoms and previous operations

Symptoms	Laparoscopy-operated group (group A) (n=26)	Conservative group (group B) (n=25)
Abdominal pain	26	25
Distension	22	23
Constipation	20	19
Vomiting	19	18
Previous operations		
Stomach	7	6
Appendectomy	5	4
Colon	4	4
Rectum	1	2
Liver, biliary, and pancreases	3	2
Gynecological	5	6
Others	1	1

Table 3 Outcome of the study

	Laparoscopy-operated group (group A)	Conservative group (group B)	P value
Hospital stay (days) (mean \pm SD) ^a	1.6 \pm 0.5	6.5 \pm 1.2	0.0001*
Stool passage ^a	1.2 \pm 0.4	3.9 \pm 0.9	0.0001*
Sick leave ^a	7 (3.3)	15 (5.3)	0.001*
Enteral nutrition ^a	2.8 \pm 0.5	4.3 \pm 0.9	0.0001*
30-day mortality ^b	2	5	0.2
Complications ^b	3	4	0.7
Recurrent ASBO ^b	3	15	0.0002*
Surgical interference ^b	3 open (11.5%)	1 lap 2 open (12%)	0.7

ASBO, adhesive small bowel obstruction. ^aThe values are calculated using the independent *t*-test. ^bThe values are calculated using the χ^2 -test. *Significant difference ($P\leq 0.05$).

of Miller and colleagues, as only 71–87% of patients were suffering pain. Other studies considered the incidence of abdominal crampy pain within 40% of previously operated patients as normal [14,15]. The incidence of vomiting, distension, and constipation was the same as that reported in other studies for recurrent ASBO [1,2,5].

The previous operations that caused small intestinal adhesion in our series showed no significant difference between the two groups, and this is in agreement with the study by Wang *et al.* [16].

Various authors have debated the proper course of treatment for SBO. The focus has been on the natural history and length of treatment at the time of obstruction. Seror *et al.* [17] reported a 73% success rate with conservative management of SBO, one of the highest in the literature. However, other studies range widely, from 20 to 62% resolution, without surgery. Our successful conservative therapy rate of 88% compares well with this report, but without significant difference between the two groups as regards the success of treatment. A major concern of surgeons is that patients who are operated for ASBO will tend to develop recurrent attacks compared with those who are managed conservatively. This study adheres to the dictum 'The sun should never rise or set on a small bowel obstruction'. It uses laparoscopy as a minimally invasive technique to minimize recurrence, which was significantly increased in the conservative group, and this is in agreement with the study by Fevang *et al.* [8] and Niyaf *et al.* [18].

Our patients treated with operation experienced a short hospital stay with a median of 1.6 versus 6.5 days for those patients who underwent conservative treatment. Miller *et al.* [3] reported virtually the same numbers, whereas Landercasper *et al.* [19] found an even greater difference in hospital stay (3 vs. 12 days). This significant difference between the two groups is also applied to an early stool passage, early start of oral feeding, and sick leave requested after treatment.

Although previous retrospective series have shown an association of less complications and mortality rate with the laparoscopic approach, all previous retrospective series are more or less biased, as the easiest cases are selected for laparoscopic approach [6]. This is in agreement with our study, which showed no significant difference between the two groups as regards these items.

Despite advances in surgery, 15–30% require surgical intervention primarily or due to failure of conservative management [18]. Our results as regards the conservative group were near this range (12%). However, conversion rate from laparoscopic adhesiolysis to open surgery

was 11.5%, which is not in agreement with the Irish systematic review of over 2000 cases of ASBO. In this study, 1284 (64%) patients were successfully treated with a laparoscopic approach, 6.7% were lap-assisted, and 0.3% were converted to hernia repair; the overall conversion rate to midline laparotomy was 29% [1].

Conclusion

Recurrent ASBO is a common disease. Conservative management should be attempted in the absence of signs of peritonitis or strangulation. Surgically treated patients had a lower frequency of recurrence and a longer time-interval to recurrence; however, they also had a longer hospital stay compared with patients treated nonoperatively. Laparoscopic approach appears to be safe and feasible in the hands of experienced laparoscopic surgeons and in selected patients, because there are less overall complications, prolonged ileus rates, and pulmonary complication associated with its use. We found a significant difference between early use of laparoscopy in adhesiolysis versus conservative management as regards hospital stay, stool passage, enteral nutrition, and recurrence of ASBO. This will change the previously established concept about the treatment of bowel obstruction caused by adhesions and opens wider horizons for the use of laparoscopy in such cases.

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Equipment used: CT and laparoscopy.

Criteria for inclusion in the authors'/contributors list: 2 years of laparoscopic surgery experience.

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Conflicts of interest

There are no conflicts of interest.

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