Outcome of laparoscopic intervention in acute and chronic small bowel obstruction

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Introduction
Major abdominal operations result in severe unpredictable scar tissue formation that may contribute to adhesions and then recurrent attacks of acute bowel obstruction, chronic abdominal pain, or both problems. Laparoscopic adhesiolysis provides good relief of symptoms in patients with chronic abdominal pain and/or acute bowel obstruction but without major previous abdominal surgery or severe peritonitis (necrosis or perforation).
Early laparoscopic intervention for acute or chronic bowel obstruction has been tried many times worldwide but without complete data about the safety and outcome for both conditions.
Patients and methods
Between February 2017 and January 2019, a prospective randomized controlled study was done on 32 patients admitted for small bowel obstruction (14 patients with acute bowel obstruction and 18 patients with chronic small bowel obstruction). Patients selected for early laparoscopic adhesiolysis were those who had no preoperative finding of perforation, torsion, strangulation, or any clinical signs or radiological evidences of peritonitis. The outcome of the study was evaluated depending on length of postoperative hospital stay, enteral nutrition, 30-day mortality, positive bowel movement and stool passage, the length of sick leave (return to work), and recurrence of bowel obstruction during the 2-year follow-up.
Results
A total of 32 patients with a diagnosis of small bowel obstruction were identified and divided into two groups. Group A included 18 patients with chronic bowel obstruction who were treated with laparoscopic adhesiolysis, and group B included 14 patients having acute intestinal obstruction who were treated with laparoscopic adhesiolysis. The follow-up period was ~24 months.
Conclusion
Laparoscopic adhesiolysis is a safe and effective management option for patients with prior abdominal surgery with acute or chronic abdominal pain or recurrent bowel obstruction.

Keywords:
abdominal pain, acute and chronic, laparoscopy, lysis of adhesions

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Introduction

Major abdominal operations result in severe unpredictable scar tissue formation that may contribute to adhesions and then recurrent attacks of acute bowel obstruction, chronic abdominal pain, or both problems. Laparoscopic adhesiolysis provides good relief of symptoms in patients associated with chronic abdominal pain and/or acute bowel obstruction but without major previous abdominal surgery or severe peritonitis (necrosis or perforation) Klingensmith *et al*. [1].

Early laparoscopic intervention for acute or chronic bowel obstruction has been tried many times worldwide, but data about the safety and outcome for both conditions are still under study Easter *et al*. [2].

The first lectures reviewing laparoscopic adhesiolysis of the small bowel obstruction were written by Reissman and Wexner [3]. Later other trials were reported by Duron [4] and Slim [5] and Nagle [6]. In 2006, *Société Française de Chirurgie Digestive* published a review about the evidence-based recommendations Mueller *et al*. [7].

The goal of early surgical management of bowel obstruction is to reduce morbidity and mortality of bowel obstruction Schietroma *et al*. [8]. The wisdom 'never let the sun rise and set on a case of suspected

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intestinal obstruction' is still the safest guideline in undiagnosed cases Leon *et al*. [9].

Although laparoscopic adhesiolysis has long been practiced, open laparotomy is still the standard operation, as laparoscopy in such patients may be considered dangerous, with the possibility of perforation of dilated loops of the bowel by the insufflating needle or trocar introduction El Dahha *et al*. [10]. However, with the recent expansion and acceptance of laparoscopic intervention, re-evaluation of laparoscopy as an additional useful procedure in the management of small bowel obstruction has taken place Kresch *et al*. [11].

Major abdominal operations often result in unpredictable intraabdominal scar tissue formation and adhesion. Intraabdominal scar tissue may lead to symptomatic bowel obstruction and pain. Diagnostic laparoscopy is often used to identify specific intraabdominal pathology as the cause for chronic abdominal and/or pelvic pain Herrmann *et al*. [12]. However, few studies state that laparoscopic adhesiolysis is the only operative intervention that ameliorated a significant amount of chronic recurrent abdominal pain owing to chronic obstruction Freys *et al*. [13]. Our study was designed to investigate the role of laparoscopic adhesiolysis as a safe method of treatment of patients with acute and chronic abdominal pain (acute pain or recurrent bowel obstruction), not attributed to other previous pathology or major surgery.

Patients and methods

Between February 2017 and January 2019 in Zagazig University Hospital Surgical Department, all patients who had no previous major operation or specific pathology were enrolled in two groups. Consent was taken from all patients after explaining our maneuver. A total of 25 patients with chronic bowl obstruction with ages ranging from 26 to 68 years (median age, 53.5 years) who were prepared for laparoscopic adhesiolysis were retrospectively reviewed. Seven patients who had other major abdominal procedures and previous specific pathology in the first diagnosis were excluded from the study. The extensive adhesiolysis in these seven patients who were operated on for other specific pathologies was considered incidental. Therefore, these patients were excluded from our study. After obtaining approval from the institutional review board and reviewing the inpatient and outpatient medical records, the remaining 18 patients (17 female and one male) with chronic intestinal obstruction were reviewed and classified into group A. Additionally, questionnaires were sent to these 18 patients. Assessment of clinical relief was determined by the questionnaire, and perioperative morbidity and mortality were evaluated by reviewing the inpatient and outpatient charts as well as through the review of the responses to the questionnaires.

In group B, 16 patients were hospitalized with acute bowel obstruction with exclusion of two patients with acute severe peritonitis, so all patients with acute obstruction treated laparoscopically represented 14 patients. Their ages ranged from 14 to 65 years (median age, 43.5 years). Overall, five males and nine females were included in this study. All the patients presented with typical symptoms and signs of acute pain and signs of small bowel obstruction, and the diagnosis was confirmed by history, examination, laboratory data, plain radiographs, abdomen computed tomographic scan if needed, and upper and lower endoscopy if needed.

Initially, all patients were treated conservatively for general condition adjustment and systemic support. They were maintained without oral intake (NPO), and nasogastric decompression was instituted. Peripheral or central intravenous lines were established for fluid and electrolyte replacement and central pressure for shock assessment. Decision for laparoscopic exploration was taken after failure of expectant management to relieve symptoms or result in improvement in 24 h or worsening of general conditions.

All 32 patients (18 chronic and 14 acute) included in this study were treated by laparoscopic adhesiolysis.

All operations were completed by a highly experienced surgeon and a team working in laparoscopic emergency units at a major medical institution under general anesthesia. Eighteen operations were undertaken for chronic abdominal/pelvic pain, and 14 for acute bowel obstruction.

All patients had prior abdominal operations. Table 1 shows all previous operations. Preoperatively, patients were worked up extensively (Table 2) to rule out

Table 1 Abdominal/pelvic surgeries before for all patients

Cholecystectomy	12
Appendectomy	8
Lysis of adhesion	3
Partial nephrectomy	2
Cesarean section	3
Abdominal wall mass excision	2
Partial colonic resection	2

Table 2 Preoperative evaluations

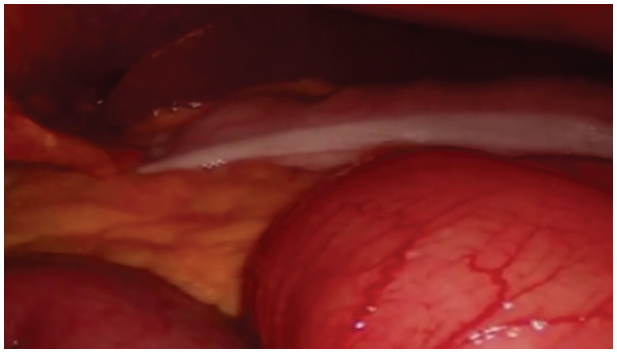
CT scan with contrast	24
Lower and or upper GIT/colonoscopy	21
Both studies	13

CT, computed tomography; GIT, gastrointestinal tract.

Figure 1

Trocar introduction in an area away from the adhesion.

Figure 2

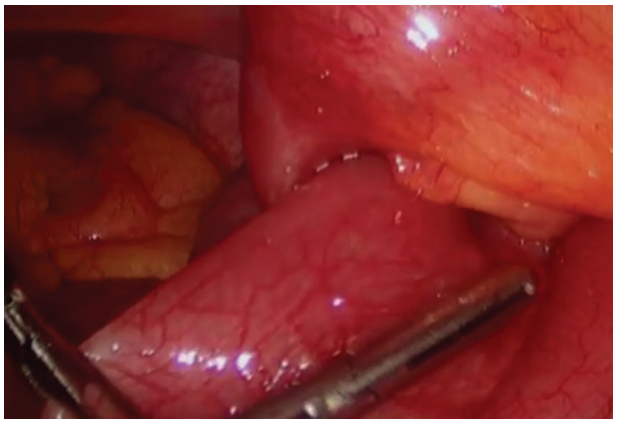


Distended small bowel but transverse colon is not distended.

obvious intraabdominal/visceral pathology that would explain the cause of abdominal pain, intestinal obstruction, or both. Only when all studies were considered negative for such processes, then the patients were considered candidates for laparoscopy and adhesiolysis.

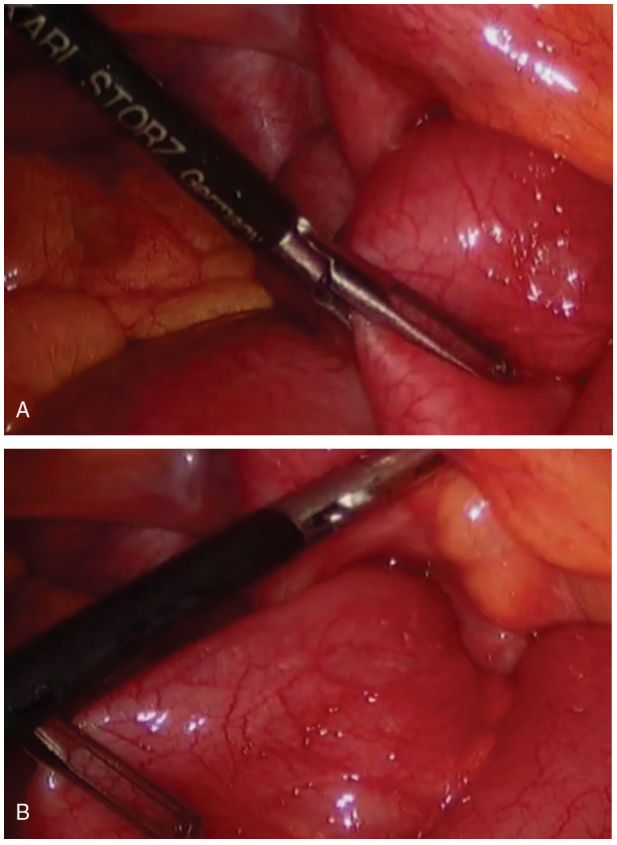
Operative technique (Figs 1–5): Laparoscopic adhesiolysis was performed under general anesthesia, using a Veress needle that was inserted in the subumbilicus, and then the peritoneal cavity was insufflated with carbon dioxide to 14 mmHg pressure. We have used a modified new procedure, by performing a cut-down procedure for trocar insertion in the middle line away from any previous scars site (e.g. the epigastrium in the case of subumbilical scars) or to the right or left upper abdominal quadrants. A 10-mm trocar was then inserted under direct visualization by the camera at

Figure 3



Loop of small bowel was herniated in the abdominal wall causing acute obstruction that was relieved by using hand-to-hand technique.

Figure 4



'Hand-to-hand' technique of bowel exploration by using nontraumatic laparoscopic clamps.

site of this port for direct visualization of the peritoneal cavity. Then we inserted two additional 5-mm trocars in the right and left lower quadrants or for a specific point around the site of obstruction if indicated, and then lysis of adhesions in the subumbilical area was done first if needed, sufficient enough to allow placement of another 10-mm trocar under vision.

The small bowel was 'run' starting at the cecum by retrograde method by grasping the bowel with two endoscopic Babcock (hand to hand) techniques. Placing the patient in the flat Trendelenburg position with tilting the table to the left for 30° allowed us to visualize the cecum good enough and also enhanced 'running' of the small bowel even with the distended bowel. The point of obstruction between a proximal dilated loop and a distal decompressed loop of small bowel was observed in all cases.

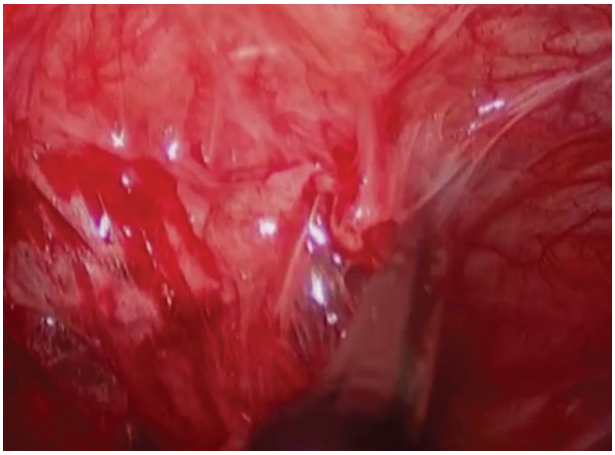
We gently try to identify the obstructing and adhesive band, then dealing with the adhesive bands by bipolar electrocautery tip or diathermy scissors releasing it. The affected bowel was observed for ten minutes to confirm its viability.

Results

Group A

Postoperatively, 12 of 18 cases had complete resolution of their symptoms by passing stool without distention. Two cases experienced distention for 2 days but passed feces after that. One patient had wound infection and another had atelectasis. All 16 patients started oral fluid safely.

Figure 5



Lysis of adhesions using diathermy scissors.

After a mean follow-up period of 12 months (range, 1–32 months), 16 patients reported an improvement in their quality of life.

Two cases converted to open laparotomy because of a large perforation in one patient that needed resection and anastomosis, and another patient had small gangrenous area that needed conversion to laparotomy also for resection of devitalized bowel and reanastomosis. They took oral fluid after 5 days without fecal fistula but with long hospital stay because of wound infection and for albumin correction.

Fourteen cases were discharged within 48–96 h after their operations. Two patients were discharged after 10–12 days following their operations, because one patient developed atelectasis after laparoscopic exploration and discharged after 12 days and another patient experienced wound infection and was discharged 10 days later. Two patients with laparotomy were discharged after 15 days.

All 18 patients were discharged without requiring blood transfusion. No perioperative deaths occurred. Hospital stay ranged from 1 to 15 days, with return to normal activity within 18–21 days (Table 3).

Follow-up after 2 years revealed that two patients presented with the same symptoms; open exploration with adhesiolysis again was done for one patient, and he was discharged after passing stool 3 days later, and one was treated by conservative measures without surgery and was relieved after 3 days and discharged.

Group B

Laparoscopic exploration was able to determine the site and cause of obstruction precisely in all 14 cases, with resolution of the problem laparoscopically in 12

Table 3 The operative findings and procedures, complications, and duration of hospital stay for the 18 patients with chronic small bowel obstruction (group A) studied in this series

Number of patients	Age of patients (years)	Operative findings	Procedure	Complications	Hospital stay (days)
12	28–65	Ileal and colon adhesions of unknown etiology	Laparoscopic adhesiolysis of all scars	None	1–2
2	34–48	Adhesions with small bowel Obstruction in more segments	Laparoscopic adhesiolysis	None	1–2
2	62–68	Postappendectomy adhesion with small incisional hernia	Laparoscopic adhesiolysis with repair of defect	Atelectasis 1 case and wound infection 1 case	10–12
2	60	Small bowel perforation and gangrenes	Conversion to open procedure	Enterotomy case	15

Table 4 The operative findings and procedures, complications, and duration of hospital stay for the 14 patients (group B) studied in this series

Number of patients	Age of patients (years)	Operative findings	Procedure	Complications	Hospital stay (days)
10	14–50	Ileal adhesions of unknown etiology	Laparoscopic adhesiolysis	None	2–3
2	38–60	Multiple adhesions with small bowel obstruction	Laparoscopic adhesiolysis	None	2–3
2	47–65	Postappendectomy adhesion extensive adhesion	Conversion to open surgery	2 enterotomies	15–17

(85.7%) patients. Two cases were converted to open surgery (14%) (Table 4).

In group B, 12 (85.7%) patients were discharged after 2–3 days. They started oral fluid by second day of operation. Two cases were converted to open surgery (14%) and were discharged after 15–17 days because of wound infection. The mean hospital stay was 3.9 days, and ranged from 2 to 17 days, and return to normal activity within 20–23 days with no mortalities.

Follow-up after 2 years revealed that one case presented with the same symptoms. Open surgery done and explored by laparotomy for adhesiolysis again and discharged after passing stool after 3 days (Table 5).

Table 5 Outcomes in both groups

Items	Group A	Group B
Success (%)	88.8	85.7
Conversion rate (%)	11	14
Morbidity (%)	5.5	7.1
Hospital stay (%)	3.7	3.9
Time of sick leave (days)	10–21	10–23

Discussion

Postoperative intestinal adhesion formation is unpredictable. Intestinal obstruction is commonly attributed to intraabdominal scar tissue and extensive adhesion. Abdominal and pelvic pain in association with intraabdominal scarring is not well understood. Mueller and Kresch have suggested that adhesions can be the cause of pain owing to obstruction if they limit the movement or dispensability of bowel. Stretching pain secondary to adhesions attached to the liver, intestine, or other organs may also contribute to chronic or sudden pain Harmon *et al.* [14]. Moreover, the adhesions can partially or intermittently cause small bowel obstruction. One study noted that small adhesions appear to cause only recurrent pain without other obstruction, whereas large adhesions produce pain in combination with intermittent bowel obstruction Vittimberga *et al.* [15].

Enthusiasm for elective adhesiolysis is often limited by the concern about subsequent scarring formation following major operation. Although the etiology for intraabdominal scarring is likely to be multifactorial, little inflammatory response, following laparoscopy versus laparotomy Jacobi *et al.* [16], has been considered the cause for subsequent scarring formation. Many studies suggest a lower incidence of adhesion following laparoscopic procedures Luciano *et al.* [17]. Therefore, it is possible that laparoscopic adhesiolysis would result in rapid resolution of obstructive symptoms attributed to intraabdominal scarring, with less likelihood of subsequent recurrence of scarring and obstruction.

Our operative technique includes complete lysis of all adhesions that have resulted in fixation of the small and large intestine to each other and to the abdominal wall. Except in those patients with operative findings of an obvious transition from dilated atrophic bowel, we do not routinely inspect the entire length of the small intestine, searching for adhesions to avoid perforation. We believe excessive manipulation of the small intestine may increase the risk of perforation.

Identification of other intraabdominal pathology through the extensive use of little or weak-invasive preoperative testing should result in a lower incidence of nontherapeutic adhesiolysis. In group A, seven patients were excluded from our study because they had other major abdominal procedures performed at the time of their adhesiolysis. All of these patients were extensively evaluated preoperatively and were found to have other possible sources for the chronic abdominal pain. During their operations, however, all seven patients underwent similar extensive adhesiolysis to prevent a future operative procedure. We believe that an extensive preoperative workup should be used before attributing symptoms of chronic abdominal pain to intraabdominal scar tissue. Additionally, we believe that patients with unusual preoperative abdominal pain should undergo adhesiolysis at the time of their laparoscopy for other preoperatively detected intraabdominal pathology.

As early as 1992, several authors suggested that laparoscopy for any type of bowel obstruction may yield inadequate enterolysis, and is likely to be dangerous Krahenbuhl *et al.* [18]. More recently, other authors have demonstrated acceptable results with laparoscopic lysis of adhesions in the setting of acute and chronic intestinal obstruction because of self-experience and technology advancement Saba *et al.* [19].

Long-term effectiveness of laparoscopic adhesiolysis remains unknown at this time. In our study, after adhesiolysis of chronic intestinal obstruction in group A, the success rate was 88.8% improvement in symptoms following laparoscopic adhesiolysis, which supports the liberal use of diagnostic laparoscopy and lysis of adhesions. There was low morbidity of laparotomy patients (5.5%), no mortality, short hospital stay (3.7 days), and rapid return to normal activities within 10 days. In patients of group B of acute obstruction, laparoscopy was used to explore 14 patients experiencing acute adhesive small bowel obstruction, and it was successful to confirm the diagnosis and to manage this obstruction in 12 (85.7%) cases, thus sparing these two patients from laparotomy. There was low morbidity of laparotomy patients (7%), no mortality, short hospital stay (3.9 days), and rapid return to normal activities within 10 days.

However, we did not hesitate to relieve the obstruction with a classic open technique in four difficult laparoscopy cases, because we believe that surgeons should not allow the excitement for a new surgical technique to confuse their clinical or surgical judgment.

Conclusion

Laparoscopic outcome for adhesiolysis in chronic or acute abdominal pain is a safe and effective operation and results in minimal perioperative morbidity. We believe that laparoscopic surgery in small bowel obstruction has the advantage of precisely localizing the problem, providing a means of rapid treatment and resolving of scarring and recurrent rate of the disease process with minimal morbidity and mortality and, at the same time, overcoming all the complications and drawbacks of the classic open technique. However, we strongly recommend that use of laparoscopy for acute and chronic small bowel obstruction should be with proper patient selection and a skilled experienced laparoscopic surgeon available.

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Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Klingensmith ME, Soybel DI, Brooks DC. Laparoscopy for chronic abdominal pain. Surg Endosc 2016; 10:1085–1087.

2 Easter DW, Cuschieri A, Nathanson LK, Lavelle-Jones M. The utility of diagnostic laparoscopy for abdominal disorders. Audit of 120 patients. Arch Surg 2014; 127:379–381.

3 Fayex JA, Toy NJ, Flanagan TM. The appendix as the cause of chronic lower abdominal pain. Am J Obstet Gynecol 2016; 172:122–123.

4 Lavonius M, Gullichsen R, Laine S, Ovaska J. Laparoscopy for chronic abdominal pain. Surg Laparosc Endosc 2014; 9:42–44.

5 Salky BA, Edye MB. The role of laparoscopy in the diagnosis and treatment of abdominal pain syndromes. Surg Endosc 2011; 12:911–914.

6 Renteria SC, Chardonnens E, Genolet PM, De Grandi P. Diagnostic laparoscopy in persistent and chronic abdominal pain. Arch Gynecol Obstet 2017; 259 (suppl 1):S47–S53.

7 Mueller MD, Tschudi J, Herrmann U, Klaiber C. An evaluation of laparoscopic adhesiolysis in patients with chronic abdominal pain. Surg Endosc 2009; 9:802–804.

8 Schietroma M, Risetti A, Carlei F, Santirocco MV, Muzi F, Maggi G, *et al.* Chronic abdominal pain: role of video-laparoscopic adhesiolysis. Chir Ital 2015; 48:43–46.

9 Leon EL, Metzger A, Tsiotos GG, Schinkert RT, Sarr MG. Laparoscopic management of small bowel obstruction: indications and outcome. J Gastrointest Surg 2000; 2:132–140.

10 El Dahha AA, Shawkat AM, Bakr AA. Laparoscopic adhesiolysis in acute small bowel obstruction: a preliminary experience. JSLS 2017; 3:131–135.

11 Kresch AJ, Seifer DB, Sachs LB, Banner I. Laparoscopy in 100 women with chronic pelvic pain. Obstet Gynecol 2005; 64:672–674.

12 Herrmann RE. Chronic lower abdominal pain. JAMA 2013; 264:2450.

13 Freys SM, Fuchs KH, Heimbucher J, Thiede A. Laparoscopic adhesiolysis. Surg Endosc 2009; 8:1202–1207.

14 Harmon GD, Senagore AJ, Kilbride MJ, Warzynski MJ. Interleukin-6 response to laparoscopic and open colectomy. Dis Colon Rectum 2017; 37:754–759.

15 Vittimberga FJ, Foley DP, Meyers WC, Callery MP. Laparoscopic surgery and the systemic immune response. Ann Surg 2018; 227:326–334.

16 Jacobi CA, Ordemann J, Zieren HU, Volk HD, Bauhofer A, Halle E, Muller JM. Increased systemic inflammation after laparotomy vs. laparoscopy in an animal model of peritonitis. Arch Surg 2012; 133:258–262.

17 Luciano AA, Maier DB, Koch EI, Nulsen JC, Whitman GF. A comparative study of postoperative adhesions following laser surgery by laparoscopy versus laparotomy in the rabbit model. Obstet Gynecol 2015; 74:220–224.

18 Krahenbuhl L, Schafer M, Kuzinkovas V, Renzulli P, Baer HU, Buchler MW. Experimental study of adhesion formation in open and laparoscopic fundoplication. Br J Surg 2016; 85:826–830.

19 Saba AA, Godziachvili V, Mavani AK, Silva YJ. Serum levels of interleukin-1 and tumor necrosis factor alpha correlate with peritoneal adhesion grades in humans after major abdominal surgery. Am Surg 2018; 64:734–737.