

Laparoscopic Adhesiolysis in Adhesive Intestinal Obstruction

Essay

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدقة الله العظيم

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Candidate

 **Osama Amraga El-Gassi**



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List of Abbreviations

<i>Abbr.</i>	<i>Full-term</i>
CT	: Computed Tomography
GIST	: Gastrointestinal stromal tumors
HASTE	: Half-Fourier Acquisition Single-shot Turbo-spin Echo
ICAM-1	: Intracellular Adhesion Molecule
IL-1	: Interleukin-1
IO	: Intestinal Obstruction
MRI	: Magnetic Resonance Imaging
NSAIDs	: Non-Steroids Anti inflammatory Drugs
PAI-1	: Plasminogen Activator Inhibitors 1
PAI-2	: Plasminogen Activator Inhibitors 2
PLGA	: Poly lactidecoglycolide
PTFE	: Poly tetrafluoroethylene
SBO	: Small Bowel Obstruction
SP	: Substance P
TGF-β	: Transforming Growth Factor- β
Tpa	: Tissue Plasminogen Activator
VCAM-1	: Vascular Cell Adhesion Molecule

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ABSTRACT

Postoperative adhesive intestinal obstruction is a common surgical complication and causing a large number of hospital admission worldwide.

There are some technical and procedural precautions undertaken to prevent or reduce adhesion, formation's formation. Some of which are synthetic and the others semisynthetic but still meticulous surgical techniques, such as avoidance of unnecessary tissue manipulation, are the most important to reduce the formation of adhesions.

Key words: adhesive intestinal obstruction, mechanical intestinal obstruction, laparoscopic adhesiolysis, diagnostic laparoscopy, closed loop obstruction, small bowel obstruction.

Introduction

The small bowel is the most frequent intestinal occlusion site and adhesional pathology represents the most common cause of small bowel obstruction (80%). Other less common causes are: peritoneal carcinosis, Crohn disease, GIST, internal hernia, diaphragmatic hernia, Meckel's diverticulum, and biliary ileus (*Gutt et al., 2004*).

Small bowel obstruction (SBO) is a common surgical emergency most frequently caused by adhesions. A large portion of adhesive SBO resolve by nonoperative methods such as fasting and ingestion of an oral contrast-media, while a significant number of patients will need emergency surgery (*Di Saverio et al., 2013*).

For decades open surgery has been the gold standard in treating adhesive SBO. Now that 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 emerging also as a viable alternative in emergency surgery (*Sallinen et al., 2014*).

If SBO is caused by one adhesive band, the surgical treatment is straightforward - cutting the band causing obstruction. Laparoscopic approach seems ideal for such a

procedure, preventing the morbidity of a laparotomy incision. First publications describing laparoscopic adhesiolysis in SBO are from the 1990's. Since then several retrospective series have been published, and a recent meta-analysis pooled patients from four studies, including a total of 334 patients (*Li et al., 2012*).

Meta-analysis showed that patients treated by the laparoscopic approach had less complications, and faster return of bowel function (*Li et al., 2012*). However, there are no prospective randomized trials comparing open approach to laparoscopy. Furthermore, previous retrospective studies have a selection bias because the easiest cases are selected for laparoscopic approach. One of the drawbacks of laparoscopic approach is a concern for iatrogenic bowel perforation. In one report, the rate of bowel lesion in laparoscopic adhesiolysis was 6.6%, and only 84% were detected during the operation (*O'Connor and Winter, 2012*).

The first laparoscopic adhesiolysis for small bowel obstruction was performed by Mouret in 1972. Following this first case, the use of laparoscopy for treating small bowel obstruction was accepted by other surgeons and the indication was represented by patients with unique band adhesion and no clinical signs of bowel ischemia or necrosis (*Farinella et al., 2009*).

In laparoscopic adhesiolysis for small bowel obstruction the first trocar needs to be placed using Hasson's technique for open laparoscopy in order to avoid accidental bowel perforations related to bowel distension and adhesions with the abdominal wall. Two 5 mm trocars must be introduced under vision in order to explore the peritoneal cavity. Dilated bowels are moved away to find out the obstructed bowel segment by the band adhesion. If the surgeon notices ischemic or necrotic bowel he performs a laparotomy, on the contrary if the bowel appears healthy the laparoscopic procedure can be delivered and an atraumatic grasp can be used to isolate the band adhesion, which is coagulated by bipolar coagulator and then sectioned with scissors. These manoeuvres result in the liberation of the obstructed small bowel segment (*Farinella et al., 2009*).

In order to perform an emergency laparoscopic adhesiolysis, three factors are fundamental early indication for surgical treatment, exclusion of patients with history of multiple abdominal surgical procedures, and exclusion of patients with suspected strangulation or small bowel torsion associated with ischemic or necrotic bowel. It is often not possible to achieve a preoperative diagnosis of mechanical small bowel obstruction caused by peritoneal adherences. For this reason the number of patients and the quality of the studies published in literature on this topic are both low, resulting in poor scientific evidences (*Dallemagne, 2003*).

The first review concerning laparoscopic adhesiolysis of the small bowel obstruction was written by Reissman and Wexner (**Reissman and Wexner, 1995**). The following reviews were by Duron (**Duron, 2002**) in 2002 and Nagle (**Nagle et al., 2004**) in 2004.

In 2006 *Société Française de Chirurgie Digestive* (SFCD) published a review (**Peschaud et al., 2006**). from which evidence-based recommendations could be extracted. In this review, because of absence of randomized studies in literature, the Authors considered only 11 studies with a minimum of 40 patients, of which 3 were perspectives and 2 with a patient group treated by laparotomic surgery. In the same years European Association for Endoscopic Surgery (EAES) guidelines for the laparoscopic treatment of abdominal emergencies were also published (**Sauerlander et al., 2006**).

Aim of the Study

The aim of work is to display modalities and new trends in management of adhesive intestinal obstruction via laparoscopic adhesiolysis.

Chapter (I)

Acute Intestinal Obstruction

Bowel obstruction occurs when the normal flow of intraluminal contents is interrupted. Obstruction can be functional (due to abnormal intestinal physiology) or due to a mechanical obstruction, which can be acute or chronic (*Miller et al., 2000*).

Advanced small bowel obstruction leads to bowel dilation and retention of fluid within the lumen proximal to the obstruction, while distal to the obstruction, as luminal contents pass, the bowel decompresses. If bowel dilation is excessive, or strangulation occurs, perfusion to the intestine can be compromised leading to necrosis or perforation, complications which increase the mortality associated with small bowel obstruction (*Bordeianou et al., 2015*).

Acute intestinal obstruction is one of the most common causes for surgical admissions worldwide. The etiology varies; however, adhesions appear to be the most common cause in the Western world as well as in parts of Asia and Middle East (*Chen et al., 2008*).

Pathophysiology of Acute Intestinal Obstruction:

Failure of intestinal contents to pass through the intestinal tract leads to a cessation of flatus and bowel movements. Intestinal obstruction can be broadly

differentiated into small bowel and large bowel obstruction. Fluid loss from emesis, bowel edema, and loss of absorptive capacity leads to dehydration. Emesis leads to loss of gastric potassium, hydrogen, and chloride ions, and significant dehydration stimulates renal proximal tubule reabsorption of bicarbonate and loss of chloride, perpetuating the metabolic alkalosis (**Jackson and Rajiji, 2011**).

In addition to derangements in fluid and electrolyte balance, intestinal stasis leads to overgrowth of intestinal flora, which may lead to the development of feculent emesis. Additionally, overgrowth of intestinal flora in the small bowel leads to bacterial translocation across the bowel wall (**Rana and Bhardwaj, 2008**).

Ongoing dilatation of the intestine increases luminal pressures. When luminal pressures exceed venous pressures, loss of venous drainage causes increasing edema and hyperemia of the bowel. This may eventually lead to compromised arterial flow to the bowel, causing ischemia, necrosis, and perforation. A closed-loop obstruction, in which a section of bowel is obstructed proximally and distally, may undergo this process rapidly, with few presenting symptoms. Intestinal volvulus, the prototypical closed-loop obstruction, causes torsion of arterial inflow and venous drainage, and is a surgical emergency (**Jackson and Rajiji, 2011**).