

## Laparoscopic Versus Open Adhesiolysis in Patients with Bowel Obstruction

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### ABSTRACT

**Background:** Adhesions are bands of scar tissue that form between organs. In the abdomen, they form after an abdominal surgery or after a bout of intra-abdominal infection (i.e., pelvic inflammatory disease, diverticulitis). More than 95% of patients who undergo abdominal surgery develop adhesions; these are nearly inevitably part of the body's healing process. Though most adhesions are asymptomatic, some can cause bowel obstructions, infertility, and chronic pain.

**Objectives:** Concerning whether patients with chronic pelvic pain benefit from laparoscopic adhesiolysis or whether any appearing advantage is a placebo effect.

**Materials and methods:** This review was conducted using a comprehensive search of MEDLINE, PubMed, EMBASE, Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials from January 1, 1990, through October 31, 2017.

**Results:** The spectrum of treatments for a small-bowel obstruction ranges from conservative management with bowel rest to surgical intervention, sometimes involving bowel resection. The caveat with regard to surgical treatment is that while surgery may be required to release symptomatic adhesions, postoperative reformation of these adhesions is common. Debate continues as to whether laparoscopic adhesiolysis yields added benefit in terms of decreasing postoperative adhesion reformation; however, promising results have been obtained with Open approach.

**Conclusion:** Laparotomy with open adhesiolysis has been the treatment of choice for acute complete bowel obstructions. Patients who have partial obstructions, with some enteric contents traversing the obstruction, might similarly require surgery if nonoperative measures fail.

**Keywords:** Open Adhesiolysis, Laparoscopic, Bowel obstructions.

### INTRODUCTION

Adhesions are bands of scar tissue that form between organs. In the abdomen, they form after an abdominal surgery or after a bout of intra-abdominal infection (i.e. pelvic inflammatory disease, diverticulitis). More than 95% of patients who undergo abdominal surgery develop adhesions; these are almost inevitably part of the body's healing process [1, 2]. The morbidity from adhesions can range from chronic abdominal pain to female infertility [3]. The most common of these conditions is partial or complete intestinal obstruction, for which the small bowel is the most common location. Postoperative adhesions account for as many as 79% of acute intestinal obstructions [4]. The spectrum of treatments for a small-bowel obstruction ranges from conservative management with bowel rest to surgical intervention, from time to time containing bowel resection. The caveat with regard to surgical

treatment is that whereas surgery may be required to release symptomatic adhesions, postoperative reformation of these adhesions is common. Debate continues as to whether laparoscopic adhesiolysis yields added benefit in terms of decreasing postoperative adhesion reformation; however, promising results have been attained with open technique [5, 6]. Laparoscopic adhesiolysis was first defined by a gynecologist for the treatment of chronic pelvic pain and infertility [7]. In the early days of laparoscopy, previous abdominal surgery was a relative contraindication to perform most laparoscopic procedures. Laparoscopic surgery to relieve bowel obstructions was not routinely performed. Nevertheless, in 1991, **Bastug et al.** described the successful use of laparoscopic adhesiolysis for small-bowel obstruction in one patient with a single adhesive band [8].

From that point forward, many case series have documented this technique<sup>[9]</sup>. Advanced technology with high-definition imaging, smaller cameras, and better instrumentation have allowed for an increasing number of adhesiolysis to be performed laparoscopically with good outcomes. Compared with the open approach to adhesiolysis, the laparoscopic approach offers the following:

- Shorter hospital stay
- Less postoperative pain
- Decreased incidence of ventral hernia
- Reduced recovery time with earlier return of bowel function

In 2012, a European consensus conference formulated clinical practice guidelines for laparoscopic adhesiolysis, including recommendations for diagnostic assessment, operative timing, patient selection, conversion criteria, equipment, adjunctive agents, and other concerns<sup>[10]</sup>.

Nonsurgical treatments have been used<sup>[11]</sup>, for example, anti-inflammatory agents, synthetic inert solid barriers, and fibrinolytic agents. However, none of these treatments has proven uniformly effective under all circumstances<sup>[12]</sup>. Consequently, surgical adhesiolysis should be performed promptly for patients for whom surgery is clearly indicated but ought to be reserved for those patients who do not respond satisfactorily to nonsurgical treatment.

## METHODOLOGY

### • Data Sources and Search terms

We conducted this review using a comprehensive search of MEDLINE, PubMed, EMBASE, Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials from January 1, 1990, through October 31, 2017.

### • Data Extraction

Two reviewers independently reviewed studies, abstracted data, and resolved disagreements by consensus. Studies were evaluated for quality. A review protocol was followed throughout.

### Indications

Patient selection is significant in the realization of the procedure. Laparoscopic adhesiolysis has a number of potential benefits, but these benefits are realized only if the procedure is performed in patients best suited for it.

Laparoscopic adhesiolysis is indicated in the following patients:

- Patients with resolved bowel obstruction but with a history of recurrent, chronic small-bowel obstruction demonstrated by a contrast study

- Patients with a complete small-bowel obstruction or partial small-bowel obstruction not resolving with nonoperative therapy, but without signs of peritonitis or bowel perforation or ischemia

Argument occurs concerning whether patients with chronic pelvic pain benefit from laparoscopic adhesiolysis or whether any appearing advantage is a placebo effect. This controversy notwithstanding, the procedure should be offered to patients with chronic pelvic pain if no other etiology of pain is found in the earlier workup.

### Outcomes

For open surgery a simple obstruction adhesiolysis carries a mortality of 5%, and mortality can be 30% or higher when strangulated or necrotic bowel is involved<sup>[13]</sup>. Recurrence rates for adhesive bowel obstruction after conventional or operative management range from 29% to 53% in the literature<sup>[13]</sup>, demonstrating the chronic potential of the problem. In a study of 156 patients, **Yao *et al.*** determined that laparoscopic adhesiolysis led to a higher occurrence of recurrence necessitating additional surgery<sup>[14]</sup>.

A meta-analysis relating laparoscopic versus open adhesiolysis (table 1) in patients with small-bowel obstruction presented that laparoscopic adhesiolysis was allied with a decreased rate of whole complications, prolonged ileus, and pulmonary complications<sup>[15]</sup>. There were no significant differences among the two groups concerning the rate of intraoperative bowel injury, the occurrence of wound infection, or mortality. In a study comparing laparotomy with laparoscopy in 9619 patients with small-bowel obstruction demanding adhesiolysis, **Kelly *et al.*** described that at 30 days, the patients in the laparoscopic adhesiolysis group had lesser rates of major complications and incisional complications than those in the open group, in addition to decreased mortality (1.3% vs 4.7%)<sup>[16]</sup>. In a nonrandomized follow-up of 68 patients over 15 years, **Paajanen *et al.*** determined that adhesiolysis had a long-term positive effect, but even though patients experienced pain relief they still had other abdominal symptoms<sup>[17]</sup>.

**Molegraff *et al.*** studied 100 patients, who were distributed into laparoscopic adhesiolysis or a placebo group with laparoscopy alone. After 12 years, both groups described less pain and enhanced quality of life, but laparoscopy alone was more beneficial in the long run. Consequently, they determined that preventing adhesiolysis, which has increased operative complications, could outcome in lower morbidity and health care costs<sup>[18]</sup>.

**Table 1.** Open Vs Laparoscopic Adhesiolysis Equipment

<b>Open Adhesiolysis</b>	<b>Laparoscopic Adhesiolysis</b>
<b>A standard operating room (OR) with the appropriate personnel and staff is required. The equipment in the OR is that typically needed for any surgical case (eg, a ventilator, other pertinent anesthesia equipment, an operating table, a back-table instrument setup, and a suction and irrigation system).</b>	At least two video monitors are required. Additionally, the surgeon must be prepared to convert to an open procedure; accordingly, a major abdominal tray should be in the room. The laparoscopic instruments needed include the following:
<b>A full laparotomy tray should be available. Depending on the surgeon's preference, an electrocautery, an ultrasonic dissector, or other energy devices can be used to separate adhesions during the operation. Gastrointestinal (GI) and vascular staplers may be beneficial, depending on the extent of the operation.</b>	Three to five trocars Angled laparoscopes (30° or 45°) Laparoscopic bowel graspers Laparoscopic shears Laparoscopic energy dissector (of the surgeon's preference)

**Adhesiolysis Technique**

- **Open Approach to Abdominal Adhesions**

The abdomen is arranged and draped in a sterile fashion. A median incision is made from the subxiphoid area to the suprapubic area, with a curvilinear portion to either side of the umbilicus. If essential, the incision might be lengthy inferiorly as far as the symphysis pubis or superiorly as far as the xiphoid. In reoperative surgery, it is suitable to enter the abdomen in virgin territory (if accessible) and then work from free space into the adhesions. If an old midline incision occurs, the new incision can retrace it in an effort to diminish scarring. After dismemberment through the subcutaneous tissues, the linea alba is recognized and uncovered over the total of the injury. The belt is partitioned painstakingly and forcefully with a surgical tool to permit section into the peritoneal pit. The fascial deformity is tested with a finger to distinguish any circles of gut sticking to the undersurface of the

stomach divider. Any disciple inside is obtusely cleared far from the midline with the finger. The finger goes about as a guide all through this procedure to cause forestall damage to the inside and other intra-stomach structures. After the abdominal cavity is opened, the adhesions to the abdominal wall lateral to the facial incision are taken down and the viscera allowed to fall posteriorly so as to provide working space. The keys here are patience and, again, working from known to unknown. It is important to start where dissection is easy and the anatomy obvious, then work into the more difficult and scarred areas. Regularly, working with delicate footing on the attachments to clarify the life structures of the inside circles demonstrates generally simple. This may require working proximally and distally to the zone of worry before moving toward the reasonable region of hindrance. The reasonable region of deterrent will have enlarged gut proximally and decompressed inside distally <sup>[16, 19]</sup>.

All quadrants of the abdomen are measured for any occult gross pathology or fluid collections. The entire visceral tract, from stomach to rectum, is observed. The ligament of Treitz is recognized, and the small bowel is run up to the terminal ileum.

As the small bowel is prepared, its viability and integrity are evaluated unceasingly, and any problematic adhesions or tethering points are separated and taken down though they do not appear to be responsible for the obstruction. Other adhesions that mat the bowel together requisite not be lysed if luminal contents can be manually milked through the bowel without signs of obstruction.

It is useful to have a nasogastric tube attached to suction throughout the procedure, and the proximal small bowel can be milked in a distal-to-proximal fashion to decompress the distended bowel loops. The optimal extent of adhesiolysis remains subject to debate: some believe that all adhesions should be taken down, whereas others believe that only the adhesions responsible for the obstruction should be separated <sup>[13]</sup>.

Any nonviable ischemic bowel is resected, and an end-to-end or end-to-side anastomosis is completed between feasible, healthy portions of the bowel. Under conditions wherein the integrity of an anastomosis might be conceded (e.g., ongoing local or regional infection, diffuse bowel ischemia, or hemodynamic instability), a diverting ostomy is always a plausible option. If bowel ischemia is current, a reoperation or second-look operation to confirm feasibility is a sound practice. In women, the pelvic anatomy ought to be inspected carefully to ensure that adhesions are not distorting the normal

anatomic relations of the ovaries and fallopian tubes.

- **Laparoscopic Approach to Abdominal Adhesions**  
**Access to abdominal cavity and insufflation**

Since most patients experiencing laparoscopic adhesiolysis have experienced earlier abdominal surgery, additional care should be taken in placing the first trocar and forming pneumoperitoneum. Preferably, the initial trocar ought to be placed 5-10 cm away from the patient's previous scar. For instance, the left upper quadrant can be a safe place to put the first trocar if patient has had a previous midline incision. The Hasson (open) technique is favored as it is usually a safer technique for accessing the abdominal cavity, particularly in dealing with dilated bowel loops and adhesions<sup>[20]</sup>.

#### **Placement of trocars**

As soon as the first trocar is positioned, the aim is to deliver suitable visualization and working space to permit insertion of the remaining trocars. At least three and as many as five trocars are used. Depending on the available laparoscopes, one can use three 5-mm trocars or one 11-mm trocar for the camera and two 5-mm trocars for the laparoscopic instruments. Good triangulation should be planned on the basis of the planned site of dissection. Further trocars ought to be placed as needed.

#### **Dissection of adhesions**

Adhesions to the abdominal wall ought to be taken down first with laparoscopic scissors. Recognizing the white line where the abdominal wall peritoneum meets the adhesions enables dissection in a bloodless plane. On the off chance that the patient has a ventral hernia, delicate weight can be put on the outside stomach divider to permit withdrawal and representation of the entrails appended to the hernia sac. Limit and sharp dismemberment is wanted to utilization of the electrocautery in light of the fact that the warmth can be transmitted to contiguous gut and can cause warm damage and aperture. Vitality gadgets might be utilized if satisfactory room exists and in the event that it is sure that no inside is covered up in the adhesions.

Adhesiolysis can be carefully implemented if dissection is completed cautiously through avascular planes. The laparoscopic method prevents feeling through these adhesions. Therefore, a common rule that can be followed in this setting is, If you can see through it, you can cut it. If the anatomy is still imprecise in spite of meticulous dissection, changing the position or the angle of the camera might yield better visualization of the bowel loops. It cannot be emphasized too strongly that the surgeon should feel free to place extra trocars as needed. The 5-mm port

sites do not need fascial closure and do not add much to the length of the process or to the danger of hernia. Therefore, adding more 5-mm trocars to facilitate the procedure adds less morbidity than changing to an open midline incision would.

When a point of obstruction is not obviously defined, the bowel ought to be run until all doubtful bands are removed. Upon completion of the case, it is desirable to run the bowel twice to guarantee that there are no missed serosal injuries or enterotomies. Any injuries that are recognized ought to be repaired laparoscopically in a single layer. However, if the surgeon is not comfortable repairing bowel laparoscopically, the injured bowel ought to be grabbed with a laparoscopic locking bowel grasper so that it can simply be brought out through a midline abdominal incision (typically made by extending one of the port-site incisions) and repaired in an open fashion<sup>[2, 3]</sup>.

#### **Surgical pearls**

Identification of tissue planes is important. Learn to identify the interface of two different tissue types, and cut perpendicular to the bowel wall. If a bowel injury arises, repairing a straight laceration is easier. Start in an area that is easy. Taking down the adhesions that are easy to take down might facilitate working in areas that are tougher to handle. Endeavor to get a feeling of the tissue. A few patients have tissue that will tear effectively, though others have tissue that promptly allows limit dismemberment. An individualized way to deal with every patient's tissues is vital. If you feel you are not making progress, pick a time at which you will convert to an open procedure if you are still struggling; this permits peace of mind as you continue to work laparoscopically. If you are making progress when the chosen time is reached, continue with the laparoscopic approach; if not, convert. Never be afraid to convert to an open procedure. Patient safety is the most important metric.

#### **CONCLUSION**

Laparotomy with open adhesiolysis has been the treatment of choice for acute complete bowel obstructions. Patients who have partial obstructions, with some enteric contents traversing the obstruction, might similarly require surgery if nonoperative measures fail. However, operation often leads to formation of new intra-abdominal adhesions in many patients, which may necessitate another laparotomy for recurrent bowel obstruction in the future.

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