Prospective Study Evaluating Laparoscopic Management of Adhesive Intestinal Obstruction

AHMED SALAH SHALABY, M.Sc. and MOHAMED MOSTAFA EL-SHEIKH, M.D.
The Departments of General Surgery, GIT & Laparoscopic Surgery Unit, Faculty of Medicine, Tanta University

Abstract

Background: The development of adhesions leading to small bowel obstruction (SBO) has been universally recognized by surgeons ever since abdominal operations have been performed. Laparotomy to treat adhesive SBO seems a paradox as laparotomy is the most common cause of adhesive SBO currently.

Aim: The aim is to evaluate laparoscopic adhesiolysis in the management of adhesive intestinal obstruction as regard feasibility, post-operative pain and hospital stay.

Patient and Methods: This study was carried out on 14 patients, 18-53 years, presented with signs and symptoms of intestinal obstruction with previous abdominal surgical history. Patients were initially given supportive treatment in the form of insertion of nasogastric tube for decompression, Urinary catheter, intravenous fluids, antibiotics till resuscitation and correction of metabolic and electrolyte disturbance if present. Then treated by laparoscopic adhesiolysis within 48 hours of conservative management. Recording the data of timing of intervention from beginning of the symptoms, the operation time, the success rate, the incidence of complications, the length of the hospital stay and conversion to open laparotomy and data of follow-up.

Results: Total operative time rang from 40-190 minutes which was statistically significant in correlation with bowel edema, types of adhesions, attacks of recurrence and previous abdominal operations with a \( p \)-value 0.039, 0.015, 0.024, 0.042 respectively. There was statistical significant of total hospital stay in correlation with timing of intervention and operative time, \( p \)-value 0.041, 0.032 respectively.

Conclusions: The convenience of laparoscopic management of the correctly selected patients with small bowel obstruction is demonstrated by operative time, short hospital stay, and early oral intake and especially by the lower post-operative morbidity.

Key Words: Adhesiolysis - Laparoscopic – Intestinal obstruction – Adhesive

Key Messages: Developing selection criteria and predictive factors for achieving the best results for laparoscopic management of adhesive small bowel obstruction may be helpful.

Introduction

Acute intestinal obstruction is one of the most common surgical emergencies. Small bowel is the site of obstruction in most patients (76%) and adhesions following open surgery are the most common etiology (65%) [1]. Postoperative intraabdominal adhesions are associated with significant rehospitalization rates and costs [2].

Laparoscopic approach has been used more frequently in the management of acute SBO since Bastug published the dissection of a single band with this approach in 1991 [3]. The conversion rate is relatively low, Patients benefit from shorter hospital stays, less postoperative pain and especially less postoperative morbidity and a reduction in the formation of possible new postoperative adhesions [4].

Aim and objectives

The aim of the study is to evaluate laparoscopic adhesiolysis in management of adhesive intestinal obstruction as regard feasibility, post-operative pain and hospital stay.

Patients and Methods

This prospective study was carried out in the Gastrointestinal and Laparoscopic Surgery Unit, General Surgery Department, Tanta University Hospitals in the period between 1st of June 2015 and 30th of May 2016 on 14 patients of both sex, 18-53 years old who presented by symptoms and signs of intestinal obstruction with previous history of abdominal operations, Patients with delayed presentation of symptoms, with strangulation or peritonitis, with suspected peritoneal carcinosis, with abdominal malignancy or after radiotherapy or patients with more than three abdominal operations were excluded from the study.
Preoperative assessment by: History taking, clinical examination, laboratory investigations including: CBC, liver and renal function tests. Sodium and potassium, imaging studies including plain X-ray, abdominal US and CT scan with contrast to rule out other pathology causing obstruction rather than adhesions (Fig. 1).

Patients were initially given supportive treatment in the form of insertion of nasogastric tube for decompression, Urinary catheter, intravenous fluids, antibiotics till resuscitation and correction of metabolic and electrolyte disturbance if present. Then were treated by laparoscopic adhesiolysis within 48 hours of conservative management (Table 1).

The patient was put in supine position on the operating table which was compatible with the free movement of the surgical team around it according to the site of adhesions. The arrangement of the surgical team depend on the site of adhesions and might change several times in one case according to working ports and better site of view for adhesions. Careful inspection of the abdominal cavity was performed, (Fig. 2) and the small bowel was run by grasping the bowel with two a traumatic graspers (intestinal clamp instrument) and using hand to hand technique.

We used Ultrasonic shears (Harmonic scalpel, Lotus scalpel), advanced Bipolar machine (Erbee) or monopolar diathermy on Maryland, scissor or hook (according to type and site of adhesions) to divide the bands of adhesions (Fig. 3). The affected bowel was inspected and observed to confirm viability (Fig. 4). Then removal of the trocars was done under vision and closure of the wounds.
Results

It was found that the cases with moderate grade mechanical obstruction in the CT scan had more adhesions intraoperatively in the abdomen with statistically significance of p-value 0.029.

Timing of intervention in our study was within 5 days from the day of start of symptoms ranging 2-5 days and was found statistically significant in correlation with abdominal distension, vomiting, US findings and CT data p-value 0.023, 0.001, 0.021, 0.020 respectively (Table 2).

Total operative time ranged from 40-190 minutes with mean 70.36. And was found to be statistically significant in correlation with bowel edema, types of adhesions, attacks recurrence and previous abdominal operations p-value 0.039,0.015, 0.024, 0.042 respectively (Table 3).

Total hospital stay ranged from 4-10 days with mean 4.79. And was found to be statistically significant in correlation with timing of intervention and operative time, p-value 0.041, 0.032 respectively.

One case (7.1%) converted to open surgery due to small bowel injury, also one case (7.1%) was explored due to post-operative peritonitis caused by thermal injury to ascending colon Laparotomy and primary repair was done. Superficial wound infection occurred in the umbilical port in one case and in wounds of laparotomy in two cases (21.4%).

Table (1): Types of previous operations for included cases in this study.

<table>
<thead>
<tr>
<th>Surgical history</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendectomy (Grid iron incision)</td>
<td>8</td>
<td>57.1</td>
</tr>
<tr>
<td>Para umbilical hernia (Transverse incision)</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>caesarian section (Pfannenstiel incision)</td>
<td>3</td>
<td>21.4</td>
</tr>
<tr>
<td>Open cholecystectomy (Kocher incision)</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>Hysterectomy (Pfannenstiel incision)</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>Exploration (Transverse, midline incision)</td>
<td>2</td>
<td>14.3</td>
</tr>
<tr>
<td>Spleenectomy (Para median incision)</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>Bilateral Oophorectomy (Pfannenstiel incision)</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>Resection anastomosis (Midline incision)</td>
<td>1</td>
<td>7.1</td>
</tr>
<tr>
<td>Ovarian cyst (Pfannenstiel incision)</td>
<td>1</td>
<td>7.1</td>
</tr>
</tbody>
</table>

Table (2): Correlations to timing of intervention.

<table>
<thead>
<tr>
<th>Timing of intervention</th>
<th>Range</th>
<th>Mean±S. D</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distention:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2–5</td>
<td>3.36±0.55</td>
<td>2.314</td>
<td>0.032*</td>
</tr>
<tr>
<td>No</td>
<td>2–3</td>
<td>2.67±0.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vomiting:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilious</td>
<td>3–5</td>
<td>4.02±0.63</td>
<td>20.074</td>
<td>0.001*</td>
</tr>
<tr>
<td>No</td>
<td>2–3</td>
<td>2.63±0.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowel caliber:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>2–3</td>
<td>2.5±0.58</td>
<td>3.524</td>
<td>0.021*</td>
</tr>
<tr>
<td>Distended</td>
<td>3–4</td>
<td>3.75±0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>2–3</td>
<td>2.5±0.71</td>
<td>3.584</td>
<td>0.020*</td>
</tr>
<tr>
<td>Moderate</td>
<td>3–5</td>
<td>3.83±0.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dilated</td>
<td>2–4</td>
<td>3.14±1.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital stay:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td></td>
<td></td>
<td>0.041*</td>
</tr>
</tbody>
</table>
Adhesions:
Attacks:
Period even longer than 10 days before proceeding to surgical intervention appears to be safe. (Assalia et al.)

Hospital stay:
Previous operations:
Bowel edema:

In the study of (Wullstein et al.) [10] showed a mean operative time in his totally laparoscopic group was 83 minutes and in intended laparoscopic group with conversion was 103 minutes. And for (Kelly et al.) [11] had mean operative time was 77.2 minutes. And with (Poves et al.) [12] as his mean operative time was 72 minutes. While (Byrne et al.) [13] had a mean operative time was 13 1.2 minutes. And (Borzellino et al.) [14] had a mean operative time was 118 minutes with rang 30-230 minutes. This was comparable with this study in which the mean operative time was 70.36 min.

There was (7.1%) conversion in this study (carried on 14 patient) which was comparable to other studies as (O’Connor et al.) [15]. In a review of the literature that included 29 series and more than 2000 cases, showed an overall conversion rate of 36%, even though in cases of single adhesions this decreased to 27%. (Ghosheh and Salameh) [16] in their review reported a morbidity rate of 15.5% and a mortality rate of 1.5%.

Our results (oral feeding started 1-3 days after operations) echo those of (Poves et al.) [12] as day of start of oral intake 1.8 ±0.9, and the day of start of oral feeding was delayed. (Wullstein et al.) [10] showed earlier resumption of regular diet 5.1 days and it was earlier in comparison to open group in his study. (Johnson et al.) [17] and (Okamoto et al.) [18]reported in their retrospective series Reduction in time to recovery of GI function and shorter length of stay (LOS) in patients undergoing laparoscopic management of adhesive SBO.

Complications in the study occurred in One case (7.1%) that showed post-operative early peritonitis. 3 cases (21.4%) had post-operative superficial wound infection, 2 of them at incision of laparotomy (converted and complicated cases) and one case at umbilical port site. One case (7.1%) had post-operative atelectasis and chest infection.

Kelly et al., [11] demonstrated that there were significant reduction in rates of wound infection and pneumonia in patients undergoing laparoscopic compared to open adhesiolysis, (Hashimoto et al.) [19]had in his study a morbidity rate of 3 1.1% Pneumonia and acute respiratory distress syndrome (ARDS) were the most frequent complications. Li et al., [20] in his systematic review and meta-analysis found that laparoscopic adhesiolysis to be associated with a reduced overall complication rate.

Discussion

Even though different series have demonstrated that laparoscopic approach is safe and effective in selected cases, [1] the reality in daily practice is that there is still a low percentage of patients treated with this approach [3].

Grafen et al., [6] found that patients with adhesive small bowel obstruction who previously had undergone appendectomy or cholecystectomy alone could all be successfully managed laparoscopically.

CT imaging in this study showed that the cases with moderate grade mechanical obstruction in the CT scan had more adhesions in the abdomen, as in (Jabra et al.) [7] found the sensitivity of CT in revealing small bowel obstruction was determined to be 87%, its specificity was 86% and its accuracy was 86%.

There was delayed intervention in cases with sever distention (11 cases) and vomiting (6 cases) in which electrolyte disturbance and bad general condition were the main reasons for delayed intervention. There was also delayed intervention in cases with increasing diameter of the bowel in US (10 cases) and increasing grade of mechanical obstruction in CT (7 cases). Shih et al., [8] added that With closely monitoring and in the absence of signs suggestive of complications, an observation period even longer than 10 days before proceeding to surgical intervention appears to be safe. (Assalia et al.) [9] recommended that operation should be considered for any patient with bowel obstruction which does not improve after 48h of conservative treatment.

In the study of (Wullstein et al.) [10] showed a mean operative time in his totally laparoscopic group was 83 minutes and in intended laparoscopic group with conversion was 103 minutes. And for (Kelly et al.) [11] had mean operative time was 77.2 minutes. And with (Poves et al.) [12] as his mean operative time was 72 minutes. While (Byrne et al.) [13] had a mean operative time was 13 1.2 minutes. And (Borzellino et al.) [14] had a mean operative time was 118 minutes with rang 30-230 minutes. This was comparable with this study in which the mean operative time was 70.36 min.

There was (7.1%) conversion in this study (carried on 14 patient) which was comparable to other studies as (O’Connor et al.) [15]. In a review of the literature that included 29 series and more than 2000 cases, showed an overall conversion rate of 36%, even though in cases of single adhesions this decreased to 27%. (Ghosheh and Salameh) [16] in their review reported a morbidity rate of 15.5% and a mortality rate of 1.5%.

Our results (oral feeding started 1-3 days after operations) echo those of (Poves et al.) [12] as day of start of oral intake 1.8 ±0.9, and the day of start of oral feeding was delayed. (Wullstein et al.) [10] showed earlier resumption of regular diet 5.1 days and it was earlier in comparison to open group in his study. (Johnson et al.) [17] and (Okamoto et al.) [18]reported in their retrospective series Reduction in time to recovery of GI function and shorter length of stay (LOS) in patients undergoing laparoscopic management of adhesive SBO.

Complications in the study occurred in One case (7.1%) that showed post-operative early peritonitis. 3 cases (21.4%) had post-operative superficial wound infection, 2 of them at incision of laparotomy (converted and complicated cases) and one case at umbilical port site. One case (7.1%) had post-operative atelectasis and chest infection.

Kelly et al., [11] demonstrated that there were significant reduction in rates of wound infection and pneumonia in patients undergoing laparoscopic compared to open adhesiolysis, (Hashimoto et al.) [19]had in his study a morbidity rate of 3 1.1% Pneumonia and acute respiratory distress syndrome (ARDS) were the most frequent complications. Li et al., [20] in his systematic review and meta-analysis found that laparoscopic adhesiolysis to be associated with a reduced overall complication rate.
The mean total hospital stay mean was 5.5 days and increased in converted case and also in complicated case agreed with us (Kelly et al.) [11] who showed a significant reduction in mean LOS in patients undergoing laparoscopic adhesiolysis with mean (4.7) days. (Mancini et al.) [5] also observed a 27% shorter LOS in their laparoscopic group and comparable to (Byrne et al.) [13] Post-operative LOS was significantly lower in patients who underwent laparoscopy with patients being discharged at a range(3–8)days after surgery.

Conclusions:
Laparoscopic management of small bowel obstruction appears to offer the advantage of decreased overall morbidity, earlier return of bowel function, decreased length of hospital stay and faster return of full activity.

The surgeon’s experience was a major factor on successful laparoscopic adhesiolysis. Needless to say, experience in advanced laparoscopic surgery appeared advisable for the treatment of patients with more extensive adhesion formation.

Performing an accurate selection of obstructed patients is essential in order to avoid an increase in morbidity due to laparotomy conversion.

Conversion should not be viewed as a sign of failure; instead, it represents good clinical judgment.

Acknowledgments:
This research was carried out without funding.

Conflicts of interest:
No conflicts of interest declared.

Authors’ Contributions:
All authors had equal role in design, work, statistical analysis and manuscript writing.

References
17- JOHNSON K.N., CHAPITAL A.B., HAROLD K.L., MERRITT M.V. and JOHNSON D.J.: Laparoscopic man-
Prospective Study Evaluating Laparoscopic Management of Adhesive Intestinal Obstruction


Tقييم علاج حالات الانسداد المعوي نتيجة الالتهابات

بعد الانتشار المعوي بصورة عامة والإنساتي ما بعد العمليات الجراحية بصورة خاصة، فلا يتأثرها في واقتنا الذيين.

ويلاحظ إلى ما يميز مناظر البطن الجراحية ويجعلها تمت العملية الإملاء للتكبش المشهكة نجد أنها تتميز بالاتي:

1- الق 마련 في استعمال الالتهابات المعوية للمشكلة دون التسبب في مزيد من الالتهابات.

2- قصة مدى الاستجابة بالمضادات بما يمثل التخفيف من كاهل الدوام في تفاقم الالتهاب.

3- تجنب مشكلة الجروح ما بعد عمليات الاستئصال وسرعه تأهيل المريض ومراعاة حياةه الطبيعية.

وقد تمت هذه الدراسة على 14 مريض كانوا يعانون من أعراض الانسداد المعوي الإنساتي حيث أجريت لهم عمليات جراحية في وقت سابق ثم دخل الحالات إلى قسم الجراحة وبدأت جراحة الجهاز الهضمي والمناظر، وتجهيزها بالعلاج التحيطي المبدئي إلى الشق الجراحي عن طريق منظور البطن.

عند الشق بالمناظر الجراحية وجدت أنواع مختلفة من الالتهابات منها ما هو بين الأجسام جداً بيد البطن وبين الإمساك، وبعضها تم التعامل معهم بالوسائل المختلفة للك الالتهابات ونهاية واحدة تم استعمال العملية عن طريق الشق الجراحي بعد أن تحققت للك الالتهابات بالمناظر الجراحية وذلك لوجود إمكانيات للإمساك الدقيق احتاجت لاستعمال وإعادة التوصيل وحالة أخرى تم إعادة استئصالها عن طريق الشق الجراحي في خلال أربعة وعشرون ساعه من الشق بالمناظرة نتيجة التهاب بريتوني ثم أصلح تقب بالفوتو من الصعوب بغزير أولاية.

والمستقبل الحوص على أفضل النتائج فإن هناك بعض العوامل والتراتب التي أدت إلى الجراحين في تطويرها حتى تصل إلى يوم ما أن تكون

ما يمثل ثواب في اختيار الحالات المناسبة للك الالتهابات بالمناظر الجراحية للحصول على أفضل النتائج وتحقيق المضاعفات والتي منها:

1- تقييم المريض عن طريق جراحين بحاجة حصولها في خلال 48 ساعه من الأعراض أو بعد 48 ساعه من العلاج.

التحفيز الناجح، المريض إلى الإنسات غير الكامل.