

## INDEPENDENT FACTORS FOR SMALL BOWEL OBSTRUCTION IN JORDANIAN PATIENTS POST EXPLORATORY LAPAROTOMY FOR TRAUMA

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### Abstract

#### Keywords:

Laparotomy; trauma; early postoperative small bowel obstruction; factors.

**Objective:** To assess the frequency and factors for small bowel obstruction after surgery in patients post exploratory laparotomy for trauma.

**Methods:** This prospective and double blind investigation had 145 participants, males and females, 41.3-64.5 years and who were exposed to exploratory laparotomy for trauma at Prince Rashed military hospital, Irbid, Jordan and King Talal military hospital, Al Mafraq, Jordan during the period Nov 2015-Mar 2018. Small bowel obstruction after surgery is the existence of clinical features of obstruction between 7 days and 30 days after surgery or an obstruction presenting during postoperative 4 weeks and persisting over one week.

Univariate analysis was achieved to assess patients having (Group I, n=32 patients) or not (Group II, n=113 patients) early postoperative small bowel obstruction, Continuous parameters and categorical parameters were assessed. Logistic regression was evaluated to recognize remarkable factors of small bowel obstruction after surgery. A P-value of less than 0.05 was remarkable.

**Results:** 32 patients (22.1%) experienced early postoperative small bowel obstruction. Multivariate logistic analysis found male gender ( $P < 0.05$ ) and Abbreviated Insult Scale for mesenteric insult ( $P < 0.05$ ) as remarkable factors for postoperative small bowel obstruction.

**Conclusion:** The frequency of early postoperative small bowel obstruction was 22.1%. Male gender and Abbreviated Insult Scale score for mesenteric insult were remarkable independent risk factors for early postoperative small bowel obstruction post exploratory laparotomy for trauma.

### Introduction

Postoperatively, as the paralytic condition persists one day in the small bowel and 3 days in the large bowel, it is hard to distinguish postoperative small bowel obstruction from paralytic ileus post- surgery (1). Early postoperative small bowel obstruction is the obstruction presenting during 30 days post abdominal surgery (2). Early postoperative small bowel obstruction influences morbidity and health care economical burden. Post-laparotomy in trauma subjects, early postoperative small bowel obstruction causes postponing other required surgery and hence postponing discharge and consequently extra health care economical burden.

Postoperative small bowel obstruction must be distinguished from adhesive small bowel obstruction. Adhesive small bowel obstruction presents at a period far from the surgery (2). The frequency of early postoperative small bowel obstruction varied between 0.3% and 26.9% within traumatic and non-traumatic patients in different investigations (3) and small bowel obstruction was described by others as an ileus presenting after more than 6 months postoperatively(4).

The goal of our investigation was to study the frequency of early postoperative small bowel obstruction post laparotomy in trauma subjects and to recognize the factors of early postoperative small bowel obstruction.

## Methods

Our prospective and double blind investigation included 145 participants, of both sexes, aged 41.3-64.5 years and who were exposed to exploratory laparotomy for trauma at Prince Rashed military hospital, Irbid, Jordan and King Talal military hospital, Al Mafraq, Jordan, during the period Nov 2015-Mar 2018, after obtaining written informed consent from all subjects and approval from our local ethical and research board review committee of the Royal medical services, KHMC, Jordan. Early postoperative small bowel obstruction is the existence of clinical features of obstruction between day 7 and day 30 after surgery or an obstruction presenting during 30 days after surgery and persisting more than 7 days (3). Paralytic ileus occurs 48–72 hours after surgery. Inclusion criteria were age between 41.3 and 64.5 years and exploratory laparotomy for trauma. Exclusion criteria were age below 14 years and surgery at a different center.

Patients' characteristics in addition to insult mechanism, age, gender, Insult intensity Score, Abbreviated Insult Scale scores for different parts of the body, and results were evaluated. Early postoperative small bowel obstruction was positively diagnosed by plain abdominal x-ray, CT-scan or contrast investigation.

## Statistics

Univariate analysis was achieved to assess patients having (Group I, n=32) or not (Group II, n=113) early postoperative small bowel obstruction,. Continuous parameters were evaluated using the Mann-Whitney U-test and categorical parameters were assessed using chi-square test. Logistic regression was used to recognize remarkable risk factors of early postoperative small bowel obstruction. Students t test and Chi square test were used to calculate P value. A P-value of less than 0.05 was considered statistically significant.

## Results

The frequency of early postoperative small bowel obstruction was 22.1% (Table I).Early postoperative small bowel obstruction was more commonly found in men subjects (87.5%) ( $P < 0.05$ ). The AIS score for mesenteric insult in patients with small bowel obstruction after surgery was remarkably more than in patients having no postoperative small bowel obstruction. (46.9%, 15.9%,  $P < 0.05$ ). Patients with early postoperative small bowel obstruction experienced more pelvic or leg fractures than patients without early postoperative small bowel obstruction (37.5%, 23.9%, respectively,  $P < 0.05$ ). Table II.

There were no remarkable discrepancies between groups in terms of small bowel perforation ( $P > 0.05$ ), negative laparotomy ( $P > 0.05$ ) and past abdominal surgery ( $P > 0.05$ ). Table III. Regression found two remarkable risk factors for early postoperative small bowel obstruction in our investigation (Table IV).Male gender ( $P < 0.05$ ) and increased AIS score for mesenteric insult ( $P < 0.05$ ) were factors for postoperative small bowel obstruction.

## Discussion

In our investigation, the frequency of early postoperative small bowel obstruction was 22.1% . Gender and the severity of mesenteric insult were factors for postoperative small bowel obstruction. The frequency of small bowel obstruction after surgery in our investigation is similar to that of other investigations (0.3% to 26.9%) but with differences regarding the data of the investigation participants, the type of obstruction and the period of follow-up (5).The time edge where an ileus after surgery becomes lengthened is variable (1 day - 7 days) (6).

Causes of early postoperative small bowel obstruction include adhesions and others (2). Among 571 trauma subjects (7), the frequency of early small bowel obstruction was 3.9% and gastrointestinal perforation was shown to be a factor of small bowel obstruction. In our investigation, an increased AIS score for mesenteric insult was a remarkable factor for early postoperative small bowel obstruction. Mesenteric blood flow changes caused by mesenteric insult can recover bowel motility. Mesenteric insult is caused by severe hemorrhage as mesentery has affluent blood vessels, caused by bowel edema. Intraperitoneal contamination of bowel perforation was not associated with early postoperative small bowel obstruction. Surgery beneath the transverse mesocolon led to high risk, but that in the abdomen reduced the small bowel obstruction (8). In our investigation, gastrointestinal surgery was not a factor. Small bowel obstruction is an obstructive clinical feature during the bowel function during 30 days of laparotomy and positively diagnosing obstruction at re-surgery with a frequency of 0.7%. (8). Comparing abdominal trauma with scheduled operation, bowel penetration have an increased factor and history of abdominal surgery is not a factor for small bowel obstruction during 6 months (4).

Regarding early postoperative small bowel obstruction in non-trauma patients, only previous surgery was a factor of postoperative small bowel obstruction and early postoperative small bowel obstruction was a factor for small bowel obstruction (9). Among colorectal cancer patients, male gender, transfusion and surgery period more than 3hrs were factors of small bowel obstruction (10). Prolonged surgery period is correlated with the patient's intensity, difficulty of surgery, administering more crystalloids or colloids, and more maneuvering of the bowel which lead to ileus after surgery (10).

In our investigation, patients with early postoperative small bowel obstruction were exposed to a longer surgery (more than 2.2 hrs) but without significance. Male gender was a factor of small bowel obstruction. Male gender was a factor for ileus post colon operation (5). This outcome was due to the surgical difficulty of the anatomical male pelvis. Volume of blood and crystalloids administered were factors for ileus after surgery (8). The administration of crystalloid during surgery may lead to intestinal edema and reduce bowel motility causing ileus after surgery.

Pelvic or leg fracture patients demonstrated an increased frequency of early postoperative small bowel obstruction, but without statistical significance. Mobilization itself didn't decrease the period of ileus postoperatively (11). There is little proof that timing of mobilization speedup the recovery of ileus after surgery. Adhesion of bowel which are not under the surgical incision and reduced bowel motility can have role in small bowel obstruction (12).

Our investigation has limitations. Choice of the surgery technique was according to the surgeon's skill level and expertise. The study group is small. Patients with surgical period more than 2.2 hours were significantly more in group having early postoperative small bowel obstruction than in group having no early postoperative small bowel obstruction.

## Conclusion

Factors anticipating the small bowel obstruction were male gender and an increased AIS score for mesenteric insult.

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Table I. Overall patients' data

	Mean	NO	%
Age (years)	53.4		
Gender M		105	72.4
F		40	27.6
Body mass index (kg/m <sup>2</sup> )	23.4		
Surgical period (hr)	2.2		
Early postoperative small bowel obstruction		32	22.1

Table II. Comparison between study patients groups.

	G I (n=32)			G II (n=113)			P
	Mean	NO	%	Mean	NO	%	
Age(years)	52.6			54.6			>0.05
Gender							
Male		28	87.5		77	68.1	<0.05
Female		4	12.5		36	31.9	
Insult							
Blunt		29	90.6		95	84.1	
Penetrating		3	9.4		18	15.9	
SBP<90 mmHg at presentation		12	37.5		35	30.97	>0.05
AIS > 3							
Head		2	6.3		6	5.3	>0.05
Chest		11	34.4		35	30.97	>0.05
Abdomen		30	93.8		101	89.4	>0.05
Extremity		6	18.8		14	12.4	>0.05
Pelvis		2	6.3		6	5.3	>0.05
Fracture							
Leg or pelvic		12	37.5		27	23.9	<0.05

*Table III. Surgical data*

	<b>G I (n=32)</b>		<b>G II (n=113)</b>		<b>P</b>
<b>Small bowel perforation</b>	7	21.9	20	17.7	>0.05
<b>Negative laparotomy</b>	0	0	2	1.8	>0.05
<b>Past abdominal surgery</b>	4	12.5	16	14.2	>0.05
<b>Mesentery insult</b>	15	46.9	18	15.9	<0.05

*Table IV. Multivariate logistic regression*

<b>Factors</b>	<b>P</b>
<b>Male gender</b>	<0.05
<b>Surgical period more than 2.2 hrs</b>	>0.05
<b>AIS for mesenteric insult</b>	<0.05
<b>Pelvic or leg fractures</b>	>0.05