

# Frequency of Postoperative Ileus after Exploratory Laparotomy in Patients Admitted at Tertiary Care Hospital

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## ABSTRACT

**Introduction:** To determine the frequency of postoperative ileus after exploratory laparotomy in patients admitted at Tertiary Care Hospital, Karachi.

**Study Design:** Descriptive cross-sectional study.

**Place and Duration of Study:** Study was conducted at Department of Surgery, Jinnah Postgraduate Medical Center (JPMC), Karachi, from June 2018 to June 2021.

**Methods:** Data was prospectively collected from patients after taking a verbal consent. 165 patients who met the diagnostic criteria were included. Quantitative data was presented as simple descriptive statistics giving mean and standard deviation and qualitative variables was presented as frequency and percentages. Effect modifiers were controlled through stratification to see the effect of these on the outcome variable. Post stratification chi square test was applied taking p-value of  $\leq 0.05$  as significant

**Results:** A total of 165 patients underwent exploratory laparotomy were included in this study. Mean age, duration of surgery, duration of symptoms, height and weight in our study was  $44.21 \pm 7.24$  years,  $2.12 \pm 1.65$  hours,  $10.35 \pm 3.21$  hours,  $148.11 \pm 18.47$  cm and  $58.21 \pm 11.25$  respectively. 76 (46.1%) were male and 89 (53.9%) were female. Out of 165 patients, 42 (25.5%) and 123 (74.5%) had and did not have postoperative ileus.

**Conclusion:** Postoperative ileus occurs commonly after abdominal operations and is one of the limiting factors preventing early hospital discharge. Enhanced recovery programs, grouping together all measures for prevention or cure of POI by addressing the mechanisms of POI can reduce the duration of hospitalization, morbidity and interval to resumption of transit.

**Keywords:** Postoperative ileus, surgery, mortality, morbidity and exploratory.

## INTRODUCTION

Abdominal surgical emergencies are common and often present diagnostic and treatment challenges in the resource-limited countries like Pakistan.<sup>1</sup> Abdominal surgical emergencies pose a reasonably large burden to health care set up, particularly in poorly resourced areas, with a lack of advanced medical facilities.<sup>2</sup> The major causes of abdominal emergencies vary from region to region, and many factors may alter their presentation.<sup>3</sup> Postoperative ileus (POI) has become a public health problem because of its role in postoperative morbidity and increased hospital stay.<sup>4</sup> The consequences of POI can be severe since it causes gastrointestinal stasis with a risk of nausea and vomiting, which can be complicated by pulmonary aspiration.<sup>5-6</sup> Besides this extremely serious complication, POI may also cause dehydration, electrolyte imbalance, or sepsis.<sup>7</sup>

The clinical features are vomiting, constipation, abdominal distension and pain, with difference in magnitude according to the cause and the site of intestinal obstruction.<sup>8</sup> Small bowel obstruction is partial or complete interference with the distal passage of the contents in the small intestine. Large bowel becomes obstructed 3-4 times less frequently than the small bowel.<sup>9</sup> Early diagnosis is the key to success as the mortality rate rises with each passing hour from the onset of disease.<sup>10-11</sup> It is usually classified as dynamic or mechanical obstruction, in which peristalsis works and the other variety is called adynamic obstruction in which peristalsis ceases and no true propulsive waves occur as in paralytic ileus or mesenteric vascular occlusion.<sup>12-13</sup> Absolute constipation, which was considered to be one of the cardinal features, should be excluded from the features as it takes at least 24 hours to develop.<sup>14</sup> ERAS management protocols include preoperative measures (patient information, sweetened oral liquids, no bowel preparation, avoidance of routine anxiolytic premedication, reduction of preoperative fasting period to 2 hours for liquids and 6 hours for solids), intraoperative measures (preference for laparoscopic approach, avoidance of bladder, gastric and abdominal drains, optimal fluid replacement based on suitable monitoring, avoidance of long-acting opioids, active measures to combat hypothermia, nausea and vomiting), and

postoperative measures.<sup>15-16</sup> Venara et al. meta-analysis found that the prevalence of postsurgical ileus ranging from 10-30% in patients who were admitted and underwent exploratory laparotomy.<sup>16</sup> The study aims to determine the frequency of postoperative ileus after exploratory laparotomy in order to establish the local perspective. The data regarding postoperative ileus shows variations from one country to another with very few studies have been done in our population.<sup>16</sup> Failure to restore adequate bowel function after surgery generates a series of complications and it is associated with patients frustration and discomfort, worsening their perioperative experience. Moreover, JPMC is a Tertiary Care Hospital catering to a large number of patients coming from all over the country. Hence results from this study would form the benchmark that will be shared with other health care facilities, which will help in the development of management guidelines for patients undergoing exploratory laparotomy and prevent development of postoperative ileus.

## METHODOLOGY

This study was conducted after approval from the institutional ethical review committee. Brief history was taken about the duration of symptoms, demographic data (age, gender and place of residence) and written informed consent in local language (Urdu) was taken from each patient. Inclusion criteria includes, patients admitted to surgical ward who underwent exploratory laparotomy were included in the study, either gender, ASA  $\leq 2$ , age 20-60 years. And exclusion criteria include non-consenting patients, patients with history of hospitalization within the last month, patients with history of recent infection like pneumonia, UTI or cellulitis, patient with history of hypothyroidism or hyperthyroidism, Patients presenting  $\geq 7$  days, patients with history of malignancy, pregnant patients assessed by history and confirmed by dating scan, patients with history of asthma, congestive cardiac failure, chronic liver disease, COPD and stroke

Patients were followed and evaluated for the development of postoperative ileus as per operational definition. The findings of quantitative variables like (age, height, weight, duration of symptoms and duration of surgery) and qualitative variables like

(gender, hypertension, diabetes mellitus type II, BMI  $\geq 27.5$  kg/m<sup>2</sup> status, previous history of surgery, drain use status, hospital stay status, morphine use status and postoperative ileus) was entered in proforma attached as annexure

Data was analyzed on SPSS Version 20. Mean and standard deviations was calculated for the quantitative variables like age, height, weight, duration of symptoms and duration of surgery. Frequencies and percentages was calculated for the qualitative variables like gender, hypertension, diabetes mellitus type II, BMI  $\geq 27.5$  kg/m<sup>2</sup> status, previous history of surgery, drain use status, hospital stay status, morphine use status, and postoperative ileus (Yes/No). Effect modifiers will be controlled through stratification of age, gender, hypertension, diabetes mellitus type II, BMI  $\geq 27.5$  kg/m<sup>2</sup> status, previous history of surgery, drain use status, hospital stay status, morphine use status, duration of symptoms and duration of surgery to see the effect of these on the outcome variables postoperative ileus. Post stratification chi square test will be applied taking p-value of  $\leq 0.05$  as statistically significant

**RESULT**

Out of 165 patients, the minimum age of the patient was 20 while the maximum age of the patients was 60 years. Mean age in our study was 44.21 years with the standard deviation of  $\pm 7.24$ . Whereas, mean duration of surgery, duration of symptoms, height and weight in our study was  $2.12 \pm 1.65$  hours,  $10.35 \pm 3.21$  hours,  $148.11 \pm 18.47$  cm and  $58.21 \pm 11.25$  respectively. Out of 165 patients, 42 (25.5%) and 123 (74.5%) had and did not have postoperative ileus. 76 (46.1%) were male and 89 (53.9%) were female. 98 (59.4%) and 67 (40.6%) patients were in the age group 20-40 years and 41-60 years respectively (Table 1).

Table 1: Clinical characteristics of patient

Characteristic	Mean $\pm$ sd
Age (years)	44.21 $\pm$ 7.24
Duration of Symptoms (hours)	10.35 $\pm$ 3.21
Duration of Surgery (hours)	2.12 $\pm$ 1.65
Height (cm)	148.11 $\pm$ 18.47
Weight (kg)	58.21 $\pm$ 11.25

Frequency distribution of duration of symptoms showed that out of 165 patients, 98 (59.4%) and 67 (40.6%) had duration of symptoms for < 12 hours and > 12 hours respectively. Frequency distribution of duration of surgery showed that out of 165 patients, 75 (45.5%) and 90 (54.5%) had duration of surgery for < 2 hours and > 2 hours respectively. Frequency distribution of BMI status showed that out of 165 patients, 84 (50.9%) and 81 (49.1%) had BMI  $>27.5$  kg/m<sup>2</sup> and BMI  $<27.5$  kg/m<sup>2</sup> respectively.

Frequency distribution of previous history of surgery showed that out of 165 patients, 17 (10.3%) and 148 (89.7%) had and did not have previous history of surgery respectively. Frequency distribution of drain use showed that out of 165 patients, 33 (20%) and 132 (80%) had and did not have drain use respectively.

Frequency distribution of hospital stay showed that out of 165 patients, 82 (49.7%) and 83 (50.3%) had hospital stay < 5 days and > 5 days respectively. Frequency distribution of morphine use showed that out of 165 patients, 17 (10.3%) and 148 (89.7%) had and did not have morphine use respectively. This information is illustrated in Table 2.

Stratification for age with respect to postoperative ileus showed that 33 (78.6%) and 09 (21.4%) patients who were in the age group 20-40 years and 41-60 years had postoperative ileus respectively. Whereas 65 (52.8%) and 58 (47.2%) patients who were in the age group 20-40 years and 41-60 years did not have postoperative ileus respectively. P-value was 0.02.

Stratification for duration of symptoms with respect to postoperative ileus showed that patients who had the disease for < 12 hours, 10 (23.8%) and 88 (71.5%) had and did not have postoperative ileus respectively. Whereas patients who had the disease for > 12 hours, 32 (76.2%) and 35 (28.5%) had and did not have postoperative ileus respectively. P-value was 0.00.

Table 2: Distribution of patient characteristics

Parameter	N (%)
Age distribution	
20-40 years	98 (59.4%)
41-60 years	67 (40.6%)
Gender distribution	
Male	76 (46.1%)
Female	89 (53.9%)
Distribution of Symptoms	
<12 hours	98 (59.4%)
>12 hours	67 (40.6%)
Duration of Surgery	
<2 hours	75 (45.4%)
>2 hours	90 (54.6%)
Type 2 Diabetes Mellitus status	
Yes	42 (25.5%)
No	123 (74.5%)
Hypertension status	
Yes	34 (20.6%)
No	131 (79.4%)
BMI distribution	
<27.5 kg/m <sup>2</sup>	81 (49.1%)
>27.5 kg/m <sup>2</sup>	84 (50.9%)
History of Surgeries	
Yes	17 (10.3%)
No	148 (89.7%)
Drain use status	
Yes	33 (20%)
No	132 (80%)
Hospital stay duration	
<5 days	82 (49.7%)
>5 days	83 (50.3%)
Morphine use distribution	
Yes	17 (10.3%)
No	148 (89.7%)
Postoperative Ileus distribution	
Yes	42 (25.5%)
No	123 (74.5%)

Stratification for duration of surgery with respect to postoperative ileus showed that patients who had the duration for < 2 hours, 09 (21.4%) and 66 (53.7%) had and did not have postoperative ileus respectively. Whereas patients who had the duration for > 2 hours, 33 (78.6%) and 57 (46.3%) had and did not have postoperative ileus respectively. P-value was 0.00

Stratification for previous history of surgery with respect to postoperative ileus showed that patients who had previous history of surgery, 08 (19%) and 09 (7.3%) had and did not have postoperative ileus respectively. Whereas patients who did not have previous history of surgery, 34 (81%) and 114 (92.7%) had and did not have postoperative ileus respectively. P-value was 0.03.

Stratification for hospital stay with respect to postoperative ileus showed that patients who had stayed < 5 days, 09 (21.4%) and 73 (59.3%) had and did not have postoperative ileus respectively. Whereas patients who had stayed > 5 days, 33 (78.6%) and 50 (40.7%) had and did not have postoperative ileus respectively. P-value was 0.00.

Stratification for morphine use with respect to postoperative ileus showed that patients who had morphine use, 09 (21.4%) and 08 (6.5%) had and did not have postoperative ileus respectively. Whereas patients who did not have morphine use, 33 (78.6%) and 115 (93.5%) had and did not have postoperative ileus respectively. P-value was 0.01. This information is depicted in table 3.

Table 3: Stratification of postoperative Ileus against against characteristics

Parameter	Postoperative Ileus		p-value
	Yes	No	
Age distribution			<0.0001
20-40 years	33 (78.6%)	65 (52.8%)	
41-60 years	9 (21.4%)	58 (47.2%)	
Gender distribution			0.38
Male	18 (42.9%)	58 (47.2%)	
Female	24 (57.1%)	65 (52.8%)	
Distribution of Symptoms			<0.0001
<12 hours	10 (23.8%)	88 (71.5%)	
>12 hours	32 (76.2%)	35 (28.5%)	

Duration of Surgery			<0.0001
<2 hours	9 (21.4%)	66 (53.7%)	
>2 hours	33 (78.6%)	57 (46.3%)	
Type 2 Diabetes Mellitus status			<0.0001
Yes	18 (42.9%)	24 (19.5%)	
No	24 (57.1%)	99 (80.5%)	
Hypertension status			<0.0001
Yes	2 (4.8%)	32 (26%)	
No	40 (95.2%)	91 (74%)	
BMI distribution			0.37
<27.5 kg/m <sup>2</sup>	20 (47.6%)	64 (52%)	
>27.5 kg/m <sup>2</sup>	22 (52.4%)	59 (48%)	
History of Surgeries			0.03
Yes	8 (19%)	9 (7.3%)	
No	34 (81%)	114 (92.7%)	
Drain use status			0.47
Yes	9 (21.4%)	24 (19.5%)	
No	33 (78.6%)	99 (80.5%)	
Hospital stay duration			<0.0001
<5 days	9 (21.4%)	73 (59.3%)	
>5 days	33 (78.6%)	50 (40.7%)	
Morphine use distribution			0.01
Yes	9 (21.4%)	8 (6.5%)	
No	33 (78.6%)	115 (93.5%)	

## DISCUSSION

Postoperative ileus (POI) is a frequent, frustrating occurrence for patients and surgeons after abdominal surgery. Despite significant research investigating how to reduce this multifactorial phenomenon, a single strategy has not been shown to reduce POI's significant effects on length of stay (LOS) and hospital costs. Perhaps the most significant cause of POI is the use of narcotics for analgesia. Strategies that target inflammation and pain reduction such as NSAID use, epidural analgesia, and laparoscopic techniques will reduce POI but are accompanied by a simultaneous reduction in opioid use. Pharmacologic means of stimulating gut motility have not shown a positive effect, and the routine use of nasogastric tubes only increases morbidity.

This study included a total of 165 patients who underwent exploratory laparotomy. Mean age, duration of surgery, duration of symptoms, height and weight in our study was 44.21±7.24 years, 2.12±1.65 hours, 10.35±3.21 hours, 148.11±18.47 cm and 58.21±11.25 respectively. 76 (46.1%) were male and 89 (53.9%) were female. Out of 165 patients, 42 (25.5%) and 123 (74.5%) had and did not have postoperative ileus.

An Indian study found the incidence rate was 9.8%. In 8 (27.6% of PPOI group) patients, it was secondary to other underlying complications. In the remaining 21 (72.4% of PPOI group) cases, it was primary. In 80.9% cases, it was resolved completely by five postoperative days. Using univariate regression analysis, we observed that only the female sex (OR 2.71) was an independent predictor of PPOI development, whereas age >65 years was associated with a lower risk (OR 0.33). Also, patients after procedures involving handling the small bowel were more likely to develop PPOI (OR 2.65). Traditional risk factors for PPOI seem to play a limited role in its development.<sup>17</sup>

Another study found that out of 297 patients, 72 (24.2%) developed EPSBO. The length of hospital stay was significantly longer in patients with EPSBO than in those without EPSBO (median [interquartile range], 34 [21–48] days vs 24 [14–38] days,  $P < 0.001$ ). Multivariate logistic analysis identified male sex (adjusted odds ratio [AOR], 3.026;  $P = 0.008$ ), intraoperative crystalloid (AOR, 1.130;  $P = 0.031$ ), and Abbreviated Injury Scale (AIS) score for mesenteric injury (AOR, 1.397;  $P < 0.001$ ) as independent risk factors for EPSBO. The incidence of adhesive small bowel adhesion after 30 days postoperatively did not significantly differ between the 2 groups (with EPSBO, 5.6% without EPSBO, 5.3%;  $P = 0.571$ ). Most of the patients with EPSBO were recovered by conservative treatment (95.8%).<sup>18</sup>

Another study evaluated preoperative, intraoperative, and postoperative risk factors for developing prolonged ileus in patients that underwent elective colon resection. Postoperative ileus

occurred in 22.3% of the patients. The statistically significant predictors of ileus were obesity (OR 1.119,  $P = .048$ ) and admission to the intensive care unit (OR 3.571,  $P = .050$ ). The use of peridural anesthesia during the surgical act was found to be a protective factor (OR 0.363,  $P = .050$ ). The presence of these risk factors can alert the physician to the need for a closer follow-up in patients at high risk for postoperative ileus, and the use of epidural anesthesia can possibly lower the incidence of ileus.<sup>19</sup>

Another meta-analysis yielded 3233 citations; 54 were eligible, comprising 18 983 patients. Twenty-six studies were prospective [17 of these being randomized controlled trials (RCTs)] and 28 were retrospective. Meta-analysis revealed an incidence of PPOI of 10.3% (95% CI 8.4-12.5) and 10.2% (95% CI 5.6-17.8) for non-RCTs and RCTs, respectively. Significant heterogeneity was observed for both non-RCTs and for RCTs. The used definition of PPOI, the type of surgery and access (laparoscopic, open) and the duration of surgery lead to significant variability of reported PPOI incidence between studies.<sup>20</sup>

Another study included 140 patients with elective abdominal surgery. It was found that these factors were significantly associated with POI. Out of the 140 patients enrolled in the study, appearance of bowel motility within 4 days was in 126 (90.00%) while after 4 days in only 14 (10.0%) patients. This study showed that POI was an undeniable complication of abdominal surgeries; however, it was dependent on a host of factors, including age, type of surgery, category of bowel handling, duration of surgery and electrolyte imbalance. Although most of these are unmodifiable risk factors, however, a skillful handling, selection of appropriate operative technique and fluid management could help to reduce this complication.<sup>21</sup>

## CONCLUSIONS

Postoperative ileus occurs commonly after abdominal operations and is one of the limiting factors preventing early hospital discharge. Enhanced recovery programs, grouping together all measures for prevention or cure of POI by addressing the mechanisms of postoperative ileus can reduce the duration of hospitalization, morbidity and interval to resumption of transit. Poor nutrition, dehydration, and electrolyte imbalance are likely to further aggravate the problem.

Novel strategies are emerging, but further studies are required for the treatment of prolonged postoperative ileus, where evidence is still lacking. Although postoperative ileus is often inevitable, methods to reduce its duration and facilitate recovery of postoperative gastrointestinal function are evolving rapidly. Proper evaluation of the patient, careful application of principals of conservative management, and timely surgical intervention may fetch satisfactory results.

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