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Predictors of Management Outcomes in Pathological Small Bowel Surgical Emergencies: A Prospective Study in a Busy Emergency Unit

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Abstract

Background: The management of pathological small bowel disorders in the emergency department is challenging, and is linked to higher morbidity and mortality rates.

Aim of Study: The aim of this study was to identify the main factors that could help predict the management outcomes in pathological small bowel surgical emergencies (PSBSEs).

Patients and Methods: All patients presenting with PSBSEs to the Emergency Unit over a 6-months period were prospectively studied. Data about patient-related, assessment-related, pathology-related, and management-related variables; 90-day morbidity; as well as mortality were all recorded. Univariate and multivariate analyses were carried out to identify the predictors of management outcomes in PSBSEs.

Results: Our study included 107 patients. The most frequently encountered PSBSEs were obstruction and/or strangulation (64 cases, 59.8%). Management was operative in 88 cases (82.2%). Overall, 30 cases (28%) developed morbidity, and 7 cases (6.5%) died. In univariate analysis, 14 different factors were associated with a significantly increased risk of morbidity; whereas in multivariate analysis, only 5 factors were found to be significant predictors of 90-day morbidity. The highest odds of morbidity were associated with re-operation [Odds Ratio (OR)=11.2, 95% CI=6.7-18.3, p=0.001] and hemodynamic status [OR=9.7, 95% CI=2.8-21.5, p=0.001].

Conclusion: Constant abdominal pain at presentation, hemodynamic instability, midline surgical incision, operative time ≥2 hours, and re-operation were all associated with a significantly increased risk of 90-day morbidity in patients with PSBSEs.

Key Words: *Predictors – Outcomes – Pathological small bowel emergencies.*

Introduction

THE surgeon often faces a challenge when performing an emergency small bowel resection. The small intestine is a complicated organ that serves a variety of purposes. It can digest, absorb, and secrete, as well as perform endocrine functions. It also protects the internal environment from unpleasant ingested substances, luminal bacteria and their toxins [1]. Aside from various types of traumatic bowel injuries, there is a variety of pathological disorders that can affect the small bowel [2]. Among those, small bowel obstruction (SBO) is a common disorder. In patients with SBO; symptoms at presentation, physical findings and laboratory tests are not sensitive or specific enough to detect which patients have co-existing strangulation or ischemia; which presents a difficulty in clinical management [3]. To overcome diagnostic uncertainty in such cases, imaging is now widely used not only to diagnose SBO but also to detect complications that might necessitate immediate surgery [4].More recent studies have focused on the various computed tomographic (CT) signs in SBO to see if they can identify which patients need surgery and which patients can be managed conservatively [5].

Small bowel disease management in the emergency department is thought to be an independent risk factor for postoperative morbidity and mortality [6]. Based on the underlying pathology, timing of presentation (early or late), and concomitant co-morbidities; several studies of small intestinal emergency procedures have estimated the overall morbidity and mortality to be around 30% and 15% respectively. Different morbidities (e.g. metabolic, cardiovascular, infectious, respiratory) can significantly increase the risk of mortality [7]. Here, we conducted a prospective, non-randomized, analytical study over a 6-months period in order to identify the main factors that could help predict

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the management outcomes in pathological small bowel surgical emergencies (PSBSEs).

Patients and Methods

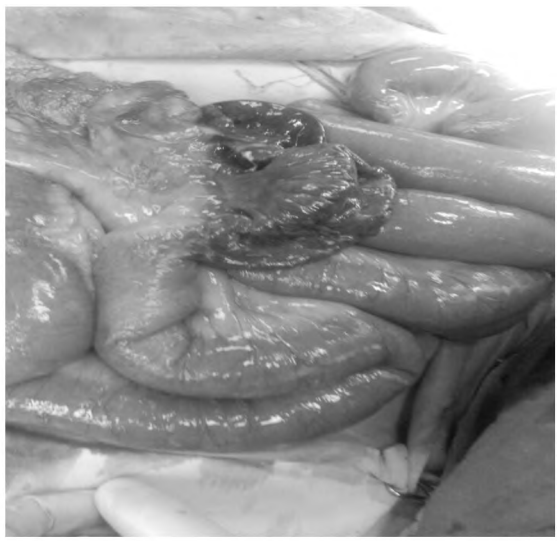
Study design and population:

All patients presenting with pathological small bowel surgical emergencies (PSBSEs) to the Emergency Unit (EU), Kasr Al-Aini Hospital, Cairo University, between September 2017 and February 2018 were prospectively studied. Pathological small bowel surgical emergencies were defined as "All acute non-traumatic surgical conditions affecting the jejunum and/or ileum, and requiring prompt management in an emergency surgical unit". Accordingly, a wide spectrum of surgical disorders fell under the entity "PSBSEs" (Table 1, Figs. 1-3). Informed consent was obtained from all patients. The study protocol was approved by the institutional ethical committee and conformed to the provisions of the Declaration of Helsinki (as revised in Seoul, Korea, October 2008).

Table (1): Different types of pathological small bowel surgical emergencies (PSBSEs).

Types	Examples
1- Obstruction &/or strangulation	Adhesions, tumors, obstructed &/or strangulated external abdominal hernias, internal hernias, intussusception, foreign body ingestion
2- Inflammatory	Crohn's disease, tuberculosis, typhoid
3- Vascular	Acute mesenteric ischemia (occlusive or non-occlusive)
4- Postoperative	Anastomotic dehiscence
5- Miscellaneous	Incarcerated hernias, foreign body ingestion (non-obstructive)

(A)



(B)

(C)

Fig. (1A,B,C): Three cases of acute mesenteric ischemia in our study.

(A)

(B)

Fig. (2A,B): Two cases of foreign body ingestion in our study who were treated by 'enterotomy, removal of foreign body (bodies) and primary repair'.

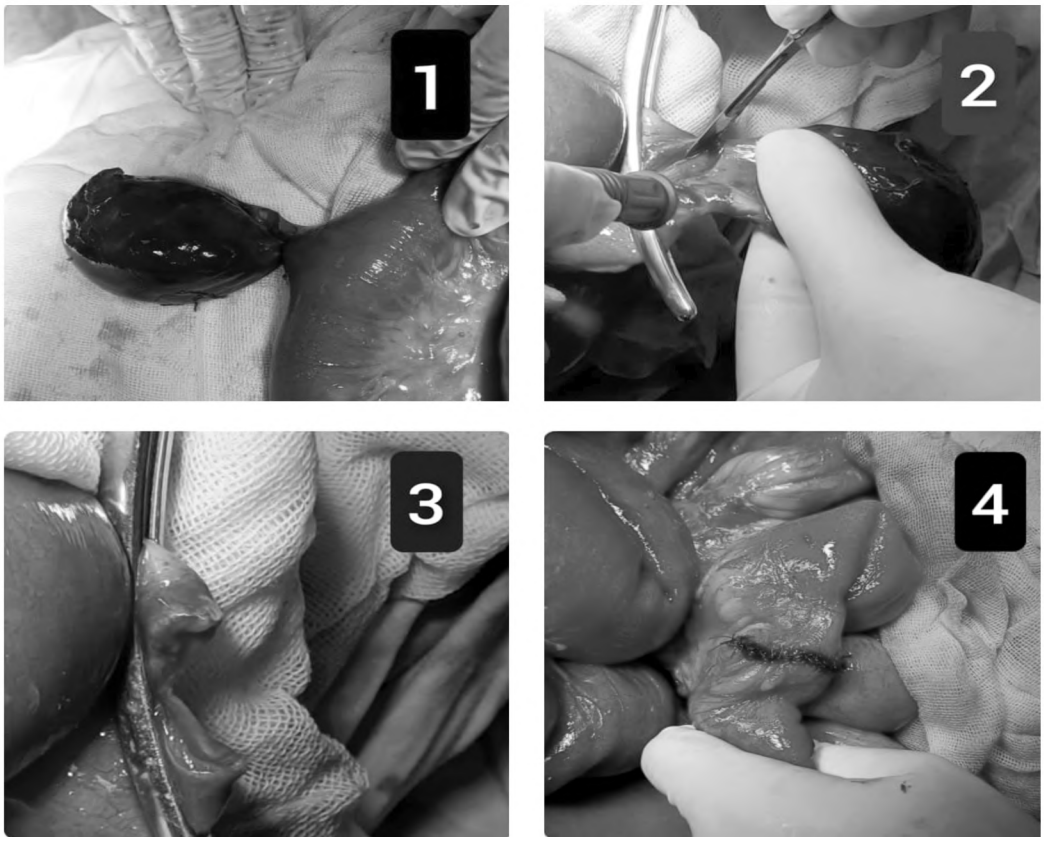


Fig. (3): Resection of a gangrenous twisted Meckel's diverticulum in one of the study patients.

All patients who presented to the EU over the study period with “acute abdomen” were subjected to a strict preliminary work-up protocol, aiming to identify, assess and resuscitate -if needed- patients with PSBSEs. This preliminary workup included a baseline assessment of the vital signs (blood pressure, pulse, temperature, respiratory rate) and the level of consciousness, full history-taking (including special habits e.g. smoking, drug abuse; co-morbidities e.g. diabetes, ischemic heart disease; previous abdominal surgery), as well as thorough general and abdominal examination. Patients with a body mass index of $\geq 30 kg/m^2$ were labeled "obese". If the possibility of a PSBSE was considered, further investigations were carried out. Those included:

a- Laboratory investigations (complete blood count, random blood sugar, liver & kidney functions tests, serum electrolytes, coagulation profile, arterial blood gases, cross-matching, serum amylase in patients with upper or generalized abdominal pain).

b- Radiological investigations [plain X-ray chest (erect), plain X-ray abdomen (erect & supine), CT scan of the abdomen & pelvis with intravenous (+/- oral) contrast for better assessment and delineation of bowel pathology].

At this stage, in all patients with either a clear diagnosis or any degree of suspicion of PSBSE, two wide-bore cannulas, a nasogastric tube, and a urinary catheter were inserted. Surrogates of organ-specific perfusion: Urine output and capillary refill time were also recorded. The baseline recordings of vital signs, urine output, level of consciousness, and capillary refill time were used to assess the patient's hemodynamic status upon admission. If signs of shock were present, fluid resuscitation was initiated according to the Advanced Trauma Life Support (ATLS) guidelines [8]. Patients with septic shock were clinically identified by a serum lactate level of >2mmol/L and the requirement of a vasopressor to maintain a mean arterial pressure of ≥65mmHg in the absence of hypovolemia [9]. The 2016 Surviving Sepsis Campaign International Guidelines for Management of Severe Sepsis and Septic Shock were followed for the management of patients with sepsis [10]. The Eastern Cooperative Oncology Group (ECOG) Performance Status was used to assess the functional status of all patients, whereas the American Society of Anesthesiologists (ASA) Physical Status Classification system was used to assess their fitness for surgery [11,12].

Guided by the history, clinical examination, and investigations, a prompt decision regarding each patient's management strategy, whether conservative or surgical, was made by the EU surgical team. In selected cases, diagnostic laparoscopy was used to confirm the diagnosis. All patients in the 'conservative management' group were treated using a “Drip & Suck” approach, with serial monitoring of hemodynamic parameters, blood tests & bowel motions; serial abdominal examinations; and liberal use of diagnostic imaging. If no remarkable response was noted within 72 hours of conservative management or if any deterioration occurred, surgical management was promptly considered. In the 'surgical management' group, all patients underwent exploratory midline laparotomy under general anesthesia, except those with complicated hernias in whom the surgical incisions were dictated by the site of the hernia defect(s). The type of bowel pathology, if any, was identified. The exact site of the pathology, its distance from the duodenojejunal flexure (DJF) “in case of jejunal pathology” and from the ileocaecal junction (ICJ) “in case of ileal pathology” was also reported. Seven different types of surgical procedures were proposed for dealing with different types of PSBSEs. Those included resection & primary anastomosis; resection & stoma formation; diversion only; primary repair / enterotomy & primary repair; hernia reduction & repair; others (e.g. adhesiolysis, fecal dis-impaction, milking of foreign body; application of warm foments); and abdominal closure without any intervention.

The choice of the most appropriate surgical procedure for every specific patient was made at the operating room by the most senior staff member of the EU surgical team, after careful consideration of a variety of factors including the patient's general condition & hemodynamic status; the site, extent & severity of bowel pathology; as well as the condition of the bowel wall e.g. edema, tissue friability. In cases with doubtful viability of strangulated small bowel, warm packs were used to wrap the affected bowel for a minimum duration of 10 minutes while the anesthetist was requested to give 100% oxygen. Bowel viability was then re-assessed and a decision regarding further management was promptly taken.

Only patients who were diagnosed, either during the preliminary work-up or at the time of surgery (laparoscopy and/or laparotomy), with a PSBSE, were enrolled in the study. Meanwhile, those who were diagnosed -at any point- as having gastroduodenal, appendicular, large bowel, or any other abdominal pathology with no small bowel involvement were excluded from the study.

Patients who underwent surgery were closely monitored postoperatively in the surgical ward, or the Intensive Care Unit (ICU) if indicated. Intravenous fluids, antibiotics, and analgesics were prescribed, as necessary, according to the performed procedure and the patient's needs. Patients in the ICU were moved to the surgical ward once their condition was stabilized. Drains were removed once the daily output was serious and was less than 30cc. All the study patients were discharged home once complete recovery was ensured and postoperative complications, if any, were appropriately dealt with (Fig. 4). Patients were instructed to come for follow-up at 2 weeks, 1 month & 3 months from the time of initiation of successful conservative management or from the time of surgery. All postoperative complications in the first 90 days after surgery were reported. The Clavien-Dindo Classification of Surgical Complications (CDCSC) was used for grading of postoperative complications [13]. According to the CDCSC, complications were classified into five grades, with grade I being defined as "Any deviation from the normal postoperative course without the need for pharmacological treatment / interventions beyond the administration of antiemetics, antipyretics, analgesics, diuretics, electrolytes & physiotherapy", whereas grade V being defined as "Death".

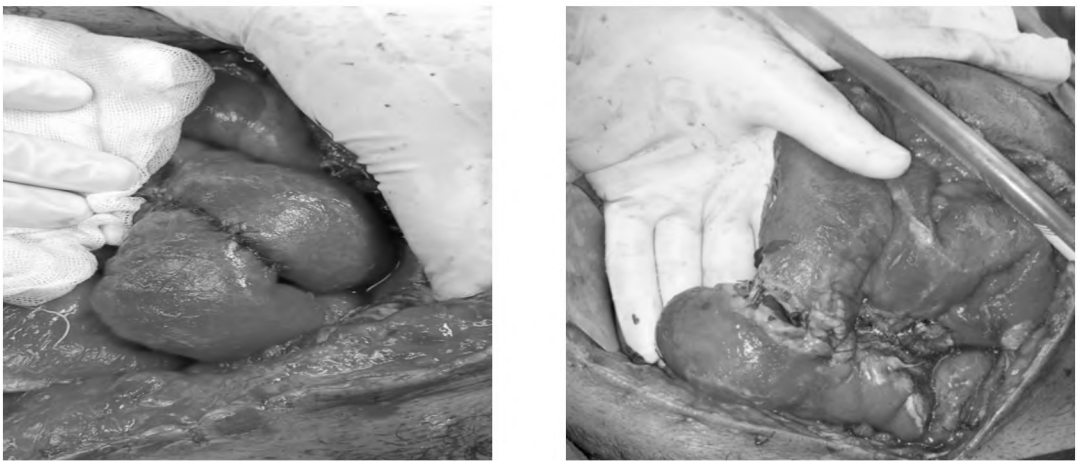


Fig. (4): Anastomotic dehiscence following resection & primary anastomosis for a gangrenous ileal loop in a patient with mesenteric vascular occlusion.

Data collection:

Data about patient-related variables [age, gender, special habits, comorbidities, previous abdominal surgery]; assessment-related variables at presentation [duration of symptoms (from the onset of symptoms To presentation), pattern of abdominal pain, hemodynamic status, presence of fever and/or leucocytosis, ECOG Performance Status, ASA score]; pathology-related variables [type of PSBSE, part of small bowel involved, distance from DJF in case of jejunal pathology, distance from ICJ in case of ileal pathology, bowel viability, associated colonic involvement]; management-related variables [management strategy (conservative / operative), surgical incision used -if operative management was carried out-, type of surgical procedure(s) performed, need for re-operation or ICU admission]; 90-day morbidity (including postoperative complications & their grading according to the CDCSC); as well as mortality were all recorded.

Statistical analysis:

Values in our study were expressed as means and standard deviations (mean $\pm$ SD) or as numbers (%). Mean values of different variables in both groups were compared using the unpaired *t*-test, whereas categorical variables were compared using the Chi-square test. Correlation between variables was calculated using Pearson's correlation coefficient (r). A p-value <0.05 was considered statistically significant. Univariate and multivariate analyses were carried out to identify the predictors of management outcomes in PSBSEs. When statistical significance testing and multivariate analyses of morbidity & mortality were performed, minor postoperative complications that were classified as grade I according to the CDCSC were not counted as morbidity; whereas grades II, III & IV complications formed the cornerstone of the morbidity analysis. Data were analyzed using Statistical Package for Social Sciences (SPSS) for Windows version 16 (IBM SPSS, Chicago, IL, USA).

Results

Our study included 107 patients, 61 (57%) were females and 46 (43%) were males, with the most common age subgroup being 30-39 years (Fig. 5).

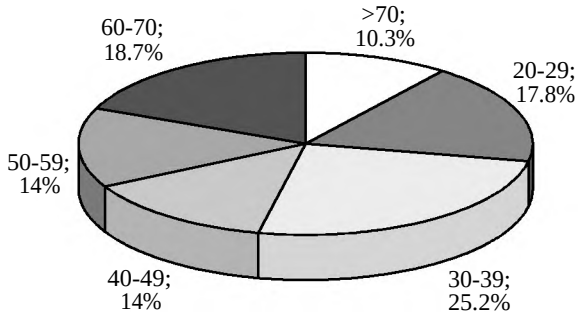


Fig. (5): Distribution of age subgroups in the study patients.

Patients' characteristics and clinical features:

In our series, 47 patients (43.9%) had co-morbidities, whereas 58 patients (54.2%) had undergone previous abdominal surgery. Abdominal pain pattern at presentation was classified into two main categories: Intermittent pain [67 patients (62.6%)] and constant pain [40 patients (37.4%)]. Only 10 patients (9.3%) were hemodynamically unstable at presentation, whereas 43 patients (40.2%) had fever and/or leukocytosis. One hundred and one patients (94.4%) had an ASA score of I-III. The most frequently encountered PSBSEs in our study were obstruction and/or strangulation (64 cases, 59.8%). Among those, adhesive intestinal obstruction (I.O.) was the most common [33 cases (30.8%)]. Other types of PSBSEs (e.g. vascular, inflammatory, miscellaneous) were encountered in 43 cases (40.2%). Management was operative in 88 cases (82.2%). Of those, 75 cases underwent operative management from the start, and 56 cases (63.6%) underwent laparotomy through a midline incision. The most commonly performed surgical procedure was resection and primary anastomosis (32 cases, 36.4%). Thirty cases (34.1%) developed postoperative complications (morbidity), and 12 cases (13.6%) were re-operated upon. The most commonly encountered postoperative complications in our series were wound complications [wound infection and/or wound dehiscence; 17 cases (19.3%)]. Of note, the 90-day morbidity rate in the 'conservative management' group was 0% (0/19 cases). Overall, in our study, 30 cases (28%) developed morbidity, 16 cases (15%) required ICU admission, and 7 cases (6.5%) unfortunately passed away (Table 2).

Table (2): Clinical features of the study patients (n=107).

Variable	Number	Percent	Variable	Number	Percent
Patient-related variables			Fecal impaction	2	1.9
Age (years):			Retracted jejunostomy tube	1	0.9
20-29	19	17.8	Strangulation	20	18.7
30-39	27	25.2	External hernia	18	16.8
40-49	15	14.0	Internal hernia	1	0.9
50-59	15	14.0	Adhesive band	1	0.9
60-70	20	18.7	Vascular (Acute mesenteric ischemia)	16	15.0
>70	11	10.3	Inflammatory (Pathological perforation)	5	4.7
Gender:			Miscellaneous	22	20.6
Female	61	57.0	Incarcerated hernia	15	14.0
Male	46	43.0	Foreign body ingestion	5	4.7
Special habits:			Meckel's diverticular pathology	2	1.9
None	62	57.9	*Part of small bowel involved:*		
Smoking	41	38.3	Jejunum	24	22.4
Smoking & Tramadol addiction	4	3.7	Ileum	60	56.1
Associated co-morbidity:			Jejunum & ileum	4	3.7
No	60	56.1	Unknown	19	17.8
Yes	47	43.9	*Bowel viability:*		
Hypertension	3	2.8	Viable	72	67.3
Diabetes Mellitus	6	5.6	Non-viable	35	32.7
Heart disease (e.g IHD, AF)	6	5.6	*Colonic involvement:*		
Liver disease	6	5.6	Yes	7	6.5
Others	2	1.9	No	100	93.5
			Malignant pathology:		
			Yes	4	3.7
			No	103	96.3

Table (2): Count.

Variable	Number	Percent	Variable	Number	Percent
Previous abdominal surgery:	58	54.2	**Management-related variables**		
Midline laparotomy	9	8.4	*Management strategy:*		
Trauma	4	3.7	Conservative	32	29.9
Intestinal obstruction	1	0.9	Operative	88	82.2
Feeding jejunostomy	1	0.9	From the start	75	70.1
Ruptured ectopic pregnancy	1	0.9	After failure of conservative management	13	12.1
Cystectomy & ileal conduit	3	2.8			
Appendicectomy	11	10.3	*Time to surgical intervention (Presentation To Operation):*		
Cholecystectomy (lap/open)	7	6.5	<6 hours	27/88	30.7
Hernia repair	1	0.9	≥6 hours but <24 hrs	39/88	44.3
Caeserian section(s)	14	13.1	≥24 hours	22/88	25.0
Gynecological	4	3.7			
Nephrolithotomy	1	0.9	*Surgical incision:*		
Multiple surgical procedures	11	10.3	Midline incision	56/88	63.6
			Others	32/88	36.4
Assessment-related variables at presentation			*Type of surgical procedure performed:*		
Pattern of abdominal pain:			Resection & primary anastomosis	32/88	36.4
Intermittent pain	67	62.6	Resection & stoma formation	9/88	10.2
Constant pain	40	37.4	Diversion only	0/88	0.0
			Primary repair / enterotomy & primary repair	7/88	8.0
Duration of symptoms (Onset to Presentation):			Hernia reduction & repair	21/88	23.9
≤24 hours	33	30.8	Others (e.g. adhesiolysis, fecal disimpaction)	16/88	18.2
>24 hours	74	69.2	Abdominal closure without any intervention	3/88	3.4
			Operative time:		
Haemodynamic status:			<2 hours	42/88	47.7
Stable	97	90.7	≥2 hours	46/88	52.3
Unstable	10	9.3			
			Re-operation:		
Fever &/or leukocytosis:			Yes	12/88	13.6
Yes	43	40.2	No	76/88	86.4
No	64	59.8			
			ICU admission:		
ECOG Performance Status:			Yes	16	15.0
PS <2	85	79.4	No	91	85.0
PS ≥2	22	20.6			
			Morbidity:		
ASA score:			No	77	72.0
ASA I-III	101	94.4	Yes	30	28.0
ASA IV-V	6	5.6			
			Mortality:		
Pathology-related variables			No	100	93.5
Type of PSBSE:			Yes	7	6.5
Obstruction	44	41.1			
Adhesive intestinal obstruction	33	30.8			
External hernia	2	1.9			
Internal hernia	2	1.9			
Tumour (e.g. locally advanced colorectal cancer, GIST)	4	3.7			

Predictors of morbidity:

Univariate analysis of predictors of morbidity revealed that 14 variables were statistically significant. These included co-morbidity, previous abdominal surgery, pain pattern at presentation, hemodynamic status, fever and/or leukocytosis, ASA score, part of small bowel involved, bowel viability, colonic involvement, type of definitive management, time to surgical intervention, surgical incision, re-operation, and ICU admission. Meanwhile, variables like age, gender, smoking history, duration of symptoms, ECOG Performance Status, presence of malignant pathology, and operative time were not statistically significant (Table 3). In the multivariate analysis, however, only 5 variables were significant predictors of 90-day morbidity. These included constant abdominal pain at presentation, hemodynamic instability, midline surgical incision, operative time ≥2 hours, and re-operation (Table 4). Unfortunately, predictors of mortality could not be analyzed in this study due to the small sample size, where only 7 patients (6.5%) died.

Table (3): Univariate analysis of predictors of morbidity.

Variable	No (n=77)	Yes (n=30)	*p*-value
Age:			
<70 years	68 (70.8%)	28 (29.2%)	0.724
≥70 years	9 (81.8%)	2 (18.2%)	
Gender:			
Male	31 (67.4%)	15 (32.6%)	0.361
Female	31 (75.4%)	15 (24.6%)	
Smoking history:			
No	46 (74.2%)	16 (25.8%)	0.546
Yes	31 (68.9%)	14 (31.1%)	
Co-morbidity:			
No	49 (81.7%)	11 (18.3%)	0.012*
Yes	28 (59.6%)	19 (40.4%)	
Previous abdominal surgery:			
No	29 (59.2%)	20 (40.8%)	0.007*
Yes	48 (82.8%)	10 (17.2%)	
Pain pattern at presentation:			
Intermittent pain	61 (91.0%)	6 (9.0%)	0.001*
Constant pain	16 40.0%)	24 (60.0%)	
Duration of symptoms:			
≤24 hours	24 (72.7%)	9 (27.3%)	0.906
>24 hours	53 (71.6%)	21 (28.4%)	
Haemodynamic status:			
Stable	76 (88.4%)	10 (11.6%)	0.001*
Unstable	1 (4.8%)	20 (95.2%)	
Fever &/or leukocytosis:			
No	57 (89.1%)	7 (10.9%)	0.001 *
Yes	20 (46.5%)	23 (53.5%)	
ECOG Performance Status:			
PS <2	64 (75.3%)	21 (24.7%)	0.132
PS ≥2	13 (59.1%)	9 (40.9%)	
ASA score:			
ASA I-III	76 (75.2%)	25 (24.8%)	0.006*
ASA IV-V	1 (16.7%)	5 (83.3%)	
Part of small bowel involved:			
Jejunum	15 (62.5%)	9 (37.5%)	0.013*
Ileum	43 (71.7%)	17 (28.3%)	
Jejunum & ileum	0 (0.0%)	4 (100.0%)	
Bowel viability:			
Viable	62 (80.5%)	10 (33.3%)	0.001*
Non-viable	15 (19.5%)	20 (66.7%)	
Colonic involvement:			
No	75 (75.0%)	25 (25.0%)	0.018*
Yes	2 (28.6%)	5 (71.4%)	
Malignant pathology:			
No	74 (71.8%)	29 (28.2%)	0.890
Yes	3 (75.0%)	1 (25.0%)	
Definitive management:			
Conservative (n=19)	19 (100.0%)	0 (0.0%)	0.003*
Operative (n=88)	58 (65.9%)	30 (34.1%)	

Table (3): Count.

Variable	No (n=77)	Yes (n=30)	*p*-value
Time to surgical intervention:			
<6 hours	13 (48.1%)	14 (51.9%)	0.019*
≥6 hours	45 (73.8%)	16 (26.2%)	
Surgical incision:			
Midline incision	32 (57.1%)	24 (42.9%)	0.022*
Others	26 (81,2%)	6 (18.8%)	
Operative time:			
<2 hours	31 (75.6%)	10 (24.4%)	0.073
≥2 hours	27 (57.4%)	20 (42.6%)	
Re-operation (n=88):			
No	77 (81.1%)	18 (18.9%)	0.001*
Yes	0 (0.0%)	12 (100.0%)	
ICU admission:			
No	74 (82.2%)	16 (17.8%)	0.001*
Yes	3 (17.6%)	14 (82.4%)	

Data are expressed as number (%). *p<0.05 = Significant.

Table (4): Multivariate analysis of predictors of morbidity.

Variable	OR (95% CI)	*p*-value
Pain pattern at presentation (constant)	2.6 (1.7-4.8)	0.015
Haemodynamic status (unstable)	9.7 (2.8-21.5)	0.001
Surgical incision (midline)	5.1 (1.9-13.6)	0.008
Operative time (≥ 2 hours)	6.7 (2.3-17.5)	0.008
Re-operation (yes)	11.2 (6.7-18.3)	0.001

Results are shown only for the variables that were significant at end of the analysis; other variables included in the multivariable analysis were co-morbidity (yes), ASA >3, fever &/or leucocytosis (yes), bowel viability (non-viable), colonic involvement (yes), definitive management (operative), time to surgical intervention (<6 hrs), and ICU admission (yes). (OR = Odds ratio; CI = Confidence interval).

Discussion

A wide range of pathologies, as well as various types of traumatic injuries, can affect the small bowel. The aim of this study was to identify the main factors that could help predict the management outcomes in pathological small bowel surgical emergencies (PSBSEs).

Our study observed 107 consecutive patients who presented to the Emergency Unit (EU), Kasr Al-Aini Hospital, Cairo University over a 6-months period with PSBSEs affecting the jejunum and/or ileum. Patients with gastroduodenal, appendicular, or large bowel pathologies with no small bowel involvement were excluded from the study. Overall, the 90-day morbidity rate in our series was 28% (30 cases), whereas the mortality rate was 6.5% (7 cases). These figures were higher than those published by Mohammed et al., **[14]** in their recent

series of emergency small bowel resections [morbidity: 25% (15 cases); mortality: 3% (2 cases)].

Small bowel surgical emergencies can include obstructive lesions (e.g. herniae, adhesions), vascular lesions (e.g. acute mesenteric ischemia), as well as cases with wall disruption, with some interactions in between **[14]**. In our study, 58 patients had a history of previous abdominal surgery (e.g. Caesarian section, appendectomy, cholecystectomy, midline laparotomy, others). Of those, 33 patients presented with adhesive I.O. Of note, adhesive I.O. was the most commonly encountered PSBSE in our series (30.8%) and was most frequently observed in patients who had previously undergone appendectomy or midline laparotomy. According to Catena et al., **[15]**, postoperative adhesions, which occur following about 67%-93% of abdominal procedures, present a major clinical concern that can result in intestinal obstruction, infertility, and pain. Band adhesions commonly develop following appendectomies, colorectal resections and gynecological operations **[16]**.

In this study, univariate analysis revealed that 14 different factors were associated with a significantly increased risk of morbidity in patients with PSBSEs. These factors included the presence of co-morbidity, the absence of a history of previous abdominal surgery, constant abdominal pain at presentation, hemodynamic instability, fever and/or leukocytosis, ASA score IV-V, ileal involvement, non-viable bowel, colonic involvement, operative management, time to surgical intervention <6 hours, midline surgical incision, re-operation, and ICU admission. In the multivariate analysis, however, only 5 factors were found to be significant predictors of 90-day morbidity in patients with PSBSEs. These included constant abdominal pain at presentation, hemodynamic instability, midline surgical incision, operative time ›_2 hours, and re-operation. The highest odds of morbidity were associated with re-operation [Odds Ratio (OR)=11.2, 95% CI=6.7-18.3, p=0.001] and hemodynamic status [OR=9.7, 95% CI=2.8-21.5, p=0.001]. The aforementioned findings partially agreed with the recent study by Mohammed et al., **[15]** which revealed that, in univariate analysis, resection procedures and hemodynamic instability were associated with the highest risk of morbidity; whereas in multivariate analysis, age and presence of co-morbidities were the most significant variables. In a study by Margenthaler et al., **[21]**, it was shown that poor preoperative performance status was a major risk factor for both morbidity and mortality, and that dependent functional health status was an independent risk factor for postoperative morbidity in SBO patients. Another retrospective series of 323 patients that was conducted by Jeppesen et al., **[20]** found that daily use of systemic corticosteroids before surgery was related to an increased risk of morbidity, but not mortality. Furthermore, a study by Mitra **[17]** reported that male gender was associated with a higher risk of complications and anastomotic leak following intestinal resection and anastomosis. In our series, there were 4 cases of anastomotic leak, 2 of whom were males.

Unfortunately, because of the small sample size, we were unable to analyze the predictors of mortality. In a prospective series of 286 patients who were operated upon for postoperative adhesive SBO, Duron et al., **[18]** showed that early postoperative mortality was strongly linked to age and ASA class, whereas long-term mortality was strongly linked to postoperative complications. Another study by Teixeira et al., **[19]** suggested that early operative intervention for patients with acute SBO was associated with a considerable survival benefit, decreased incidence of local and systemic complications, as well as shorter hospitalization.

Conclusion:

Constant abdominal pain at presentation, hemodynamic instability, midline surgical incision, operative time ›_2 hours, and re-operation were all associated with a significantly increased risk of 90-day morbidity in patients with pathological small bowel surgical emergencies. Further studies with larger sample sizes are, however, still needed to help analyze the predictors of mortality in this group of patients.

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العوامل المنبئة لنتاج معالجة الحالات الطارئة الباثولوجية للأمعاء الدقيقة (دراسة استباقية بوحدة الطوارئ المزدحمة)

تهدف الدراسة إلى التعرف على العوامل الرئيسية التى تساعد فى التنبؤ بنتاج معالجة الحالات الباثولوجية الطارئة للأ معاء الدقيقة على مدار ستة أشهر بوحدة الطوارئ بالقصر العينى تم جمع البيانات المرتبطة بكل من: المرضى أنفسهم والتقييم الطبى وطبيعة المرض الباثولوجى وطريقة العلاج المتبعة.

ومن ثم تم تسجيل معدل حدوث المرض ومعدل الوفاه على مدار تسعين يوماً منذ احالة المريض للمستشفى وتم إجراء تحليل أحادى المتغير وأخر متعدد المتغير للتعرف على العوامل المنبئة لنتاج معالجة الحالات الطارئة الباثولوجية للأمعاء الدقيقة.

اشتملت الدراسة على ١٠٧ مريضاً وكانت النسبة الأكبر من الحالات الباثولوجية الطارئة للأمعاء هى انسداد للأمعاء الدقيقة بالاضافة إلى (أو بدون اختناق) (٦٤ حالة بنسبة ٨ و ٥٩٪) و كان العلاج جراحياً فى ٨٨ حالة (بنسبة ٢ و ٨٢٪).

وفى المجمل: حدثت المرضية بثلاثين حالة (بنسبة ٢٨٪) بينما توفى ٧ حالات بنسبة ٥ و ٦٪).

ووجد أن هناك ١٤ عامل مختلف مرتبط بزيادة نسبة حدوث المرضية بصورة ملحوظة خلال التحليل أحادى المتغير فى حين أن التحليل متعدد المتغير أسفر عن وجود عوامل فقط يعدوا من العوامل المنبئة الهامة لحدوث المرضية فى خلال ٩٠ يوماً مع العلم أنه وجد أن ارتفا ع احتمالية حدوث المرضية كان مرتبط بالأكثر باعادة اجراء عملية جراحية مرة أخرى وكذلك بحالة الدورة الدموية.

الاستنتاج العوامل المرتبطة بزيادة نسبة حدوث المرضية بصورة ملحوظة فى خلال ٩٠ يوماً فى مرضى الحالات الطارئة الباثولوجية للأمعاء الدقيقة كانت كالآتى:

ألم البطن المستمر عند الاحالة إلى المستشفى وعدم استقرار الدورة الدموية والجروح الوسطية الاستكشافية للبطن وزيادة الزمن المستغرق بالعملية عن ساعتين واعادة اجراء عملية جراحية مرة أخرى.