Annals of Surgery and Perioperative Care

Open Access

Austin Publishing Group

Research Article

Epidemiology of Intestinal Obstruction: A Single-Centered Retrospective Study in Lebanon

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Received: May 31, 2025

Accepted: June 16, 2025

Published: June 18, 2025

Abstract

Background: Intestinal obstruction is a prevalent surgical emergency with varied etiologies across age groups and geographic regions. Despite its clinical significance, data on its epidemiology in Lebanon remain scarce.

Objective: This study aims to describe the etiologies of intestinal obstruction at a major Lebanese hospital, stratify causes by age group, compare conservative and surgical management outcomes, and examine associated mortality and complication rates.

Methods: A retrospective observational study was conducted at Makassed General Hospital, Lebanon, including 839 patients admitted with a radiologically confirmed intestinal obstruction between 1994 and 2023. Patient records were analyzed for demographics, etiology, age distribution, management strategy, and clinical outcomes. Chi-square testing was used to assess associations between variables.

Results: Adhesions were the most common cause (38.4%), particularly in adults, while intussusception was the predominant etiology in the pediatric group (48%). Functional obstructions (9.4%) and malignancies (intraluminal: 3.3%; extraluminal: 6.6%) also contributed significantly. Congenital, inflammatory, and benign intraluminal causes such as fecaloma and phytobezoars were identified at varying frequencies. Surgical intervention was required in 54.7% of cases, with significantly longer hospital stays observed compared to conservative management. Mortality and bowel perforation rates were highest among patients with mesenteric ischemia and malignant obstructions.

Conclusion: This study highlights the diverse and age-dependent etiologies of intestinal obstruction in Lebanon. Adhesions and malignancies dominate in adults, while congenital and intraluminal causes are more common in children. Early diagnosis and tailored management strategies are critical for improving outcomes, particularly in high-risk subgroups.

Keywords: Intestinal obstruction; Lebanon; Surgical management; Perforation; Mortality

Introduction

Intestinal obstruction is a common surgical condition that results from a mechanical or functional obstruction of the intestines, preventing the normal movement of its contents. Out of the total acute abdominal admissions, around 15-20% are intestinal obstruction cases which could be caused by different etiologies [1]. Patients usually presents with abdominal pain, distension, vomiting, and constipation [2]. The diagnosis of intestinal obstruction remains a challenging issue especially in low-resources settings where delayed presentation, low imaging techniques, and limited access to specialized care could affect the prognosis [3]. In fact, intestinal obstruction could lead to significant morbidity and mortality, if left untreated, which necessitates timely diagnosis [4].

According to some authors, adhesions remain the leading cause of small bowel obstruction in adults, accounting for around 65% of the causes [4]. However, developing nations show more variability, with obstructions from volvulus and hernias remaining substantial [5]. Therefore, it is highly important to note that the epidemiology of causative and associated factors can vary significantly depending on geographic location and study population. Jena et al. have provided valuable insights into global and regional trends in intestinal obstruction epidemiology. A few notable findings include adhesions now surpassing hernias as the leading cause in most developed areas, attributable to increased abdominal surgeries over time [5]. This finding was also reported by Krielen et al. [6]. However, hernias remain a substantial portion of obstructions in Middle Eastern and North African regions [7]. Furthermore, neoplastic obstructions also represent a growing portion of cases as improvement in cancer diagnostics and therapies are prolonging patients' survival [5].

Citation: El Haress M, El Saleh R, Sinno H, Addam F, Sinno, MD, et al. Epidemiology of Intestinal Obstruction: A Single-Centered Retrospective Study in Lebanon. Ann Surg Perioper Care. 2025; 10(2): 1074.

There is minimal data about the etiologies of intestinal obstruction in the Middle East region in general and in Lebanon in particular. Thus, this study was conducted at Makassed General Hospital, which is one of the largest hospitals in Lebanon and aims to:

1. Describe the different etiologies of intestinal obstruction,

2. Determine the causes of obstruction in different age groups,

3. Evaluate the outcomes of conservative versus surgical management and their association with hospital stay duration,

4. Discuss the mortality rate and perforation risk of each cause.

Methodology

This study is a retrospective observational analysis of all patients admitted with a primary diagnosis of intestinal obstruction at Makassed General Hospital between 1994 and 2023. Following hospital and Institutional Review Board (IRB) approval (ID Number: MGH-271123), medical records were reviewed capturing patient demographics, documented etiology, imaging findings, management approach, and clinical outcomes.

Patient charts were identified using ICD-10 diagnosis codes that are associated with intestinal obstruction (K56 series), as well as the related presenting, including abdominal pain (R10), vomiting (R11), constipation (K59.0), hernias (K40–K46), malignant and benign gastrointestinal neoplasms (C18–C20, D12), and congenital intestinal anomalies (Q41–Q42). Intestinal obstruction was defined radiologically by either abdominal CT scans or upright abdominal X-rays.

Out of 1,299 initially identified cases, 460 were excluded due to incomplete documentation, diagnostic uncertainty, or the presence of other cofounding causes that may have affected the diagnosis, resulting in a final study sample of 839 patients. Patients were categorized based on the type and etiology of obstruction: functional, malignant tumors, congenital, inflammatory, and benign tumors. Then patients were further grouped into three age cohorts: 0–13 years, 14–49 years, and 50 years and older. Management strategies (surgical vs. conservative) were compared across subtypes, and associations with mortality and complications such as bowel perforation were examined. Descriptive statistics were used to analyze frequency trends, and chi-square tests assessed associations between etiologies and demographic factors.

Results and Discussion

Etiologies of Intestinal Obstruction

Functional: Our study showed that 9.4% of all the patients who presented with intestinal obstruction symptoms had ileus due to medical condition rather than a surgical cause which is considered as pseudo-obstruction (Table 1). This is considered a big percentage as compared to other studies. To illustrate, based on a national study that was done in Japan, the prevalence of chronic intestinal pseudo-obstruction is 0.0008% [8]. Another illustration, data analysis of intestinal obstruction cases in the United States between 2001 and 2011 showed that only 0.975%- 1.218% are due to pseudo-obstruction [9].

Malignant Tumors

Extraluminal: The malignant extraluminal group in our study included 55 patients accounting for 6.6% of the total (Table 1). Of these cases, 49 (89.1%) were due to a metastatic deposit from a primary cancer, 5 (9.1%) resulted from cancer in the head of the pancreas compressing the duodenum, and 1 (1.8%) was attributed to a retroperitoneal cancer. The global prevalence of MBO is estimated to range from 3% to 15% of cancer patients [10]. Primary cancers of abdominal origin that most frequently produce MBO are those of the colon (25%–40%), ovary (16%–29%), stomach (6%–19%), the pancreas (6%–13%), while the primary cancers of extra-abdominal origin most frequently leading to MBO due to peritoneal infiltration are those of the breast (2%–3%) and melanoma (3%) [10-26].

Intraluminal: In our study, 28 patients (3.3% of the total) had intestinal obstruction caused by intraluminal malignancies. These cases were classified by tumor location, with the colon being the most common site (18 patients, 64.3%), followed by the small bowel (9 patients, 32.1%) and the rectum (1 patient, 3.6%). This aligns with global data indicating that colorectal cancers are among the most common causes of malignant intraluminal bowel obstruction, particularly in older adults [21]. The predominance of colonic involvement (64.3%) reflects the higher overall incidence of colorectal cancer compared to

Table 1: Etiologies of intestinal obstruction.

	Number	Percentage %
Cause of Obstruction (79)	**79**	
Functional		
Ileus	79	100%
Malignant Extraluminal (55)		
Metastasis	49	89.1%
Cancer in Head of Pancreas (Duodenal obstruction)	5	9.1%
Retroperitoneal Tumor	1	1.8%
Malignant Intraluminal (28)		
Tumor (Small Bowel)	9	32.1%
Colon Cancer	18	64.3%
Rectal Cancer	1	3.6%
Congenital		
Malrotation	4	57.1%
Congenital Jejunal Atresia	2	28.6%
Anal Stenosis	1	14.3%
Inflammatory (24)		
Perforated Small Bowel	10	41.7%
Crohn's Disease	10	41.7%
Diverticulitis	3	12.5%
Necrotizing Enterocolitis	1	4.2%
Benign Extraluminal (410)		
Adhesion	322	78.5%
Incarcerated Hernia	47	11.5%
Volvulus	28	6.8%
Internal Hernia	9	2.2%
Mesenteric Cyst	1	0.2%
Uterine Mass	1	0.2%
Trocar Site Hernia	1	0.2%
Cecal Volvulus	1	0.2%
Benign Intraluminal (236)		
Constipation and Fecaloma	131	55.5%
Small Bowel Intussusception	82	34.7%
Phytobezoar	15	6.4%
Tumor (Benign Intra)	1	0.4%
Gall Stone Ileus	2	0.8%
Mickle's Diverticulum	2	0.8%
Bowel Hematoma	2	0.8%
Lipoma of Ileocecal Valve	1	0.4%

Table 2: Etiologies of intestinal obstruction as per age.

		Age			*P-Value*
Category	Cause of Obstruction	0 - 13 Years	14 - 49 Years	50 Years and Above	
Functional	Ileus	10 (6.7%)	9 (5%)	60 (11.8%)	<0.001
Malignant Extraluminal	Metastasis	1 (0.7%)	11 (6.1%)	37 (7.2%)	
	Cancer in Head of Pancreas (Duodenal obstruction)	-	1 (0.6%)	4 (0.8%)	
	Retroperitoneal Tumor	-	-	1 (0.2%)	
Malignant Intraluminal	Tumor (Small Bowel)	-	2 (1.1%)	7 (1.4%)	
	Rectal Cancer	-	-	1 (0.2%)	
	Colon Cancer	-	1 (0.6%)	17 (3.3%)	
Congenital	Malrotation	2 (1.3%)	2 (1.1%)	-	
	Congenital Jejunal Atresia	2 (1.3%)	-	-	
	Anal Stenosis	1 (0.7%)	-	-	
Inflammatory	Perforated Small Bowel	2 (1.3%)	3 (1.7%)	5 (1%)	
	Crohn's Disease	-	10 (5.6%)	-	
	Diverticulitis	-	-	3 (0.6%)	
	Necrotizing Enterocolitis	1 (0.7%)	-	-	
Benign Extraluminal	Adhesion	18 (12%)	95 (53.1%)	209 (41%)	
	Incarcerated Hernia	5 (3.3%)	6 (3.4%)	36 (7.1%)	
	Volvulus	4 (2.7%)	7 (3.9%)	17 (3.3%)	
	Internal Hernia	1 (0.7%)	3 (1.7%)	5 (1%)	
	Mesenteric Cyst	-	-	1 (0.2%)	
	Uterine Mass	-	1 (0.6%)	-	
	Trocar Site Hernia	-	-	1 (0.2%)	
	Cecal Volvulus	-	1 (0.6%)	-	
Benign Intraluminal	Constipation and Fecaloma	27 (18%)	19 (10.6%)	85 (16.67	
	Small Bowel Intussusception	72 (48%)	7 (3.9%)	3 (0.6%)	
	Phytobezoar	1 (0.7%)	1 (0.6%)	13 (2.5%)	
	Tumor (Benign Intra)	-	-	1 (0.2%)	
	Gall Stone Ileus	-	-	2 (0.4%)	
	Mickle's Diverticulum	2 (1.3%)	-	-	
	Bowel Hematoma	1 (0.7%)	-	1 (0.2%)	
	Lipoma of Ileocecal Valve	-	-	1 (0.2%)	
Total		150 (17.9%)	179 (21.3%)	510 (60.8%)	

Table 3: Surgical versus non-surgical management based on each etiology.

Table 10:		Surgical Vs Conservative		Days of Stay	
Category	Cause of Obstruction	Surgical Management	Conservative Management	3 Days and Less	More Than 3 Days
Functional	Ileus	14 (3.4%)	65 (15.3%)	26 (8.4%)	53 (10%)
Malignant Extraluminal	Metastasis	15 (3.6%)	34 (8%)	14 (4.5%)	35 (6.6%)
	Cancer in Head of Pancreas (Duodenal obstruction)	3 (0.7%)	2 (0.5%)	2 (0.6%)	3 (0.6%)
	Retroperitoneal Tumor	1 (0.2%)	-	-	1 (0.2%)
Malignant Intraluminal	Tumor (Small Bowel)	9 (2.2%)	-	2 (0.6%)	7 (1.3%)
	Rectal Cancer	17 (4.1%)	1 (0.2%)	1 (0.3%)	17 (3.2%)
	Colon Cancer	1 (0.2%)	-	1 (0.3%)	-
Congenital	Malrotation	4 (1%)	-	-	4 (0.8%)
	Congenital Jejunal Atresia	2 (0.5%)	-	-	2 (0.4%)
	Anal Stenosis	1 (0.2%)	-	1 (0.3%)	-
Inflammatory	Perforated Small Bowel	10 (2.4%)	-	1 (0.3%)	9 (1.7%)
	Crohn's Disease	1 (0.2%)	9 (2.1%)	5 (1.6%)	5 (0.9%)
	Diverticulitis	-	3 (0.7%)	1 (0.3%)	2 (0.4%)
	Necrotizing Enterocolitis	1 (0.2%)	-	-	1 (0.2%)
Benign Extraluminal	Adhesion	131 (31.6%)	191 (44.9%)	122 (39.6%)	200 (37.7%)
	Incarcerated Hernia	44 (10.6%)	3 (0.7%)	11 (3.6%)	36 (6.8%)
	Volvulus	27 (6.5%)	1 (0.2%)	4 (1.3%)	24 (4.5%)
	Internal Hernia	9 (2.2%)	-	-	9 (1.7%)
	Mesenteric Cyst	1 (0.2%)	-	1 (0.3%)	-
	Uterine Mass	1 (0.2%)	-	-	1 (0.2%)
	Trocar Site Hernia	1 (0.2%)	-	-	1 (0.2%)
	Cecal Volvulus	1 (0.2%)	-	-	1 (0.2%)
Benign Intraluminal	Constipation and Fecaloma	45 (10.9%)	86 (20.2%)	73 (23.7%)	58 (10.9%)
	Small Bowel Intussusception	52 (12.6%)	30 (7.1%)	42 (13.6%)	40 (7.5%)
	Phytobezoar	15 (3.6%)	-	1 (0.3%)	14 (2.6%)
	Tumor (Benign Intra)	1 (0.2%)	-	-	1 (0.2%)
	Gall Stone Ileus	2 (0.5%)	-	-	2 (0.4%)
	Mickle's Diverticulum	2(0.5%)	-	-	2 (0.4%)
	Bowel Hematoma	2 (0.5%)	-	-	2 (0.4%)
	Lipoma of Ileocecal Valve	1 (0.2%)	-	-	1 (0.2%)
Total		414 (49.3%)	425 (50.7%)	308 (36.7%)	531 (63.3%)

P-Value Surgical Vs. Conservative and Cause of Obstruction = <0.001

P-Value Days of Stay and Cause of Obstruction = 0.000

small bowel or rectal malignancies. Although small bowel cancers are rare, comprising less than 5% of all gastrointestinal tract neoplasms, their contribution to obstruction in our sample (32.1%) is notable [21]. These malignancies are often diagnosed at advanced stages due to non-specific symptoms and limited screening options, which may explain their role in acute presentations such as obstruction [23,26]. In addition, approximately 20-30% of patients with small bowel cancer may experience bowel obstruction at some point during their illness [13]. Rectal cancer was a rare cause of obstruction in our study (3.6%), which is consistent with its relatively lower likelihood of causing complete luminal blockage compared to more proximal lesions. These findings reinforce the need for early diagnostic strategies and highlight the importance of considering malignancy, particularly colorectal cancer, in the differential diagnosis of adult bowel obstruction.

Congenital

In our study, 7 patients (0.8% of the total) had intestinal obstruction due to congenital causes. Among these, malrotation was the most common cause, affecting 4 patients (57.1%). Additionally, 2 patients (28.6%) had congenital jejunal atresia, and 1 patient (14.3%) had anal stenosis. These findings are consistent with existing literature, where malrotation has been identified as a significant cause of intestinal obstruction in children [16], and jejunal atresia comprises a notable proportion of intestinal atresia cases [17]. Another study reports that Jejunal or ileal atresia occurs in approximately 0.7 per 10,000 births, each representing approximately 20% of small intestinal atresia [19]. On the other hand, although anal stenosis is less commonly reported, it is recognized in the context of congenital anomaly syndromes such as VACTERL [18].

Inflammatory

The category of inflammatory causes of obstruction in our study included 24 patients, with Crohn's disease and mesenteric ischemia each accounting for 41.7% of cases, followed by diverticulitis (12.5%) and necrotizing enterocolitis (4.2%). Notably, all cases of bowel perforation in this group were found to have mesenteric ischemia with necrotic bowel segments intraoperatively. Mesenteric ischemia remains a highly morbid condition, with mortality rates reported to exceed 50% in untreated cases, underscoring the importance of early diagnosis and surgical intervention [20]. In Crohn's disease, the transmural inflammatory process often leads to fibrotic strictures, which can result in recurrent episodes of small bowel obstruction or, less commonly, colonic obstruction [21]. Differentiating between inflammatory and fibrostenotic strictures is essential, as inflammatory strictures may respond to medical therapy, whereas fibrostenotic lesions typically require surgical resection or endoscopic dilation [22]. Diverticular disease is the third most common cause of large bowel obstruction, accounting for approximately 10% of cases [23]. Although acute diverticulitis rarely causes complete obstruction, many patients presenting with symptomatic large bowel obstruction may have underlying sigmoid strictures, either from chronic inflammation or malignancy [23]. The increasing prevalence of diverticulitis in aging populations, particularly in settings adopting Western dietary patterns, may contribute to a rise in related obstructive presentations [24].

Benign Tumors

Extraluminal: The category of benign extraluminal causes of obstruction included 410 patients. The most common cause was adhesions, affecting 322 patients (78.5%), followed by incarcerated hernias in 47 patients (11.5%). Volvulus was observed in 28 patients (6.8%), while 9 patients (2.2%) had internal hernias. Additionally, mesenteric cyst, uterine mass, trocar site hernia, and cecal volvulus each affected 1 patient (0.2%). These results go with previous articles where adhesions are reported as the most common cause of intestinal obstruction in Western countries [25].

Intramural: The benign intraluminal category included 236 patients, with constipation and fecaloma being the most prevalent causes, affecting 131 patients (55.5%). This finding is consistent with

prior studies showing that the prevalence of constipation ranges from 24% to 50% in older adults, particularly among institutionalized and sedentary populations [27]. Fecal impaction can result in significant colonic obstruction and may require manual disimpaction, enemas, or, in rare cases, surgical intervention. Small bowel intussusception was the second most common etiology in this category, observed in 82 patients (34.7%). Although intussusception is primarily a pediatric condition, it can occur in adults and is often associated with a pathological lead point, such as benign tumors or Meckel's diverticulum [28]. Phytobezoars were identified in 15 patients (6.4%), a relatively uncommon but well-documented cause of small bowel obstruction, especially in individuals with impaired gastric motility, previous gastric surgery, or high-fiber diets [29]. Gallstone ileus, Meckel's diverticulum, and bowel hematoma were each found in 2 patients (0.8%), reflecting their known rarity in clinical practice. Finally, intraluminal obstruction due to a lipoma of the ileocecal valve and other benign tumors was diagnosed in just one patient each (0.4%), consistent with literature describing such neoplasms as extremely uncommon and typically incidental findings [30].

Etiologies of Intestinal Obstruction Per Age

Our analysis stratified the 839 patients into three age groups: 0–13 years (17.9%), 14–49 years (21.3%), and 50 years and older (60.8%) (Table 2). Among patients aged ≥50 years, adhesions were the leading cause of obstruction (41%), followed by constipation and fecaloma (16.7%). In the 14–49 age group, adhesions were also predominant (53.1%). In contrast, small bowel intussusception accounted for 48% of obstructions in the pediatric group (<14 years), consistent with known epidemiology. Intussusception occurs primarily in infants and toddlers, with peak incidence between 4 and 36 months of age. Approximately 1% of cases are seen in infants younger than 3 months, and 30% occur between 3 and 12 months, reflecting its predominance in early childhood [28]. When intussusception occurs outside the typical age range, it often involves a pathologic lead point such as Meckel's diverticulum or lymphoid hyperplasia. Congenital causes such as malrotation and jejunal atresia also presented in both pediatric and adolescent age groups, highlighting the need for broad diagnostic consideration across age brackets. A large population-based study reported the average age at first hospital admission for bowel obstruction to be 68.5 years, and up to 10–12% of patients over 65 presenting with abdominal pain in the emergency department are ultimately diagnosed with small bowel obstruction (SBO) [31,32]. These findings emphasize that while certain etiologies like intussusception dominate in younger patients, adhesions remain the most common cause in adults, particularly with advancing age.

Surgical Vs Conservative Management

Treatment strategies for intestinal obstruction in our study were divided into surgical and conservative approaches, with length of stay categorized as three days or less versus more than three days (Table 3). Adhesions were the most frequent etiology in both surgically and conservatively managed patients, as well as in both hospitals stay categories. This trend is consistent with the high prevalence of adhesive small bowel obstruction (ASBO) and the variable clinical course it presents. National data suggest that approximately 20–30% of patients with small bowel obstruction ultimately require operative intervention [33]. In our study, 131 out of 322 adhesion-related cases underwent adhesiolysis. Bowel ischemia was a key determinant for surgery, as it is a known complication in 7–42% of obstructions and is associated with significantly increased mortality [34]. The decision to pursue surgery versus conservative management is multifactorial, often depending on imaging findings, patient response to initial treatment, comorbidities, and risk of complications such as perforation or strangulation. For instance, in Crohn's disease and diverticulitis, conservative management proved effective in most cases, whereas conditions like congenital anomalies, hernias, and failed intussusception reductions often necessitated surgical correction. Moreover, patients undergoing surgery frequently had longer hospital stays, which reflects the need for perioperative monitoring and recovery from more complex pathology.

Mortality Rate and Perforation Risk

Among the 839 patients included in our study, 33 (3.9%) died during hospitalization. This mortality rate was attributed to intestinal obstruction and associated complications (Tables 4 & 5). The most significant contributor was adhesions, which accounted for 24.2% (n=8) of all deaths. Notably, 7 of these patients were found to have bowel perforations during surgery. Adhesiolysis, while often necessary, is known to carry increased risks of sepsis, intra-abdominal complications, and mortality, especially when complicated by bowel injury. One prospective study reported a mortality rate of 8% following adhesiolysis complicated by bowel perforation, compared to 1.6% in cases without perforation [35]. Malignant intraluminal tumors were responsible for 12.1% of deaths, while 6.1% were attributed to malignant extraluminal tumors. Bowel perforation occurred in 4.4% of all patients, with the remaining 95.6% managed without this complication. Incarcerated hernias were the leading cause of perforation, representing 18.9% of all cases complicated by perforation and affecting 27% of all patients with incarcerated hernias. This is consistent with existing literature indicating that while the annual risk of strangulation in untreated hernias is relatively low (0.3–3%), the consequences can be severe. In two randomized trials comparing elective hernia repair with watchful waiting, the

Table 4: Mortality rate of each etiology.

		Mortality		*P-Value*
Category	**Cause of Obstruction**	**Died**	**Home**	
Functional	Ileus	3 (9.1%)	76 (9.4%)	<0.001
Malignant Extraluminal	Metastasis	2 (6.1%)	47 (5.8%)	
	Cancer in Head of Pancreas (Duodenal obstruction)	-	5 (0.6%)	
	Retroperitoneal Tumor	-	1 (0.1%)	
Malignant Intraluminal	Tumor (Small Bowel)	1 (3%)	8 (1%)	
	Rectal Cancer	3 (9.1%)	15 (1.9%)	
	Colon Cancer	-	1 (0.1%)	
Congenital	Malrotation	-	4 (0.5%)	
	Congenital Jejunal Atresia	-	2 (0.2%)	
	Anal Stenosis	-	1 (0.1%)	
Inflammatory	Perforated Small Bowel	2 (6.1%)	8 (1%)	
	Crohn's Disease	-	10 (1.2%)	
	Diverticulitis	-	3 (0.4%)	
	Necrotizing Enterocolitis	-	1 (0.1%)	
Benign Extraluminal	Adhesion	8 (24.2%)	314 (39%)	
	Incarcerated Hernia	5 (15.2%)	42 (5.2%)	
	Volvulus	4 (12.1%)	24 (3%)	
	Internal Hernia	-	9 (1.1%)	
	Mesenteric Cyst	1 (3%)	-	
	Uterine Mass	-	1 (0.1%)	
	Trocar Site Hernia	-	1 (0.1%)	
	Cecal Volvulus	-	1 (0.1%)	
Benign Intraluminal	Constipation and Fecaloma	2 (6.1%)	129 (16%)	
	Small Bowel Intussusception	1 (3%)	81 (10%)	
	Phytobezoar	-	15 (1.9%)	
	Tumor (Benign Intra)	1 (3%)	-	
	Gall Stone Ileus	-	2 (0.2%)	
	Mickle's Diverticulum	-	2 (0.2%)	
	Bowel Hematoma	-	2 (0.2%)	
	Lipoma of Ileocecal Valve	-	1 (0.1%)	
Total		**33 (3.9%)**	**806 (96.1%)**	

Table 5: Risk of perforation in each etiology.

		Perforated or not		*P-Value*
Category	Cause of Obstruction	Perforated	Not Perforated	
Functional	Ileus	-	79 (9.9%)	<0.001
Malignant Extraluminal	Metastasis	2 (5.4%)	47 (5.9%)	
	Cancer in Head of Pancreas (Duodenal obstruction)	-	5 (0.6%)	
	Retroperitoneal Tumor	-	1 (0.1%)	
Malignant Intraluminal	Tumor (Small Bowel)	-	9 (1.1%)	
	Rectal Cancer	-	18 (2.2%)	
	Colon Cancer	-	1 (0.1%)	
Congenital	Malrotation	2 (5.4%)	2 (0.2%)	
	Congenital Jejunal Atresia	-	2 (0.2%)	
	Anal Stenosis	-	1 (0.1%)	
Inflammatory	Perforated Small Bowel	10 (27%)	-	
	Crohn's Disease	-	10 (1.2%)	
	Diverticulitis	-	3 (0.4%)	
	Necrotizing Enterocolitis	-	1 (0.1%)	
Benign Extraluminal	Adhesion	7 (18.9%)	315 (39.3%)	
	Incarcerated Hernia	10 (27%)	37 (4.6%)	
	Volvulus	1 (2.7%)	27 (3.4%)	
	Internal Hernia	-	9 (1.1%)	
	Mesenteric Cyst	-	1 (0.1%)	
	Uterine Mass	1 (2.7%)	-	
	Trocar Site Hernia	-	1 (0.1%)	
	Cecal Volvulus	1 (2.7%)	-	
Benign Intraluminal	Constipation and Fecaloma	-	131 (16.3%)	
	Small Bowel Intussusception	2 (5.4%)	80 (10%)	
	Phytobezoar	-	15 (1.9%)	
	Tumor (Benign Intra)	-	1 (0.1%)	
	Gall Stone Ileus	-	2 (0.2%)	
	Mickle's Diverticulum	1 (2.7%)	1 (0.1%)	
	Bowel Hematoma	-	2 (0.2%)	
	Lipoma of Ileocecal Valve	-	1 (0.1%)	
Total		**37 (4.4%)**	**802 (95.6%)**	

rates of strangulation ranged from 0.18 to 0.79 per 1,000 patient-years [36,37]. Additionally, bowel necrosis occurs in up to 15% of cases with incarcerated groin hernias, often necessitating urgent surgical intervention and increasing the risk of mortality (38). These findings emphasize the importance of timely surgical evaluation and intervention for obstruction causes with high perforation potential.

Limitations

This study has several limitations. First, its retrospective design is inherently subject to information bias and missing data, particularly given that patient records spanned nearly three decades. A significant number of cases (460) had to be excluded due to incomplete documentation, which may have introduced selection bias. Second, the study was conducted at a single tertiary care center, which may limit the generalizability of findings to other hospitals or regions with different referral patterns, population characteristics, or resource availability. Third, variations in diagnostic protocols, surgical decision-making, and data recording over the study period may have affected the consistency of classification and outcomes. Finally, the lack of long-term follow-up data limited our ability to assess recurrence rates, late complications, or survival beyond hospital discharge.

Conclusion and Recommendation

This retrospective analysis sheds light on the wide range of causes behind intestinal obstruction in a major Lebanese tertiary care center. Our findings indicate that colon cancer remains the most frequent cause of large bowel obstruction, while small bowel obstruction is most often due to adhesions—also contributing significantly to associated mortality. Among inflammatory conditions, Crohn's disease emerged as the leading cause. In pediatric patients, congenital anomalies such as bowel malrotation were the most common, though late presentations in adulthood were occasionally observed. For malignant extraluminal obstructions, metastasis was the most frequent etiology. Benign intraluminal obstructions were largely caused by fecaloma, whereas lipomas were rare. Perforated bowel cases, often due to incarcerated hernias, were associated with longer hospital stays, highlighting the severity of these presentations.

Overall, the results underscore the importance of early surgical evaluation and timely intervention, especially in complicated cases like malignancy or perforation. Given the lack of comprehensive regional data, particularly from the Middle East, there is a clear need for future prospective, multicenter research to better understand etiological trends and guide clinical decision-making. Further efforts should also look into cost-effective diagnostics and innovative surgical solutions, particularly in resource-limited settings. Finally, strengthening national databases and promoting collaborative research would be essential steps toward more evidence-based and patient-centered care in our region.

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