

Etiology of Small Bowel Obstruction (SBO) in a Culturally Diverse Patient Population

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Background & Aims: Small bowel obstructions (SBO) are a major cause of morbidity and recurrent hospitalizations worldwide. The leading cause of SBO in the western world is adhesions. The goal of this study was to determine the etiologies of SBO in a large, university-affiliated hospital with a culturally, ethnically and socioeconomically diverse patient population.

Methods: Systematic chart review of all patients hospitalized at Elmhurst Hospital Center with the discharge diagnosis of “bowel obstruction” between January 2005 and October 2012 was conducted. Patients with the diagnosis of SBO were selected from this group. Our cohort included 348 patients accounting for 405 admissions for SBO. Data collected included demographic profile, length of stay, hypothesized etiology of SBO and type of management. Because all data had skewed distributions, we calculated medians and compared several parameters.

Results: The etiologies of SBO were found to be adhesions (56%), hernia (10.3%), Crohn’s disease (5.7%), neoplasia (4.9%), tuberculosis (0.9%) and miscellaneous (22.2%). Surgical management was more frequent when a hernia (61.1%) or malignancy causing obstruction (59%) was the cause of SBO. Medical management was more common in Crohn’s disease (72%). Patients with hernia, malignancy or adhesions were older and had a longer median hospital stay after surgical management. There was no specific gender predilection for any cause of SBO except for Crohn’s (predominantly male). Ethnicity of the patient population was white (12.1%), African American (7.9%), Hispanic (48.4%) and Asian/others (31.6%).

Conclusion: Adhesions were the most common cause of SBO according to our study (56%), a finding consistent with other studies in the developed countries (70% as per current literature). Hernia was the second most common cause of SBO in our study, unlike other studies in western countries where malignant mass or Crohn’s disease have been found to be the second most common cause. This could be attributed to the cultural diversity in our population group. The prominence of hernias as an etiology of SBO in developing countries has been attributed to the infrequency of elective hernia repair in those areas.

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Small bowel obstructions (SBO) account for more than 300,000 hospitalizations annually in the United States.¹ The incidence of SBO from adhesions has increased during the last 30 years because of increasing number of laparotomies.² The morbidity and financial cost of SBO are compounded by the recurrent nature of the disease, which often depends upon the etiology of the obstruction. The outcome of the disease, the length of hospital stay and treatment modality also vary according to the underlying reason for obstruction. Treatment success and health care costs also differ depending on the treatment modality. Numerous factors contribute to the underlying pathology resulting in SBO including socio-economic background, ethnicity and cultural diversity of the serving patient population as well as developed versus developing countries. We conducted a review to determine the etiology of SBO in our hospital, which serves as one of the most diverse patient populations from an ethnic, cultural and socio-economic standpoint in United States. According to the 2010 Census, 39.7% of the population was white, 19.1% black or African American, 22.9% Asian, 12.9% from other races and 4.5% of two or more races. 27.5% of the Queens population was of Hispanic, Latino or Spanish origin (they may be of any race).³

METHODS

Patients

Systematic chart review of all patients hospitalized at Elmhurst Hospital Center with the discharge diagnosis of “bowel obstruction” between January

2005 and October 2012 was conducted. Patients with the particular diagnosis of small bowel obstruction were selected from this group. No distinction was made between complete versus partial obstruction. The exclusion criteria included age less than 18 years and diagnosis of large bowel obstruction. The cohort included 348 patients accounting for 402 admissions for SBO.

Data Collection and Analysis

Medical records were reviewed in their entirety; admission notes, progress notes, radiology reports, operative reports and pathology reports were included. Demographic profiles, length of stay, hypothesized etiology of SBO and management parameters were evaluated. Final determination of the etiology of the small bowel obstruction was based on clinical presentation, operative findings, radiological findings and consultant reports.

Institutional review board approval for a retrospective chart review was obtained. Informed consent was unnecessary as this was a retrospective chart review. All data were collected into a computerized database. Because all data had skewed distributions, we calculated medians and compared multiple parameters such as ethnicity of the patient population, management approach and length of hospitalization.

Results

Table 1 summarizes the etiologies of small bowel obstruction as determined by our review. More than

Table 1. Etiology of Small Bowel Obstruction

Etiology	Number of patients (%) (n= 348)	Number of admissions (%) (n= 405)
Adhesions	195 (56%)	223 (55.1%)
Hernia	36 (10.3%)	41 (10.1%)
Crohn's disease	20 (5.7%)	23 (5.7%)
Malignant Mass	17 (4.9%)	22 (5.4%)
Tuberculosis	3 (0.9%)	9 (2.2%)
Miscellaneous	77 (22.2%)	87 (21.5%)

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Table 2. Comparison of Demographic Profile and Hospitalization for Patients with Leading Etiologies of Small Bowel Obstruction (SBO)

	Adhesions (n=195)	Hernia (n=36)	Crohn's Disease (n=20)	Malignant Mass Causing Obstruction (n=17)
Median Age at Admission for SBO	56	62	43	57
Sex (male %)	99 (50.8%)	19 (52.7%)	14 (72%)	10 (53%)
Ethnicity				
White	50 (25.6%)	9 (25%)	3 (15%)	1 (5.9%)
African American	12 (6.2%)	3 (8.3%)	2 (10%)	1 (5.9%)
Hispanic	84 (43.1%)	16 (44.4%)	11 (55%)	9 (53%)
Asian	49 (25.1%)	8 (22.2%)	4 (20%)	6 (35.2%)
Surgical Treatment	91 (46.6%)	22 (61.1%)	6 (30%)	10 (59%)
Median length of inpatient stay (days) for patients managed medically	4	3	5	4
Median length of inpatient stay (days) for patients managed surgically	10	11	7	13

half of the patients with SBO and their admissions for SBO were due to adhesions. The second most common cause was hernia followed by Crohn's disease third. The ethnicity of the patient population was white (11.1%), African American (7.9%), Hispanic (48.4%) and Asian (29.2%).

Miscellaneous causes included: Strictures (13 patients, 15 admissions), volvulus (5, 6), foreign body (8, 9), endometriosis (2, 5), fecal impaction (5, 5), intussusception (3, 3), gallstone ileus (2, 3), malrotation (3, 3), abscess (4, 4), paralytic ileus (20, 20) and unspecified (12, 12). Of the eight patients with foreign body as the etiology, two were from a condom, two were due to a phytobezoar, one was from an ingested metallic pin, one patient had wireless capsule endoscopy retention and one patient was admitted twice with mushroom impaction.

Comparisons of the demographic profile and hospitalizations for patients with leading etiologies of

SBO are summarized in Table 2. Patients who presented with small bowel obstruction secondary to Crohn's were relatively younger with a median age of 43. Additionally, only percentage (30%) of patients with Crohn's required surgery to relieve their obstruction relative to the nearly 60% of the patients with SBO from other causes that required surgery. As might be expected, conservatively treated patients had a shorter duration of stay versus those treated surgically, regardless of etiology.

No specific gender predisposition for any cause of small bowel obstruction was determined except for Crohn's disease, approximately 72% males. Ethnical distribution is mentioned in Table 2.

Comments

Adhesions were the most common cause of small bowel obstruction according to our study, a finding consistent with other studies in the developed countries.^{1, 2, 4-7}

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Table 3. Etiology of Small Bowel Obstruction in Studies Reported in 1980

Study	Adhesions (%)	Hernia (%)	Malignancy (%)	Inflammatory Bowel Disease (%)	Number of Patients
Bizer et al., 1981 [13]	74	8	9	5	405
Brolin et al., 1987 [14]	67	6	13	4	342
Miller et al., 2000 [1]	74	2	5	7	552
Current	56	10	5	6	348

Adhesions accounted for 55.6% in our study, while it accounts for approximately 70% of all cases of SBO as per current western literature.^{1, 11-13, 17} Hernias were the second most common cause of SBO in our study, unlike other studies in western countries where malignant mass¹⁹ or Crohn's disease¹ have been found to be the second most common etiology. See Table 3. This variability could be attributed to the cultural diversity in our population group. The prominence of hernias as an etiologic agent in developing countries has been attributed to the infrequency of elective hernia repair in those areas.¹⁰ In western countries, because of the increasing elective prophylactic herniorrhaphy, there is relative decreased frequency of SBO from hernia and relative increased frequency of SBO from adhesions.^{9, 11}

A significant shift in the underlying causation of small bowel obstruction has been documented in the literature over the course of the past century. In a British study involving 6,892 patients conducted during the 1920s, Vick¹⁵ reported that hernias resulted in 49% of intestinal obstruction, while adhesions resulted in only 7%. The United States population was evaluated from 1942 to 1945 and McEntee et al.⁴ reported a dramatic change in pattern of causes of SBO, with adhesions accounting for 31% and strangulated hernias only 10%. In a similar study from United States four decades later (1980-1981);¹³ adhesions were accounting for 74% of cases and hernias only 8%. (See Table 3) This drastic change is largely due to elective treatment of inguinal hernias and increasing number of laparotomies.

Socio-economic backgrounds as well as the cultural and ethnical diversity of patient populations are also independent predictors of small bowel obstruction. In

a review of 316 African cases in 1980, Chiedozi et al.⁵ reported that strangulated hernia resulted in 65% of cases of intestinal obstruction while adhesions yielded only 11%. In a similar review from 2005-2008, including 367 Indian patients,¹⁶ hernias resulted in 36% of all cases of SBO while adhesions were responsible for only 16%. An interesting finding was that intestinal tuberculosis resulted in 14% in this study thus illustrating the difference in patterns of SBO in developing countries. In our study, 3 cases of SBO were secondary to intestinal tuberculosis that resulted in 9 hospitalizations.

No specific gender predilection for any cause of obstruction was determined except for Crohn's disease which predominantly was found in young males. Surgical intervention was more frequently used when hernia or malignant mass was involved. The length of hospital stay was found to be higher for patients treated surgically as compared to non operative management.^{12, 20}

While managing these patients, it is important to determine whether patients can be subjected to conservative treatment or to an emergency surgery. Most of the cases of partial SBO and acute obstruction from Crohn's disease often resolve spontaneously with conservative management.⁸ Obstruction from impacted food, bezoars, foreign bodies or gall stones¹⁷ may be treated endoscopically. Complete obstruction, peritonitis or strangulation mandates emergency surgery. If SBO doesn't resolve after 24-48 hours of conservative management, it is more likely a complete obstruction rather than a partial SBO and laparotomy is often

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indicated.^{7,14} Delaying surgery for more than 24 hours after the symptom onset in cases with strangulation increases the mortality threefold.^{1,18}

SUMMARY

In conclusion, our study supports previous literature in that adhesions remain the most common cause of small bowel obstruction (55.6%), a finding consistent with other studies in the developed countries (70%). This could be attributed to the ethnic, cultural and socio-economic diversity in our patient population. ■

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