

Unusual causes of mechanical small bowel obstruction

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ABSTRACT

Objectives: We herein report our experience regarding unusual causes of bowel obstruction to increase the awareness of surgeons regarding this disease.

Methods: From 1991 to 2003, we had experience at the University affiliated hospitals, northern Jordan with 24 patients with small bowel obstruction resulting from unusual causes. We retrospectively reviewed the medical records of these patients with regards to the mode of presentation, cause of obstruction, radiological and operative findings, management and outcome.

Results: We recorded 15 patients who underwent previous abdominal surgery. Preoperative diagnosis was correct in only one patient with an internal hernia, but the abdominal CT scan suggested the diagnosis in 5 of the 9 patients who had the scan. The final diagnosis was internal hernias in 11 patients, foreign bodies in 5, ischemic strictures in 3, carcinoid tumors in 2,

endometriosis in 2, and metastatic deposit from interstitial bladder carcinoma in one patient. Nine of the 12 patients with recurrent obstruction had either short course or recurrence obstruction during the same hospital admission. We carried out bowel resections in 15 patients (5 resections were due to bowel strangulation). Post operative death occurred in 4 patients.

Conclusions: Awareness of these rare causes of intestinal obstruction even in patients with previous abdominal operation might improve the outcome. The tentative diagnosis of adhesion obstruction in patients with unusual obstructive etiology might lead to a higher rate of gangrenous complications. Rigorous preoperative evaluation including careful history and early abdominal CT may show the obstructive cause.

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Mechanical small bowel obstruction (MSBO) is a common surgical problem.¹ Postoperative adhesions, external hernias and metastatic neoplasms constitute the main etiological factors, and account for 80-95% of all causes.¹⁻⁴ The remaining 5-20% is attributed to other unusual etiologies.¹⁻⁶ Each of these causes is considered a rarity in its own. Their importance lies in the fact that most of them are difficult to detect, except with thorough radiological imaging or at laparotomy. Adding to this difficulty in the diagnosis, is the fact that approximately 35% of all MSBO had more than one etiological factors present at the same time, and the fact that in only 61% of patients with previous

abdominal operation, adhesion will be the underlying obstructive etiology.¹⁻³ Awareness of these unusual etiologies as a possible cause of MSBO even in patients with previous abdominal operations might contribute to better utilization of available imaging modalities and outcome in the management of these patients. In this paper, we present our experience with these unusual causes in order to increase the awareness of the surgeons regarding this rare entity.

Methods. Over a period of 13 years extended from 1991 to 2003, we retrospectively studied the

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medical records of all adult patients operated upon for MSBO. The records of the operating rooms of Princess Basma Teaching Hospital and King Abdullah University Hospital, northern Jordan, were used to identify patients' names. Initially 376 patients operated upon for MSBO were identified. The operative notes were studied for finding and cause of obstruction. Patient with obstruction secondary to postoperative adhesions alone (with no other pathology as a cause for the obstruction), metastatic neoplasms and external hernias (groin, paraumbilical, spigelian and incisional) were excluded. This left us with 24 patients with unusual causes for their bowel obstruction. One patient with metastatic interstitial cell carcinoma of the urinary bladder was included due to the rarity of this tumor. The clinical and operative records of these patients were reviewed with regards to their age and gender, cause and site of obstruction, clinical presentations, time between presentation and surgery, radiological investigations, pre and postoperative diagnosis, operative findings, surgical procedures and outcome.

We identified 3 types of clinical presentation; MSBO for the first time, recurrent obstruction and intermittent partial obstruction. Patients were considered as having MSBO for the first time on clinical grounds with the support of confirmatory plain radiography. Recurrent obstruction was considered in patients with past history of at least single hospital admission for bowel obstruction. These recurrent attacks fall into 3 categories: short course (symptoms and signs of obstruction resolved in less than 12 hours), recurrent attacks in the same hospital stay and medium course recurrent attacks (symptoms and signs of obstruction resolved in 12-48 hours). Patients with intermittent abdominal pain and distention but without absolute constipation of more than 3 weeks were considered as having intermittent partial obstruction.

Results. The mean age of the patients was 41.7 years (range 18-72). History of abdominal surgery was recorded in 15 patients. Preoperative diagnosis of the obstructive etiology was correct in only one patient with internal hernia. The characteristics, clinical presentations, and tentative diagnoses of all patients are summarized in **Table 1**.

Abdominal ultrasound (US) was performed on 11 patients, and in none of them the underlying cause was detected. Abdominal computed tomography (CT) scan was performed on 9 patients, and the correct etiology was made in only one patient with internal hernia, although the CT scan suggested the diagnosis in other 4 patients. All patients had laparotomy, and the final diagnoses are summarized in **Table 1**. Seven of the patients with internal hernia had US preoperatively, which confirmed the obstruction in 6 patients, but failed to detect the

cause in all of them. Abdominal CT was carried out in 3 of the 11 patients with internal hernia and in one of them the diagnosis of trans mesenteric internal hernia was confirmed. Five patients had gangrenous bowel, all of which belonged to the subgroup of patients with internal hernias. The 2 patients with food bolus bezoars in the form of meat and vegetable (kebab) had previous peptic ulcer surgery. Small bowel stricture was found in 3 patients, all of them presented with chronic abdominal pain, vomiting and weight loss. Abdominal CT demonstrated stricture in 2 patients. Barium follow through showed long stricture in the proximal jejunum in one of the patients. The first patient had history of recurrent deep vein thrombosis and pulmonary embolism due to protein C deficiency, and the second patient had minor motor accident 4 month prior to presentation and found to have mid ileal stricture. No risk factor was identified in the third patient. Isolated small bowel endometriosis was the underlying etiology in 2 patients. In both of these patients, the abdominal CT showed small bowel mass causing partial obstruction. The underlying etiology was carcinoid tumor in 2 patients. One small tumor was discovered during operative exploration for recurrent incisional hernia thought to be obstructed. The other patient had recurrent MSBO, and the small tumor was found at operation. Abdominal CT failed to detect the tumors in both patients. None of these patients presented with carcinoid syndrome. Recurrent interstitial cell carcinoma of the urinary bladder was the cause of obstruction in one patient, which was initially thought to be due to adhesive obstruction. Operation biopsies from the multiple obstructing lesions of the distal ileum were proved to be recurrent tumor. Small bowel resection was carried out in 15 patients, of which 5 resections were due to small bowel strangulation. Major postoperative complications occurred in 6 patients (25%) (pulmonary embolism in 2, intestinal fistula in 2, wound infection in 3 and chest infection in 1 patient). Death occurred in 4 patients (17%) (pulmonary embolism in 2, and septic shock in 2 patients).

Discussion. Uncommon causes in this study constituted 6.4% of all causes of obstruction, which is within the range of 5-20% reported by others.¹⁻⁶ The diagnosis of MSBO can be made on clinical grounds with confirmatory plain abdominal radiography. In a significant percentage of patients, further radiological investigation might be needed, which might help to differentiate MSBO from other causes of bowel dilatation, to identify the obstructive etiology, and to assess for possible strangulation.^{7,8} The important question which has not been answered yet is that: which patient is in need for further radiological investigation? Patients with non

evident etiology of MSBO are considered as one of the selection criteria^{7,8}. However, non evident etiology is an ill-defined criteria. In this study, 63% of the patients had previous abdominal surgery, and adhesive obstruction was assumed in 54% of all the patients. More than one possible etiology was found in 35% of the patients in one series.¹ Furthermore, in patients with previous abdominal operations, adhesion will be the underlying etiology in the majority, but not all patients.^{3,9} Therefore, the assumption that adhesions will be the evident cause in patients with previous abdominal operation is not always true. Atypical clinical presentation is considered as another selection criteria. However, the definition of the atypical presentation is difficult. The presentation of MSBO depends on the etiology, level, degree and duration of the obstruction.^{1,2,6,9,10} We found a history of recurrent attacks in 50% of our patients. Nine out of the 12 patients with recurrent obstruction had either short course or recurrence obstruction during the same hospital admission. Despite that our series is limited in number; we suggest that the type of recurrence might be used as a selection criterion for further radiological studies. Even in patients with previous abdominal surgery, recurrent obstruction of either short course or during the same hospital admission

might nictitate performing abdominal CT, which might suggest the diagnosis. On the other hand, attacks of MSBO due to adhesions are usually medium coarse attacks. A long term recurrent rate of 29% was reported with adhesive obstruction.¹⁰ As 52-70% of all adhesive obstruction will respond to conservative treatments within 24 hours, if they are going to do so,^{10,11} operative intervention within 24 hours of presentation has been advocated,^{1,10-12} however, longer period of conservative treatment had been suggested.^{9,13} The low rate of preoperative diagnosis in our patients probably reflects the decreased in awareness of our radiologists regarding this entity. Abdominal CT has high accuracy rate in confirming the diagnosis, identifying the cause of obstruction and detecting strangulation.^{7,8} Actually in retrospect, the CT scan in our series had suggested the diagnosis in 5 out of 9 patients (it demonstrated an internal hernia in one out of 3 patients who had CT scan. It also demonstrated stricture in 2 of the 3 patients with strictures and it showed small bowel mass causing partial obstruction in both patients with endometriosis). On the other hand, abdominal US was reported to be an accurate and reliable tool in confirmation of obstruction and detection of complications, but was less accurate in detecting the cause of obstruction as

Table 1 - The characteristics of 24 patients with unusual causes of intestinal obstruction.

Gender	Age (years)	Clinical presentation	Preoperative diagnosis	Postoperative diagnosis	Resection	Site of obstruction
Male	23	2b	Unidentified	Left paraduodenal hernia + MC*	No	Proximal jejunum
Male	32	2a	Adhesive obstruction	Left paraduodenal hernia	Yes	Distal jejunum
Female	47	2a	Adhesive obstruction	Left paraduodenal hernia	Yes	Distal jejunum
Female	54	2a	Internal hernia	Acquired mesocolic hernia	Yes	Mid-ileum
Female	28	1	Unidentified	Transverse mesocolic hernia	No	Distal jejunum
Male	29	1	Appendicitis	Vitelline duct Remnant	Yes	Mid-ileum
Male	18	2a	Unidentified	Vitelline duct Remnant	No	Mid-ileum
Female	46	3	Adhesive obstruction	Para colostomy hernia	No	Mid-ileum
Female	22	1	Adhesive obstruction	Trance omental hernia	Yes	Distal ileum
Male	40	2a	Cecal volvulus	Paracecal hernia	No	Distal ileum
Male	25	2c	Adhesive obstruction	Mesenteric window hernia	No	Mid-ileum
Male	72	2b	Adhesive obstruction	Kebab foreign body	Yes	Proximal jejunum
Male	38	2b	Adhesive obstruction	Kebab foreign body	No	Proximal jejunum
Female	24	1	Unidentified	Fruit pulp	No	Duodenojejunal
Male	50	1	Inflammatory mass	Bone foreign body	Yes	Mid-ileum
Female	70	1	Adhesive obstruction	Fruit pulp	No	Distal ileum
Female	53	3	Adhesive obstruction	Ischemic stricture	Yes	Proximal jejunum
Female	36	3	Adhesive obstruction	Ischemic stricture	Yes	Proximal jejunum
Male	57	3	Inflammatory bowel disease	Ischemic stricture	Yes	Mid-ileum
Male	51	2c	Adhesive obstruction	Carcinoid	Yes	Mid-ileum
Female	45	2c	Unidentified	Carcinoid	Yes	Mid-ileum
Female	39	3	Small bowel tumor	Endometriosis	Yes	Mid-ileum
Female	45	3	Adhesive obstruction	Endometriosis	Yes	Proximal ileum
Male	57	2b	Adhesive obstruction	Metastatic carcinoma	Yes	Distal ileum

*Mesenteric cyst, 1 - small bowel obstruction presented for the first time; 2a- short course recurrent attacks (symptoms and signs of obstruction resolved in <12 hours); 2b - recurrent attacks in the same hospital stay; 2c - medium course recurrent attacks (symptoms and signs of obstruction resolved in 12-48 hours); 3 - intermittent partial obstruction.

what happened with our patients.¹⁴ Barium follow through is of good value in patients with intermittent partial obstruction and it may show strictures as happened with one of our patients.

Internal hernias account for 0.6-5.6% of all causes of MSBO.¹⁵ Recurrent MSBO was found in 64% of internal hernias in this series. Internal hernias can present with recurrent acute obstruction, partial MSBO and vague upper abdominal pain exacerbated by eating, straining and standing or it can be asymptomatic.¹⁵⁻¹⁸ Internal hernias were the most common of the unusual causes, and the left paraduodenal hernias were the most frequent among internal hernias in this subgroup. Paraduodenal hernias constitute 30-59% of all internal hernias or 0.2-0.9% of all causes of MSBO.^{16,17,19-21} One of our patients had an associated paraduodenal hernia with mesenteric cyst. Mesenteric cyst alone was reported to cause MSBO.²² The mechanisms of obstruction in both of our patients who had vitelline duct remnants were due to herniation and entrapment of small bowel between the anterior abdominal wall and the remaining fibrous band. Vitelline duct remnants can cause MSBO by variable mechanisms, such as a leading point of intussusceptions, volvulus, bands and internal herniation.²³ The preoperative diagnosis of an internal hernia is difficult.¹⁵⁻¹⁷ On suspicion, the diagnosis can be made by abdominal CT as what happened to one of our patients or by upper gastrointestinal series.^{18,19,21,24} In accordance with our finding, internal hernias have been reported to have high gangrenous complications and mortalities.^{15-17,21} This might be a reflection of the relatively delayed surgical interventions as 45% (5 of 11) of our patients in this subgroup were misdiagnosed as adhesive obstruction, therefore, a period of conservative management proved to be unsafe. Additionally, in such type of obstruction, the herniated gangrenous bowel is far from detection by physical examination in their hidden position.²⁵ Ingested foreign body can pass per rectum in most of the time. Impaction of foreign body can cause perforation, bleeding, fistula formation, and obstruction.²⁶⁻²⁸ The clinical presentation in 2 of our patients was interesting. The cause of obstruction was their intake of "kebab". Both patients had evidence of MSBO with recurrent obstruction after complete relieve in the same hospital admission. Probably the kebab has impacted proximal to kinked bowel leading to an obstruction, and when the kebab moved back due to dilation of the bowel, this resulted in relief of obstruction, and then re-impacted again to cause similar attacks of obstruction. Both of those patients had previous gastric surgery for peptic ulcer disease. The reported risk factors for obstruction by food bolus bezoars are: the nature of swallowed food, previous gastric surgery, incomplete mastication, rapid deglutition, swallowing of large nuts or pits, intestinal stricture,

bands and altered intestinal motility.²⁶ Careful and detailed history from patients with MSBO may point to these rare causes and initiate further investigation. The possible mechanisms of obstruction due to carcinoid tumor include: narrowing as a result of fibrotic reaction to the tumor, leading point of intussusception, and lateral kinking. Carcinoid tumors can cause acute, recurrent or intermittent partial obstruction.²⁹⁻³¹ The mechanism of obstruction in our patients was due to fibrotic and desmoplastic reaction. Small bowel carcinoid might presents with carcinoid syndrome.³¹ Obstruction secondary to endometriosis is rare, and it is unlikely without extensive pelvic involvement.³²⁻³⁶ Both of our patients with endometriosis presented with intermittent partial obstruction. The CT scan and subsequent laparotomy showed isolated small bowel tumor, the nature of which was identified only on histopathology examination. Strictures as an etiology of MSBO are mainly caused by Crohn's disease. However, ischemic stricture was reported as a result of mesenteric vein thrombosis, Henoch-Schonlein purpura, non steroidal anti-inflammatory drugs, post traumatic and idiopathic causes.³⁷⁻⁴² The mortality in our series was 17%. This is much higher than the expected mortality from other series of MSBO due to common causes.^{1,5-7} Gangrenous complications occurred in 21% of this group. In patients with MSBO, the mortality and morbidity are related to age, comorbidities and strangulated obstruction.¹¹ The relative delays in the diagnosis and surgical intervention in the subgroup of patients with obstruction secondary to rare causes as in our series are important factors, which contribute to this high mortality and morbidity.

In conclusion, high index of suspicion regarding the rare causes in patients with MSBO is mandatory especially in patients with previous abdominal surgery in whom careful history and diagnostic work up including early abdominal CT may show a rare cause for the obstruction even in patients with adhesion.

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