

# Clinical Factors Associated with Intestinal Strangulating Obstruction and Recurrence in Adhesive Small Bowel Obstruction

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## Abstract

**Background:** Post-operative adhesions are a mutual reason of small-bowel obstructions, and up to 53 percent of cases operated on for adhesive small-bowel obstructions (ASBO) face recurrences. Our study evaluated the clinical parameters accompanied with strangulating obstructions and the risk factors with ASBO rate of recurrence.

**Patients and Methods:** A retrospective research has been carried out by the department data-base. 80 Patients with ASBO were included in the study and followed-up from January 2016 to July 2018 at Sayed Galal University Hospital. The clinical issues accompanied with strangulation of obstructions and recurrences after ward treating were assessed.

**Results:** Of the 80 involved ASBO cases, the obstructions recurred in 22 patients with a rate of recurrence was 27.5% (22/288), and 6 of those 22-patients experienced repeated surgical operation [rate of re-operation 27.3% (6/22)], whereas the other 16 cases underwent conservation treatment. The rate of recurrent of the simple ASBO group was 28.6% (19/72), and the median non-recurrence period was 12.2-mths. The rate of recurrence of the strangulating obstructing group was 37.5% (3/8), and the median non-recurrence period was 11.5-mths. The alterations among the studied groups were considered as non-significant ( $p$ -value=0.241).

**Conclusion:** Four clinical factors involving leukocytosis, tachycardia, together with CT results of thickening or swelling of the mesentery and CT displaying seroperitoneum, accompanying with incidence of intestinal strangulations in ASBO. ASBO-cases who experienced operative intervention had a decreased rate of recurrence, but ASBO-cases with strangulating obstructions hadn't rise the rate of recurrence in comparison to those of cases with simple ASBO.

**Key Words:** Adhesive small bowel obstruction – Clinical parameter – Following-up – Intestinal strangulation – Recurrence.

## Introduction

**ADHESIVE** small bowel obstruction (ASBO) is one of the main reasons of operative emergency

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and in specific of operative emergency that need emergent procedures [1] in one review of 87 studies involving 11007-cases, the occurrence of ASBO succeeding all kinds of abdominal surgeries was 2.4% [2].

The incidence of recurrent ASBO rises with the extent of following-up reaching 16-53%. An elevated number of preceding ASBO events, conventional interventions, ages <40-yrs, matted adhesion, and Post-operative complications rise the recurrence risk [3].

Symptoms of compromised perfusions of the small-intestine involving nonstop abdominal pains, leukocytosis, fever, and tachycardia, symptoms of peritoneal irritations, hyperamylasemia, and metabolic acidosis aren't dependable for diagnosis intestinal ischemia or comprehensive bowel obstructions [4].

ASBO leads to significant harm, resultant in 8-days of hospital-stay on average and an in-hospital death rate of 3% for every episode [5]. About 20 upto 30% of cases with ASBO need surgical interventions [6].

The principal reason of ASBO scure failure is because of delayed diagnosing and operative intervention for strangulating obstruction. Controversy still as to which ASBO-cases want fast surgical operation; therefore, how to differentiate strangulating obstructions from a simple ASBO is very significant [7].

While ASBO is a shared disorder, the preventions and treatments are often defined by surgeons' own favors instead of standard evident-built procedures [8].

Surgeons must know that the adhesions leading to bowel obstructions are characteristically the footprints of preceding abdominal operations or

disorders. Part of the adhesions creation could be avoided by using of minimal invasive surgeries and the utilization of adhesion barrier [9]. The majority of ASBO-cases could be managed non-surgically. If surgical intervention is needed, a laparoscopic method may be advantageous for simple situations [10].

Operation for small-intestine obstructions is accompanying with a death of up to 10 percent. Also, adhesions are recognized to lead to chronic painson abdomen and are existing in up to 57% of cases with post-operative chronic pains [11].

The present work is aimed to evaluate the clinical factors associated with strangulating obstructions and the risk factors with ASBO rate of recurrence.

### Patients and Methods

This retrospective study done in Sayed Galal University Hospital was conducted on 80 cases of SBO from January 2016 to July 2018 by using the department database.

Inclusion criteria for ASBO must be satisfy one of the next situations: Plain abdominal radiographs or abdominal US giving confident multi air-fluids levels in the small-intestine but no sign of gas within the colon; CT or MRI examinations displaying small intestine obstructions; approval of ASBO by laparo-tomy or laparo-scopy.

Exclusion criteria were abdominal obstructions secondary to colon tumor, small intestine carcinoma, gastro-intestinal stromal tumor (GIST), or metastatic tumor; past of intra-abdominal chemotherapy or radio-therapy; obstructions made by stool masses; intestinal tuberculosis; and early post-operative obstruction in 1-mth.

Informed written consent was obtained from each patient to be included in the current work.

Primary assessment for ASBO-cases was as next: Past of abdominal operation; presenting signs of abdominal pains and distension, vomiting, nausea, or a absence of flatus and defecations; physical examinations viewing abdominal swelling with intestines with palpable peristaltic waves, tenderness, altering intestine sound, or peritonitis.

Clinical factors collecting comprised the next: General state: Gender, ages, past of surgical operation & abdomen trauma; symptoms & physical signs: Fever, growing heart rates, continued abdominal pains, weakening or dis-appearing intestine sound, and peritoneal inflammation.

*Laboratory examination:* Peripheral blood white blood cell counts and aspartate aminotransferase (AST) value; imaging examinations: CT results of lessening intestine wall densities and thickening or swelling of the mesentery, and abdomen space effusions (seroperitoneum).

Signs for operative treatment were built on close monitoring of the clinical signs, lab. testing, and serial radiologic results. The concluding choice to go to surgical operation was made by surgeons. To assess the prediction of ASBO cases, following-up was showed by the doctors who manage the cases.

The medical data, involving symptoms, lab. tests, and imaging examination, were studied.

### Results

Of these 80 cases, there were 44-male (55%) and 36-female (45%) with age range between 19 and 71-yrs, the ages median was 51-yrs (39 to 61-yrs) and ages average of  $51.3 \pm 14.2$ -yrs. The following-up of these 80-patients continued from Jan 2016 to July 2018 with no any mortality. The most extended following-up period continued for 16-mths, and the least period continued for 6-mths. The entire median nonrecurrence period was 11.8-mths. In this work, 38-cases (47.5%, 38/80) experienced a surgery. Of these, 26-cases experience denterolysis, and the other 12-cases experienced small intestine resection & anastomosis. 42-cases (52.5%, 42/80) experienced conservative management. Eventually, 8-patients were detected as ASBO with strangulating obstructions, and 72-patients were detected as simple ASBO (Table 1).

Table (1): Demographic and clinical data of the studied groups.

Demographic data	Strangulation group (n=8)	Simple group (n=72)	P-value
<i>Age /-yrs:</i>			
Mean $\pm$ SD	50.1 $\pm$ 7.3	53.8 $\pm$ 7.3	0.224 <sup>1</sup>
Range	(39-55)	(44-61)	
<i>Sex:</i>			
Male	5 (62.5%)	39 (54.2%)	0.372 <sup>2</sup>
Female	3 (37.5%)	33 (45.8%)	
History of trauma	2 (25%)	21 (29.2%)	0.514 <sup>2</sup>
History of surgery	6 (75%)	61 (84.7%)	0.091 <sup>2</sup>
Persistent abdominal pain >48 hours	6 (75%)	33 (45.8%)	<0.001* <sup>2</sup>
Temperature >37.5°C	1 (12.5%)	11 (15.3%)	0.028* <sup>2</sup>
Tachycardia >100PPM	4 (50%)	9 (12.5%)	0.004* <sup>2</sup>
Bowel sound weakening <3 minutes	6 (75%)	36 (50%)	<0.001* <sup>2</sup>
Peritonitis	5 (62.5%)	11 (15.3%)	<0.001* <sup>2</sup>

In Table (2), strangulation group had higher mean of WBCs than simple group with statistical significant difference. Also, CT results as reducing intestine wall densities, Thickening or swelling of mesenteric and Seropertonium were significantly higher among strangulation group than simple group (Fig. 1).

Table (2): Investigations data of the studied groups.

	Strangulation group (n=8)	Simple group (n=72)	p-value
WBCs count (*10 <sup>9</sup> /L)	16.3±1.8	11.8±2.2	<0.001 * <sup>1</sup>
AST (U/L)	22.2±4.5	21.9±3.9	0.408 <sup>1</sup>
<i>CT findings:</i>			
- Decreasing intestinal wall density	5 (62.5%)	33 (45.8%)	0.018* <sup>2</sup>
- Thickening or swelling of mesenteric	7 (87.5%)	35 (48.6%)	<0.001 * <sup>2</sup>
- Seropertonium	7 (87.5%)	35 (48.6%)	<0.001 * <sup>2</sup>

WBCs: White blood cells.  
AST : Aspartate aminotransferase.

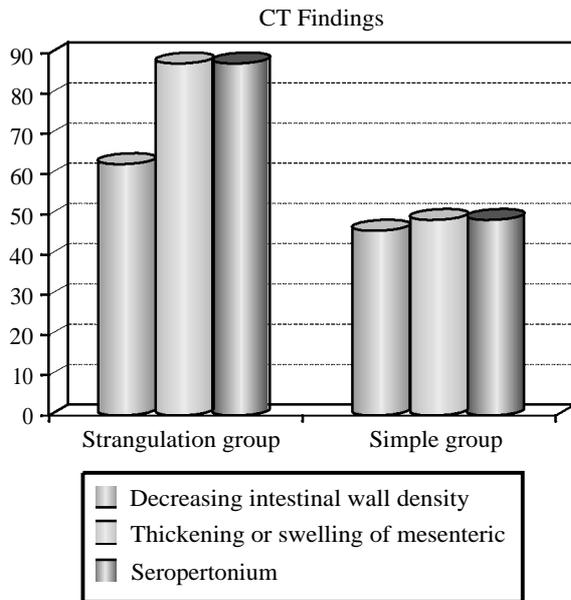


Fig. (1): CT findings in both groups.

The clinical features accompanying with strangulating obstructions of the 288-patients involve the next: Rising heart rates (>100bpm), rising WBC counts (>15x10<sup>9</sup>/L), CT results of mesentery thickening or swelling, and CT display seroperitoneum. These clinical factors were accompanying with elevated intestinal strangulation risk (p-value <.05) (Table 3).

Table (3): Multiple logistic regression analysis to predict factors.

	OR 95% CI	p-value
Persistent abdominal pain >48 hours	1.62 (0.98-2.11)	0.152
Temperature >37.5°C	1.11 (0.65-2.3)	0.423
Tachycardia > 1 00PPM	5.8 (3.8-17.3)	0.011 *
Bowel sound weakening <3 minutes	1.87 (0.88-3.21)	0.219
Peritonitis	1.33 (0.78-2.18)	0.110
WBCs count (*10 <sup>9</sup> /L)	9.2 (4-18)	0.021 *
Decreasing intestinal wall density	1.23 (0.98-1.87)	0.082
Thickening or swelling of mesenteric	12.3 (3-35)	<0.001 *
Seropertonium	13.9 (2-41)	<0.001 *

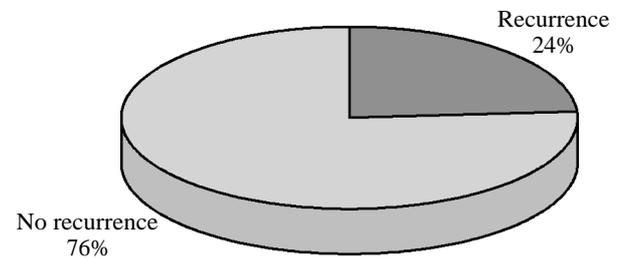


Fig. (2): Recurrence rate among the study patients.

In Table (4), among the 80 involved ASB-cases, the obstructions recurred in 22-patients with a rate of recurrence of 27.5% (22/288), and 6 of those 22-cases experienced repeated surgical operation [rate of re-operation was 27.3% (6/22)], whereas the other 16 cases underwent conservative treatment. The rate of recurrent of the simple ASBO-group was 28.6% (19/72), and the median non-recurrence period was 12.2-mths. The rate of recurrence of the strangulating obstructions-group was 37.5% (3/8), and the median non-recurrence period was 11.5-mths. The changes among these study groups weren't counted as significant (p-value=0.241).

Table (4): Recurrence after surgery or conservative management.

	Strangulation group (n=8)	Simple group (n=72)	p-value
Recurrence	3 (37.5%)	19 (26.4%)	0.385 <sup>1</sup>
Median non-recurrence interval (months)	11.5	12.2	0.241 <sup>2</sup>

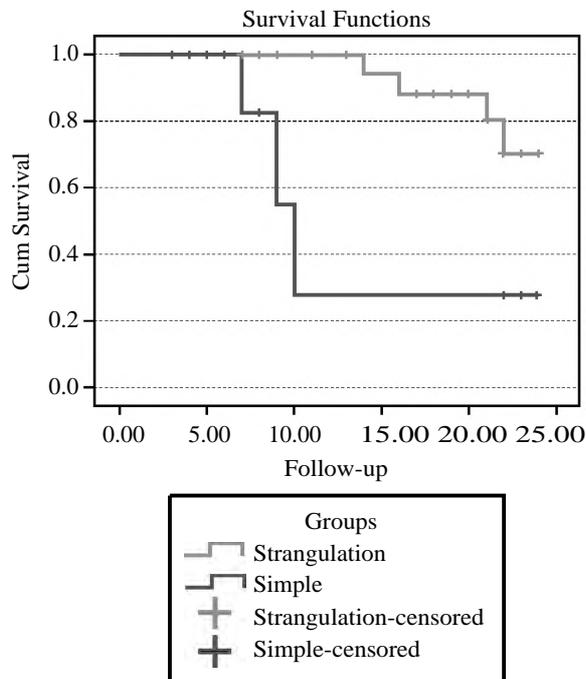


Fig. (3): Rates of recurrence comparing among various intestine obstruction kinds.

## Discussion

Intestinal obstruction is one of the commonest abdominal emergencies and has a complex pathogenesis and varying prognosis; mortality could be the most critical consequence. Commonly, ASBO-produced by Post-operative adhesions, and ASBOs are accountable for 60% to 75% of small intestine obstruction [12].

It was reported that intra-peritoneal adhesions happened in 50 up to 100% of cases who experience abdomen surgeries. Post-operative adhesion is a major health issue with main consequences on quality of life (QoL) and health care costs. ASBO was the commonest kind of obstructions and is associated with an elevated rate of abdomen reoperation [13].

Adhesions can lead to incidents of acute abdomen because of intestine strangulations, consequently, expecting the requirement for operative treatment between ASBO-cases is a challenge. The diagnosing of intestine strangulation is very significant for cases to accomplish better consequence treatments [14].

Adhesive Intestine obstruction is an unavoidable complicating of abdomen operations with substantial morbidities accompanying with poor QoL and incline to repetitive hospital-stay. The majority of them (73%-90%) could be conservatively treated. In spite of developments in surgeries, 15 to 30%

need operative treatment mainly or because of failures on conservative treatment. Owing to the nature of the disorder recurrences were calculated to be 30% [15].

In this study we aimed to evaluate the clinical factors accompanying with strangulating obstructions and the risk factors with ASBO recurrence rate.

This was a retrospective study, was conducted on 80 patients matched the inclusion criteria, of these 80-cases, there were 44-male (55%) and 36-female (45%) with age range between 19 and 71-yrs, with ages median of 51-yrs (39 to 61-yrs) and ages average  $51.3 \pm 14.2$ -yrs. The following-up of these 80-patients continued from January 2016 to July 2018 with no any mortality. The most extended following-up period continued for 16-mths, and the least period was 6-mths. The entire median nonrecurrence interval was 11.8-mths. In this work, 38-cases (47.5%, 38/80) experienced a surgery. Of these, 26-cases experience denterolysis, and the other 12-cases experienced small intestine resections and anastomosis. Forty-two patients (52.5%, 42/80) conservatively managed. Finally, 8-patients were detected as ASBO with strangulating obstructions, and 72-case were identified as simple ASBO.

In agreement with our findings, the study of Mu et al., [16] was conducted on 288-cases, there were 151-men (52.4%) and 137-women (47.6%) with age range between 14 and 97-yrs, with ages median of 54-yrs (45 to 66-yrs) and ages average of  $54.8 \pm 15.4$ -yrs. The following-up of these 288-cases continued from Sep-2013 to Apr-2016 with no mortality. The most extended following-up period continued for 37-mths, and the least interval was 6-mths. The overall median nonrecurrence interval was 32.2-mths. In this work, 122-cases (42.3%, 122/288) experienced surgeries. Of these, 83-cases experience denterolysis, and the other 39-cases experienced small intestine resections and anastomosis. 166-cases (57.6%, 166/288) conservatively managed. Eventually, 37-patients have been identified as ASBO with strangulating obstructions, and 251-patients were identified as simple ASBO.

In the study of Kabbash et al., [17] Age of the study participants ranged from 25-77-yrs with mean of 49.4-yrs and the majority of patients 32 (66%) were between 30-60-yrs. Also, most of the study participants were females (60%) with male to female ratio 1:1.5, All of our study subjects had previous abdominal surgery 50 patients (100%), distributed as follow appendectomy 16 patients (32%), followed by Cesarean section 12 patients

(24%), then cholecystectomy 11 patients (22%), then exploration 9 patients (18%) and lastly splenectomy 2 patients (4%).

Intestinal strangulating is accompanying with intestine necrosis and severe intra-peritoneal infections; consequently, timely identification of intestine strangulations when there is sign of an acute abdominal is essential for operative deciding. Our work displays that tachycardia and leukocytosis highly accompanied with incidence of intestine strangulations in ASBO. The clinical features accompanying with strangulating obstructions of the 288-patients involve the next: Rising heart rates ( $> 100\text{bpm}$ ), elevating WBC counts ( $> 15 \times 10^9/\text{L}$ ), CT results of mesentery swelling or thickening, and CT viewing seroperitoneum. These clinical factors were accompanying with raised intestine strangulation risk ( $p < .05$ ), the results are constant with preceding reports of Strik et al., [3] and Di Saverio et al., [8].

Notably, current study is similar to Williams et al., [18] contrarily, we list some clinical features for intestine strangulations in ASBO cases, involving fever, heart rates, and abdomen pains. Tachycardia, Fever, and leukocytosis were classical signs of ASBO. Thus, they have been taken in consideration as accompanying clinical features for intestine strangulation instead of as risk factors participate to abdomen adhesions. The classical symptoms mirror the abdominal infections everity; but, the consequences from standard clinical tests frequently absence details and precise data specific to intestine strangulations.

In the current study, Also CT results as reducing intestine wall densities, swelling or Thickening of mesenteric and Seropertonium were significantly higher among strangulation group than simple group.

Similar to our findings, the study of Bouassida et al., [19] reported that multi-CT scans results were much more mutual in cases with Intestine ischaemia, involving ascites, thick-walled small intestine, segmental mesenteric fluids and decreased wall enhancements.

Mu et al., [16] concluded that CT results of swelling or thickening of mesentery, and CT display seroperitoneum highly accompanying with intestine strangulations.

It was concluded by Matsushima et al., [20] that CT is a valued imaging method for detecting the reason of intestine obstructions and for defining if an intestine hemodynamic disorder presents or not.

To precisely expect intestine strangulations in ASBO cases, surgeons must associate clinical symptoms, lab. examinations and imaging results.

ASBO needs suitable treatment with a proper diagnosing and therapy path-ways. Sign and length of non-operative management and proper timing for operation can be an insidious subject. Postpone-ment in operative treatment scanlead to a consider ablerises of morbidities and mortalities [17].

In the current study, of the 80 involved ASBO cases, the obstruction sreappeared in 22 patients with arate of recurrence of 27.5% (22/288), and 6 of those 22-cases experienced repeated surgeries [rate of re-operation 27.3% (6/22)], while the other 16-patients experienced conservational management.

Lorentzen et al., [21] concluded that the total rate of recurrence after ward operatively managed ASBO was 12.1%, and there currence risk factors were females, multi/matted adhesion, and fascial dehiscence.

We are in a harmony with the study of Mu et al., [16] in which the obstructions recurred in 84-patients with arate of recurrence of 29.2% (84/288), and 20 of those 84-patients experienced repeated-operation [rate of re-operation was 23.8% (20/84)], while the other 64-patients experienced conservational managements. The rate of recurrence of the surgery group was 21.3% (26/122), and the median non-recurrence period was 19.3-mths. Also, the same study of Mu et al., [16] reported that the rate of recurrence of the conservational managing group was 34.9% (58/166), and the median nonrecurrence period was 33.1-mths. The changes in the rate of recurrence among the study groups have been taken in to consideration as significant ( $p\text{-value}=.010$ ).

Kabbash et al., [17] reported that as regard to recurrence, after following-up for 6-mths it occurred in 4 patients (14%) in group A with conservative treatment and 2 patients (9%) in group B (surgical treatment) with nonsignificant change among the two study groups.

Further more, in therate of recurrent of the simple ASBO-group was 28.6% (19/72), and the median non-recurrence period was 12.2-mths. The rate of recurrence of the strangulating obstructions group was 37.5% (3/8), and the median non-recurrence period was 11.5-mths. The changes among the studied groups weren't counted as significant ( $p\text{-value}=0.241$ ).

Mu et al., [16] reported that the rate of recurrent of the simple ASBO-group was 28.6% (72/251), and the median non-recurrence period was 32.2-

mths. The rate of recurrence of the strangulating obstructions group was 32.4% (12/37), and the median non-recurrence period was 11.5-mths. The changes among the studied groups were not counted as significant ( $p$ -value=0.186), the median nonrecurrence periods of men and women cases were 31.6-mths and 31.2-mths, correspondingly. A non-significant change was found among the nonrecurrence periods of man and women cases ( $p$ -value=0.899). The median non-recurrence periods among cases ages.

The current work showed that ASBO-cases who experienced operative management have a decreased rate of recurrence in comparison with those of nonoperative group. Generally, operative management reduced the ASBO recurrence. The consequences are agreed with preceding reports of Fevang et al., [22]; Yang et al., [23]; Isaksson et al., [24].

#### Limitations:

The current work has some limitations: 1<sup>st</sup>, this is a retrospective investigation, like non-complete or missed data attained from chart reviews. For example, some inflammatory bio-markers weren't commonly employed in our department like CRP, procalcitonin, erythrocyte sedimentations and neutrophil-to-lymphocyte ratio. 2<sup>nd</sup>, it is a monocentric study, so it needs additional validations. Additional large size multi-centric investigations are desired.

In conclusion, the treatment of ASBO is highly based on surgeon decision, involving decision on how long to try conservative intervention and if or not to employ a laparoscopic or open method if operation is desired, this work approves that two classical clinical factors and two CT findings are the clinical features accompanying with intestinal strangulations of ASBO, surgeries can lessening ASBO rate of recurrence.

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## العوامل السريرية المرتبطة بالانسداد الخانق للأمعاء وتكراره في حالة انسداد الأمعاء الدقيقة اللاصق

انسداد الأمعاء الدقيقة اللاصق من أحد أهم الأسباب الرئيسية للطوارئ الجراحية وخاصة في حالات الطوارئ الجراحية التي تحتاج إلى إجراءات طارئة.

أعراض عدم تدفق الدم لموية للأمعاء الدقيقة نتيجة الانسداد آلام البطن المستمرة وارتفاع عدد كرات الدم الأبيض وارتفاع درجة حرارة الجسم وسرعة نبضات القلب وأعراض التهاب الغشاء البروتيني بالبطن كل هذه الأعراض ليست أكيدة بدرجة عالية للاعتماد عليها في تشخيص عدم تدفق الدم للأمعاء نتيجة الانسداد الخانق لها.

انسداد الأمعاء الدقيقة الحاد يؤدي إلى أضرار كبيرة بالمرضى التي تستوجب الإقامة في المستشفى ثمانية أيام في المتوسط ومعدل وفيات داخل المستشفى قد يبلغ ٣٪ وحوالي ٢٠٪ إلى ٣٠٪ من الحالات التي تحتاج إلى تدخلات جراحية.

السبب الرئيسي لفشل علاج الانسداد الأمعاء الدقيقة الحاد هو التأخير في التشخيص والتدخل الجراحي في حالات الانسداد الخانق للأمعاء ولا يزال الجدل حول أي من الحالات تحتاج إلى عملية جراحية عاجلة لذلك فإن كيفية التفريق بين الانسداد الخانق والانسداد البسيط أمر مهم للغاية.

يهدف هذا العمل إلى تقييم العوامل السريرية المرتبطة بالانسداد الخانق وعوامل الخطر مع معدل تكرار الانسداد الأمعاء الدقيقة الحاد.