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Predictive Factors for Surgical Intervention in Adhesive Bowel Obstruction: A 5-Year Retrospective Study

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Abstract

Background: Adhesive Bowel Obstruction (ABO) is a major cause of intestinal obstruction globally and in the developing world. Although guidelines for its management lean towards initial non-operative management, it is important to identify factors that may predict the need for an operative intervention in the early phase of presentation.

Method: This was a retrospective study of all adult cases of ABO managed at the University College Hospital (UCH), Ibadan from January 2016 to December, 2020. The sociodemographic and clinical data of the patients were obtained. Patients with incomplete data were excluded. Data was analysed using version 22 of the SPSS and statistical significance set at a p-value of <0.05.

Results: The study population was eighty-four patients. The mean age was 43 ± 15.8 years with a M:F of 1:1.2. Thirty-five percent (n=29) of them had been previously admitted in other hospital prior to presentation at UCH. Ninety-five percent (n=80) had previous abdominal surgery. Majority of the previous surgeries (36.9%; n=31) were Obstetric and Gynecologic (O&G) and 55% of these O&G surgeries (n=17) were Caesarean section. The median time from previous surgery to development of symptom was 36 months (Inter-Quartile Range {IQR}=599). Operative management was done in 27.4% (n=23) patients, adhesiolysis with bowel resection and anastomosis being the most commonly performed procedure (52.2%; n=12). Hospital admission prior to presentation at UCH and previous abdominal/pelvic surgeries were significantly associated with the eventual mode of management. However, hospital admission prior to presentation was the only factor predictive of an operative intervention with those admitted in another hospital being 4 times at risk of requiring surgery (p=0.021).

Conclusion: Hospital admission prior to presentation was associated with an operative intervention in adult patients with ABO.

Keywords: Factors; Operative intervention; Adhesive bowel obstruction

Introduction

Intra-peritoneal adhesions have become a major cause of intestinal obstruction globally and in the developing world where obstructed groin hernia was previously the top aetiologic factor [1-3]. Adhesive bowel obstruction (ABO) accounts for 12-16% of emergency surgical admissions and 20% of emergency surgical procedures with an incidence of 93-100% following abdominal or pelvic surgeries [4,5]. Although previous abdominal or pelvic surgery is central to its development, other non-surgical causes like intraperitoneal inflammation, trauma or tumor may be associated with ABO.

Symptomatic patients present with features of intestinal obstruction initially characterised by colicky abdominal pain, vomiting, abdominal distention, and constipation. In delayed presentation, there may be features of strangulation and perforation (persistent and generalized pain, fever, tachycardia, guarding, rigidity and rebound tenderness) may occur.

The diagnosis of ABO is based on a detailed history, thorough physical examination and investigations that not only confirm the diagnosis but dictate the mode of management. Although a plain abdominal radiograph would identify some features of bowel obstruction, water soluble contrast study ('gastrografin challenge') and abdominal CT scan are now the diagnostic investigations of choice in ABO [6]. Whilst gastrografin challenge plays both diagnostic and therapeutic roles, abdominal CT confirms obstruction, locates the site, identifies the cause and detects complication. It also identifies features of bowel ischemia and strangulation which influences the treatment pathway.

The treatment of ABO may be operative or non-operative. As captured in the revised Bologna guidelines (2018), non-operative care is the treatment strategy of choice in all patients without signs of peritonitis, strangulation or bowel ischaemia in whom resolution of obstruction occurs within 72 hours [7]. However, operative approach is considered in failed medical treatment after 72 hours or when there is evidence of ischaemia, gangrene, perforation or peritonitis.

In addition to the previously stated indications for operative management, patients on non-operative treatment in whom the gastrographin contrast is not detected in the cecum on an abdominal x-ray 8-24 hours may benefit from an operative treatment [7,8]. In a low-resource environment like ours, contrast-based studies and abdominal CT scans are not readily available. Consequently, plain abdominal radiography remains the key investigation. Early identification of patients who may require a surgical intervention is an important aspect of the initial decision making process in the management of patients with ABO. The aim of this study is to retrospectively identify factors associated with an operative intervention in adult patients with ABO managed at the UCH, Ibadan.

Methods

This was a retrospective study of all adult patients with a diagnosis of ABO seen at the general surgery units of the department of surgery, UCH, Ibadan from January 1, 2016 to December 31, 2020. Ethical approval for the study was obtained from the joint University of Ibadan/UCH ethical review committee.

Data was retrieved from the patient case files and from the unit, theatre and admission records. Patients' sociodemographic information and peri-operative clinical data were obtained using a questionnaire proforma. Patients with incomplete data were excluded from the final analysis. Data analysis was done with version 22 of the SPSS. The association between categorical and continuous pre-operative variables with the mode of treatment (operative *vs* non-operative) was determined using the chi-square and independent t-test respectively. Binary logistic regression was used to identify pre-operative factors predictive of an operative intervention. Statistical significance was set at a p-value of <0.05.

Results

A total of 150 cases of ABO was managed over the study period. Complete data was obtained for 84 cases. Majority of the patients (59.5%; n=50) were young with a mean age of 43 ± 15.8 years and a slight female preponderance as shown in table 1.

The most common presenting symptom complex was abdominal pain and vomiting (33.3%; n=28) (Figure 1). Abdominal pain was a presenting complaint in all patients while vomiting was a presenting complaint in 88.1% (n=77) of patients. Only 7% of patients presented with fever. The average duration of symptom was 3 days (IQR=179).

A history of at least 1 episode of similar illness in the past was recorded in 27.4 % of patients (n=23). Twenty percent of patients (n=17) had previous hospital admissions in the past due to similar illness. More than a third (34.5%; n=29) were first admitted in another hospital prior to presentation at UCH. Majority of the patients (95.2%; n=80) had a previous history of abdominal or pelvic surgery while 4.8% of them (n=4) did not. In the latter, diagnosis of ABO was done intra-operatively. The pattern of distribution of previous abdominal surgery revealed that 14% of them had undergone ≥ 3 previous abdominal/pelvic surgeries. Figure 2 shows the distribution of previous abdominal/pelvic surgeries. The most common operations (36.9%; n=31) were obstetric and gynecologic procedures, 55% (n=17) of which were caesarean sections. The average time from previous surgery to current symptoms was 36 months (IQR=599). About a tenth of patients (9.5%; n = 8) previously had surgery for ABO.

Table 1: Socio-demographic profile of study subjects.

Parameter	Frequency (%)
Age (in years) Mean=43 ± 15.8	
<45	50 (59.5)
45-64	24 (28.6)
≥ 65	10 (11.9)
Gender	
Females	45 (53.6)
Males	39 (46.4)
Marital status	
Single	18 (21.4)
Married	60 (71.4)
Widow/widower	6 (7.1)
Place of residence	
Rural	1 (1.2)
Urban	76 (90.5)
Semi-urban	7 (8.3)

Comorbid illness was found in 20.2% of patients (n=17) the most common of which was hypertension (52.9%; n=9). There was no statistically significant association between the type of previous surgery and the eventual mode of management (p=0.677). Non-operative treatment was successful in 72.6% (n=61) of patients while the rest (27.4%; n=23) had surgery. The average time from presentation to surgery was 4 days (IQR=18). The site of previous scar, location and extent of intra-peritoneal adhesions are shown in table 2. There was no statistically significant association between the type of previous surgery and the nature of adhesion (multiple *vs* single band) (p=0.720).

Hospital admission prior to presentation and no history of previous abdominal surgery were significantly associated with the mode of management (Table 3). The proportion of patients in the operative group who were first admitted in other hospitals prior to presentation in UCH was twice that in the non-operative group (p=0.024). All patients without previous abdominal surgery were in the operative group (p=0.001). Hospital admission before presentation was the only factor predictive of an operative intervention with those admitted in another hospital before presentation being 4 times at risk of requiring surgery (p=0.021) as shown in table 4.

At surgery, the most commonly performed procedure was adhesiolysis with bowel resection and anastomosis. (52.2%; n=12) (Figure 3). Although there is no statistically significant association between the time to surgery (<3days *vs* ≥ 3 days) and the definitive surgical procedure (p=0.860), 64% (n=7) of patients operated more than 2 days after presentation required bowel resection compared with those operated within 2 days (50%; n=6).

Senior registrars (78.3%; n=18), followed by consultants (17.4%) performed most of the procedures. Post-operative complications occurred in 11.9% (n=10) of patients, most common (26.1%; n=6) of which was superficial surgical site infection. In all patients, the mean post-operative day of commencing oral intake was 5.1 ± 1.9 days while the median length of hospital stay was 17 days (IQR=60). However, patients who had operative intervention spent 2.2 times the length of hospital stay compared to patients who had non-operative care. The

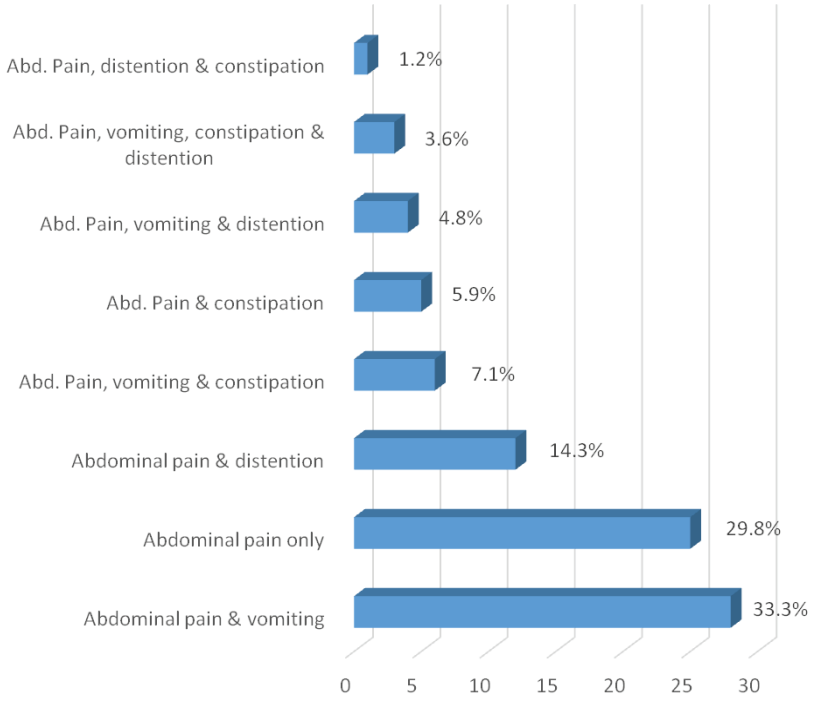

Figure 1: Distribution by presenting complaint(s).

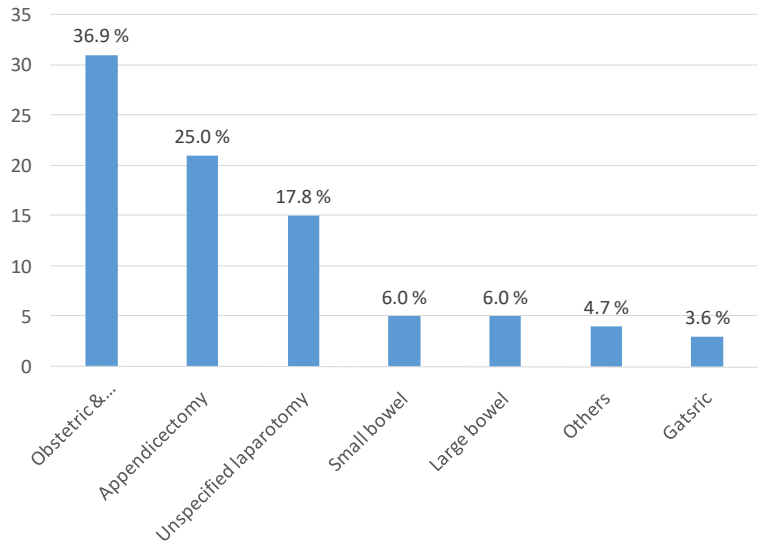

Figure 2: Distribution of previous abdominal/pelvic surgeries.

median post-operative day of discharge was 10 days (IQR=55). No patient required re-exploration and there was no 30-day mortality.

Discussion

With the increasing incidence of ABO in our practice, early decision in the choice of operative or non-operative care assists the surgeon in managing this patient cohort. This retrospective study attempts to determine the clinical profile of all cases of ABO managed over a 5-year period with the view to identifying what factors are associated with an operative intervention.

The predominantly young and feminine population in our study is in consonance with the epidemiology of ABO, which is commoner in females and younger adult population [9]. Understandably, pelvic surgeries involving the uterus, ovaries and fallopian tubes are exclusively for females in whom concomitantly, non-surgical causes of adhesions like pelvic inflammatory diseases and endometriosis are also commoner. These surgical conditions associated with the previous abdominal and pelvic surgeries our patients had are mainly seen in a younger adult population and may therefore explain the relative rarity of ABO in our elderly patients.

Table 2: Site of previous scar, location and extent of intra-peritoneal adhesions.

Parameter	Frequency (%)
Site of previous scar	
Midline infraumbilical	8 (34.8)
Extensive midline scar	4 (17.4)
Midline peri-umbilical	3 (13.0)
Pfannenstiel	3 (13.0)
Right iliac region	3 (13.0)
Midline supraumbilical	2 (8.8)
Location of bowel obstruction	
Small bowel	10 (43.5)
Large bowel	5 (21.7)
Both	8 (34.8)
Extent of scar	
Multiple	20 (87.0)
Single band	3 (13.0)
Adhesion to previous scar	
Yes	8 (34.8)
No	15 (65.2)
Other intra-peritnoneal adhesions	
None	9 (39.1)
Anterior abdominal wall	5 (21.7)
Omentum	4 (17.4)
Pelvic structures	4 (17.4)
Others	1 (4.4)

Table 3: Factors associated with the mode of management.

Parameter	Mode of management		X^2/Fi	p-value
Hospital admission prior to presentation	Operative	Non-operative	5.059	0.024
Yes	12 (52.2)	16 (26.2)		
No	11 (47.8)	45 (73.8)		
Comorbidity			0.500	0.479
Yes	3 (13.0)	12 (19.7)		
No	20 (87.0)	49 (80.3)		
Previous abdominal surgery			11.139	0.001
Yes	19 (82.6)	61 (100.0)		
No	4 (17.4)	0 (0)		
Prior surgery for similar illness			0.985	0.321
Yes	1 (4.3)	7 (11.5)		
No	22 (95.7)	54 (88.5)		

Appendiceal procedures are known to be the commonest procedure implicated in most studies on ABO [10]. Our finding of obstetric and gynecologic surgeries accounting for over a third of previous abdominal procedures may suggest a paradigm shift, akin to the findings of Irabor DO, et al. [11] in Ibadan and Emegakor CD, et al. [12] at Nnewi. One explanation for this may be due to not only a decline in appendicitis globally [13] but also the successful management of appendicitis with non-operative care [14]. Notably, 4.8% of our patients (n=4) had no history of previous abdominal or pelvic surgery, similar to the findings

Table 4: Factors that predict an operative intervention.

	Logistic Regression OR		
	OR	**95% C.I.**	**p-value**
Age	1.02	0.99-1.06	0.216
Gender			
Male	1		
Female	0.93	0.32-2.71	0.898
Comorbidity			
No	1		
Yes	0.43	0.08-2.30	0.428
Hospital admission before presentation			
No	1		
Yes	3.36	1.16-9.74	0.026
Prior surgery for similar illness			
No	1		
Yes	0.25	0.02-3.95	0.326
Number of previous hospital admissions for similar illness	1.12	0.36-3.52	0.844

of Butt MU, et al. [15] who reported no history of previous abdominal pelvic surgery in 3.3% of patients. In these patients, the diagnosis of ABO was made intra-operatively because an accurate pre-operative diagnosis is difficult especially in the absence of a radiologic evidence of an organic lesion [16]. This may led to a delay in prompt surgical intervention.

Frequently, patients with surgical conditions in the developing countries initially seek medical attention in health facilities where facilities and physicians with the requisite expertise to manage ABO are lacking. More than a third of our patients initially presented to such hospitals before being referred to UCH which is a referral quaternary health institution in our sub-region. The reason for referral is often non-resolution of the clinical condition while on non-operative care. Some of these patients present without a nasogastric intubation and may not be fasting. The typical patient therefore presents with severe colicky abdominal pain with vomiting, dehydration, with or without abdominal distention. There is a statistically significant association between such patients and the mode of management with the proportion of patients in the operative group who were first admitted in another hospital prior to presentation being twice that in the non-operative group. Perhaps more patients in the operative group would have benefited from an earlier appropriate non-operative care if they had presented earlier.

Another factor we found associated with surgical management was a negative history of previous abdominal or pelvic surgery. All our patients who did not have a previous abdominal or pelvic surgery were in the operative group. This relative inclination towards operative care for patients who had no history of previous abdominal surgery may arise from the fact that one could not confidently diagnose ABO in such situations thus a non-operative guideline could not be supported. One of the arguments against operative care for ABO is the potential risk of future adhesions that may require surgical intervention with increased risk of post-operative complications [17]. Behman R, et al. [18] showed that the 5-year probability of experiencing another recurrence in patients admitted with the first episode of adhesive small bowel obstruction increased with each episode until surgical

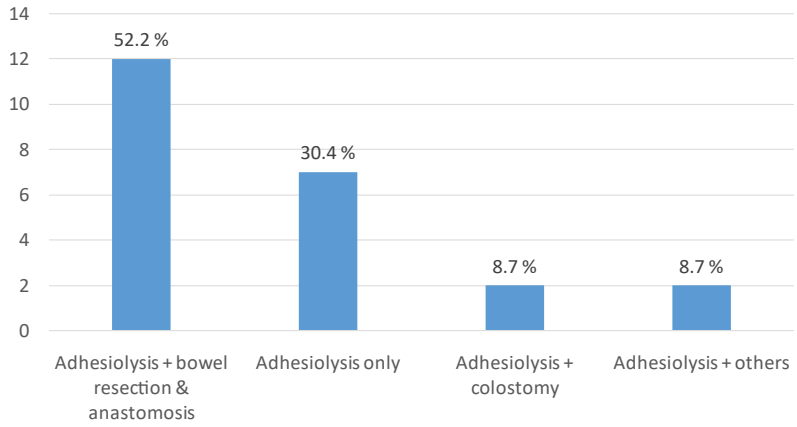

Figure 3: Distribution of patients by type of surgery done.

intervention, at which point the risk of subsequent recurrence decreased by approximately 50%. From our study however, prior operative intervention for ABO did not predict the need for another operative intervention. In contrast, Kössi J, et al. [19] reported that patient-dependent factors associated with increased likelihood to an operative treatment were previous gynecologic surgery and female gender. In our study, pre-operative factors like gender, age, duration of symptoms, and number of similar episodes of illness, number of previous hospital admissions for similar illness, prior operative intervention for similar illness, comorbidity or type of previous surgery did not predict need for an operative intervention.

The Bologna guideline recommends an operative intervention for patients in whom medical management has failed after 72 hours. Yet, the average time to surgery from presentation in our patient cohort following failure of medical treatment was 4 days, suggesting an inclination towards non-operative care in our environment. According to Tabchouri N, et al. [20] overall morbidity rates were highest in patients with adhesive small bowel obstruction who had immediate surgery and those who had surgery following failed medical treatment (30% and 33%, respectively, *vs* 4% in the successful medical treatment group, p<0 001) whereas mortality rate was highest in the failed medical treatment group. Unlike the findings above, we recorded similar outcomes in terms of morbidity between patients who had operative intervention and those managed non-operatively. Again, the mean duration from presentation to resolution of obstruction and commencement of oral intake in our patients who had non-operative care was longer than 72hours (5.72 ± 1.2 days). Considering our outcome with medical treatment of ABO, one may then posit that the 72-hour cut-off period may not apply in our environment except in the presence of a compelling indication related to bowel gangrene or peritonitis. However, in patients with previous abdominal scars below the umbilicus, an operative intervention has been recommended by Irabor DO, et al. [11] since non-operative management usually failed in this group of patients. Majority (61%; n=14) of our patients who received operative intervention had their scars below the level of the umbilicus.

Expectedly, most of the scars in our study were located in the suprapubic and right lower abdomen in keeping with the fact that most of their previous surgeries were obstetric/gynecologic and appendiceal in nature. It was therefore not a surprise that most of the adhesions were attached to scars arising from mainly previous lower abdominal incisions and that in most (60.8%) of our patients who received operative care; the previous scars lay below the level of the umbilicus.

For patients who had operative intervention, most of the adhesions were either multiple and were associated with the small bowel. Obstruction of the large bowel by adhesions is not as common as that in the small bowel [21] the large bowel being less mobile compared to the small bowel. We found out that in over half of the cases (56.5%; n=13), adhesions solely involved the large bowel or a both the large bowel and small bowel. Although the reason for this finding is not readily evident, a more diffuse precipitating factor from their previous surgeries (blood, contaminated peritoneal fluid from generalized peritonitis) may explain the high degree of large bowel involvement recorded. However, we did not find any association between the type of previous surgery and the extent of adhesion (multiple or single band).

The most commonly performed procedure was adhesiolysis with bowel resection and anastomosis. Although there is no association between the time to surgery (<3days *vs* ≥ 3 days) and whether bowel resection was performed or not (p=0.860), majority (64%; n=7) of patients whose surgeries were done 3 or more days after presentation required bowel resection compared with those operated within 2 days (50%; n=6). A similar finding was reported by Springer JE, et al. [22] in Canada where a high rate of bowel resection was recorded among patients who underwent delayed surgery. Bowel resection during adhesiolysis for ABO has been shown to be associated with adverse post-operative outcome. Bankole OB, et al. [23] reported that bowel resection is a significant predictor of mortality in adult patients with mechanical intestinal obstruction. However, we did not record any mortality in our study.

One limitation to our study was its retrospective nature in an environment with inefficient record system for patient data. We therefore could not obtain sufficient records with complete data to power our study. Considering the fact that 150 cases of ABO was managed over the study period with complete data in only 84 cases, the need for a more efficient data recording system in the health institutions of developing countries cannot be over-emphasized. Second, being a retrospective study, we did not have a proper description of the adhesions found intra-operatively using the validated peritoneal adhesion index as described by Fugazzola P, et al. [24].

Conclusion

Hospital admission prior to presentation is associated with an operative intervention in adult patients with ABO. The need for bowel resection and anastomosis is higher in such patients. What factors determine prior hospital admission and the effect of this on overall outcome in patients with ABO remains to be investigated.

Conflict of Interest

The authors do not have any conflict of interest to declare.

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