Predictive factors for strangulated intestinal obstruction

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الخلاصة

أجريت هذه الدراسة المستقبلية على 160 مريض يعانون من إنسداد الأمعاء الحاد في ردهات قسم الجراحة ، في مستشفى الديوانية التعليمي وذلك خلال الفترة الممتدة من شهر كانون الثاني 2012 إلى شهر حزيران 2013 ، وقد تم خلال هذه الدراسة تقسيم المرضى إلى مجموعتين : (1) المرضى الذين أجريت لهم عملية جراحية مبكرة وقد كان عددهم 76 مريض ، (2) المرضى الذين تم علاجهم في بداية الأمر بطريقة العلاج التحفظي وكان عددهم 84 مريض، وقد كان العلاج التحفظي ناجحا في 52 مريض منهم، بينما إحتاج 32مريض إلى إجراء عملية جراحية في وقت لاحق . كان هناك 54مريض (33,75%) يعانون من إنسداد الأمعاء المختنق ، بينما كان هناك 106 مريض(66,25%) يعانون من إنسداد الأمعاء البسيط. أسباب إنسداد الأمعاء هي: الألتصاقات (52,5%) ، الفتق الخارجي المختنق (20%)، الأورام (10%) ، تداخل الأمعاء (5%) ، ومجموعة متنوعة من الأسباب الأخرى والتي تشمل (12,5%) من المرضى . كانت هناك علاقة وثيقة بين إنسداد الأمعاء المختنق وبين العوامل التالية: ألم البطن المستمر، التقئ البرازي، حساسية الألم التي تشمل البطن بكاملها ، حساسية الألم الأرتدادي، تصلب البطن ، إختفاء أصوات الأمعاء ، تسارع النبض (أكثر من 110/ دقيقة) ، إرتفاع درجة حرارة الجسم (أكثر من 38درجة مئوية) ، علامات الصدمة (هبوط ضغط الدم إلى اقل من 90ملم زئبقي) ، وأخيرا إرتفاع عدد كريات الدم البيض إلى أكثر من 18000/ ملم ^{3}. كان معدل فترة العلاج التحفظي خلال هذه الدراسة 48 ساعة وكانت فترة الرقود في المستشفى أقل في حالة المرضى الذين تم علاجهم بطريقة العلاج التحفظي بالمقارنة مع المرضى الذين تم علاجهم بالطريقة الجراحية. كانت نسبة المضاعفات أقل في مرضى العلاج التحفظي منه في مرضى العلاج الجراحي . لم تسجل أي حالة وفاة في مرضى العلاج التحفظي بينما كانت نسبة الوفيات في مرضى العلاج الجراحي (7,4%) ، وقد كانت هناك علاقة وثيقة بين الوفاة وبين عمر المريض وحالة الأمعاء المشمولة بالانسداد ، حيث إن معظم الوفيات حدثت في المرضى كبار السن والمرضى الذين يعانون من غانغرين الأمعاء.

Abstract

This prospective study was carried out on 160 patients with acute intestinal obstruction admitted to the surgical unit at Al-Diwaniyah Teaching Hospital from January 2012 to June 2013 .The patients were divided, according to the results of treatment , into two groups : (1) patients who received early operation (76 patients) , and (2) patients who received initial conservative treatment with nasogastric decompression and observation (84 patients). The conservative treatment was successful in 52 patients but in 32 patients, delayed operation was required .There were 54 cases of strangulated intestinal obstruction (33.75%) and 106 cases of simple obstruction (66.25%) .The causes of obstruction were adhesions in 52.5%, obstructed external hernia in 20%, tumor in 10% ,intussusception in 5% and miscellaneous group of causes which accounts for 12.5% of patients. There was positive correlation between bowel strangulation and the following factors: constant abdominal pain, feculent vomiting ,generalized tenderness ,rebound tenderness , rigidity ,absent bowel sounds, tachycardia (PR >110\ min.) , fever (temperature >38˚C), signs of shock (systolic BP <90 mmHg) and WBC count above 18000\mm^3.The mean period of conservative treatment was 48 hours and the period of hospitalization was shorter in the conservative group as compared with the operative group . The morbidity was less in the conservative group than in the operative group. There was no death in the conservative group, while in the operative group the mortality rate was 7.4%. The mortality was closely related to the age, and the state of bowel involved by obstruction , since most deaths occurred in old aged patients and in patients with gangrenous bowel.

Introduction

Intestinal obstruction is a common and dangerous surgical emergency[1]. It can occur when the normal propulsion and passage of intestinal contents does not happen [2]. The aetiology and pattern of obstruction vary in different countries. In western countries, the most frequent cause is adhesions , while in developing countries , obstructed external hernia still occupies the top of the list of the causes of this surgical condition [1,3,4,5]. Acute intestinal obstruction can be classified into : (1) simple obstruction, in which the blood supply to a bowel segment is intact, and (2) strangulated obstruction , where the arterial and venous flow of a bowel segment are cut off [6] . When strangulation occurs , the blood supply is compromised and the bowel becomes ischemic , and this may be due to: (1) external compression (hernial orifices , adhesions and bands) ; (2) interruption of mesenteric blood flow (volvulus, intussusception) ; (3) rising intraluminal pressure (closed loop obstruction); and (4) primary obstruction of intestinal circulation (mesenteric infraction) [7] .Strangulation occurs in about 10% of all intestinal obstruction [8]. However , the presence of strangulation continues to be a common clinical problem in cases with intestinal obstruction because differential diagnosis between simple and strangulated obstruction is still difficult [9,10] . The morbidity and mortality associated with strangulation are largely dependent on the duration of ischemia and its extent. Elderly patients and those with co-morbidities are more vulnerable to its effects . Any length of ischemic bowel can cause significant systemic effects secondary to sepsis, and the resultant distension proximal to the site of obstruction can result in significant dehydration. When bowel involvement is extensive, circulatory failure is a common event [7].

Aim of Study

To determine the predictive factors for strangulated intestinal obstruction and to evaluate the role of conservative treatment in the management of simple intestinal obstruction.

Patients and Methods

This is a prospective study done on the patients with a diagnosis of acute intestinal obstruction who were admitted to the surgical ward of Al-Diwaniyah Teaching Hospital from January 2012 to June 2013 .Cases of neonatal intestinal obstruction and paralytic ileus were not included in this study .The diagnosis of acute intestinal obstruction was based on a history of abdominal pain , vomiting and constipation , physical finding of abdominal distension and X-ray evidence of obstruction . A total number of 160 patients (95 males and 65 females), with the age range from 6 months to 85 years and a mean of age of 41.33 years were included in the study. The patients were divided into two groups: (1) 76 patients (47.5%) had an emergency early operation after a short period of resuscitation, and (2) 84 patients (52.5%) were initially treated conservatively , since the initial clinical presentation showed no evidence of strangulation. This group is further subdivided into 2 groups :(A) delayed operation group: consisted of patients in whom conservative treatment had failed (32 patients), and (B) conservative group :consisted of patients who were successfully treated without operation (52 patients). The conservative treatment consisted of nasogastric tube suction , I.V. fluids administration with a fluid input and output chart and a frequent clinical examination which included : pulse rate, temperature , blood pressure measurement, and state of abdomen , together with serial plain X-ray of the abdomen and WBC count. Statistical analysis was carried out using the chi-square test. The data are

expressed as No. and % of cases. Differences were considered statistically significant if P-value<0.05.

Results

Table (1): Age distribution of cases.

Age(years)	No. of cases	%
<1	6	3.75
1-10	8	5
11-20	18	11.25
21-30	19	11.87
31-40	20	12.5
41-50	25	15.62
51-60	30	18.75
61-70	24	15
71-80	6	3.75
>80	4	2.5
Total	**160**	**100**

Table(2): Sex distribution of cases.

Sex	N0.of cases	%
Males	95	59.375
Females	65	40.625
Total	**160**	**100**

Table(3): Site of intestinal obstruction in 160 patients.

Site	No. of cases	%
Small bowel obstruction(SBO)	124	77.5
Large bowel obstruction (LBO)	36	22.5
Total	**160**	**100**

Table (4): Aetiology of intestinal obstruction.

Aetiology	No. of cases	%
Adhesions &bands	84	52.5
Obstructed external hernia	32	20
Tumour	16	10
Intussusception	8	5
Mesenteric vascular thrombosis	5	3.125
Sigmoid volvulus	4	2.5
Caecal volvulus	2	1.25
Pseudo-obstruction	2	1.25
Internal hernia	2	1.25
Gall stones	2	1.25
Trichobezoar	1	0.625
Tuberculosis (TB)	1	0.625
Meckel's diverticulum	1	0.625
Total	**160**	**100**

Table(5): Type of operation in 84 patients with adhesive intestinal obstruction.

Type of operation	No. of cases	%
Appendicectomy	34	40.47
Gynaecological operations	16	19.04
Laparotomy for trauma	9	10.71
Previous SBO	5	5.95
Biliary Surgery	4	4.76
Gastroduodenal Surgery	2	2.38
Colonic surgery	2	2.38
No previous operation.	12	14.28
Total	**84**	**100**

Table(6): Type of obstructed external hernia .

Type of hernia	No. of cases	%
Inguinal	20	62.5
Umbilical	6	18.75
Incisional	4	12.5
Femoral	2	6.25
Total	**32**	**100**

Table(7) : Causes of gangrene in 34 patients with gangrenous bowel.

Cause	No. of cases	%
Obstructed external hernia	14	41.17
Adhesions	10	29.41
Mesenteric vascular thrombosis	5	14.70
Intussusception	3	8.82
Volvulus	2	5.88
Total	**34**	**100**

Table(8):Predictive factors for strangulated intestinal obstruction.

Predictive factors	Strangulated obstruction (54 patients)		Simple obstruction (106 patients)		P-value
	No.	%	No.	%	
Constant abdominal pain	38	70.37	10	9.43	<0.001
Feculent vomiting	12	22.22	5	4.71	<0.001
Generalized tenderness	35	64.81	-	-	<0.001
Rebound tenderness	28	51.85	-	-	<0.001
Rigidity	20	37.03	-	-	<0.001
Absent bowel sounds	39	72.22	20	18.86	<0.001
Tachycardia (PR>110\min)	45	83.33	30	28.30	<0.001
Fever(temperature>38 $^{\circ}C$)	32	59.25	12	11.32	<0.001
Shock(Systolic BP<90mm Hg)	5	9.25	-	-	<0.004
Raised WBC count(>18000\mm^3)	48	88.88	59	55.66	<0.04

As shown in table(8), generalized tenderness ,rebound tenderness, rigidity ,and shock state were only found in strangulated obstruction.

Table(9): Group 1 patients who received early operation.

Preoperative provisional diagnosis as strangulated intestinal obstruction	Postoperative diagnosis
76 patients	48 patients :strangulated obstruction 28 patients : simple obstruction

Table(10): Group 2 patients treated initially by conservative treatment.

Preoperative provisional diagnosis as simple intestinal obstruction	Patients relieved by conservative management	Patients relieved by operation (32 patients)
84 patients	52 patients	6 patients : strangulated obstruction 26 patients: simple obstruction

Table(11): Type of intestinal obstruction.

Type	No. of cases	%
Simple intestinal obstruction	106	66.25
Strangulated intestinal obstruction	54	33.75
Total	**160**	**100**

Table (12): Type of treatment.

Type	No. of cases	%
Conservative	52	32.5
Surgical	108	67.5
Total	**160**	**100**

Table (13) : The success of conservative treatment.

Time	Patients successfully treated	
	No.of cases	%
24 hours	16	30.76
48 hours	28	53.84
72 hours	8	15.38
Total	**52**	**100**

Table (14): Morbidity in the operative and conservative groups .

Complications	Operative group	Conservative group
Wound infection	13	
Pulmonary complications	9	2
Wound dehiscence	2	
Bowel fistula	2	
Peritonitis	1	
Stress ulcer	3	
DVT	1	
UTI	2	1
Total	**33(30.55%)**	**3(5.76%)**

Table(15): Mean of hospital stay for each group .

Patient ̇s group	No. of days
Operative group	8
Conservative group	4

Table(16): Mortality rate.

Patient ̇s group	No. of patients	%
Operative group	8	7.4
Conservative group	-	-

Discussion

Acute intestinal obstruction comprises a vast clinical entity characterized by the items of the obstruction syndrome, it is still one of the common causes of surgical admission [11]. In this study , the age range was from 6 months to 85 years , with a mean of age of 41.33 years, 89 patients (55.6%) were above the age of 40 years and the maximum number of patients was in the sixth decade of life (table

1) , and this is similar to the results of other studies [12,13,14]. Males were affected more than females , and the male to female ratio was about 1.5:1(table 2) .This result is in agreement with other studies [12,15,16]. The most common cause of acute intestinal obstruction was adhesions (52.5%), followed by obstructed external hernia(20%), tumor (10%) , intussusception (5%), and a group of miscellaneous causes which accounts for (12.5%) of patients(table 4) . The pattern of acute intestinal obstruction in our study is similar to that seen in developed countries in which adhesions are the most common cause of acute intestinal obstruction [7,17.18,19], and it is also similar to the pattern seen in some developing countries [12,13,14,15,20,21]. Although it is said that the main cause of acute intestinal obstruction in developing countries is hernia and in developed countries is adhesions [22], the results in our study may reflect an increase in early elective repair of hernia and an increase in the number of laparotomy operations performed in our hospital . Adhesions are the leading cause of small bowel obstruction [23] , and they are not a common cause of large bowel obstruction [24]. Adhesions are categorized either congenital (e.g. Ladd's band) or acquired. Acquired adhesions can result from surgery, inflammation , or trauma. Over 90% of all acquired adhesions are caused by surgery [25]. Postoperative adhesions are an almost invariable consequence of abdominal and pelvic surgery. Their most important morbidity is small bowel obstruction , but other sequel can occur including chronic abdominal and pelvic pain , female infertility, urethral obstruction and voiding dysfunction [26,27,28]. The most common preceding operation in patients with adhesive intestinal obstruction was appendicectomy in 40.4% of patients, followed by gynaecological operations in 19%of patients (Table 5) and this result was obtained by many studies [7,16,23,29]. This is explained by the fact that appendicectomy is the most frequently performed urgent abdominal operation [7]. Band adhesions are commonly found following appendicectomy [30]. Other studies have showed that gynaecological operations are the most common preceding operations in patients with adhesive intestinal obstruction , and abdominal hysterectomy is the commonest operation performed [24,31]. Lower abdominal and pelvic surgeries lead to obstruction more often than upper gastrointestinal surgeries [23]. This preponderance of lower abdominal surgeries to produce adhesions that result in obstruction is thought to be due to the fact that the bowel is more mobile in the pelvis and tethered in the upper abdomen [32] .Obstructed external hernia was the second most common cause of acute intestinal obstruction , with the inguinal hernia being the most common obstructed hernia in (62.5%) of patients (table 6), and this is due to the fact that the inguinal hernia is the most common type of hernia[16]. The most common cause of gangrenous bowel in our study is obstructed external hernia in 41.17% of patients followed by adhesions in 29.41% of patients (table 7), so it is important to stress on earlier surgical intervention in cases presented with obstructed hernia .

Various clinical criteria have been described for early diagnosis of strangulated obstruction . In our study , constant abdominal pain , feculent vomiting, tachycardia (PR> 110\ min.), fever (temperature >38˚C), absent bowel sounds , and WBC count above 18000\mm^3 were significantly present in strangulated obstruction (Table 8). Other clinical criteria that were found only in patients with strangulated obstruction include rigidity , generalized tenderness, rebound tenderness, and signs of shock (systolic BP <90 mm Hg), however their presence usually indicate advanced stage of strangulation , so they may not serve the purpose of early diagnosis. These results are similar to the findings obtained by other studies in which there was a correlation between strangulation and classical findings which are fever, tachycardia , constant abdominal pain and leukocytosis , and these findings were present in 90% of patients with strangulation [33] .Other studies revealed positive

correlation between strangulation and feculent vomiting , rebound tenderness , and absent bowel sounds[34,35]. In contrast , other studies failed to establish a diagnosis of strangulated obstruction based on preoperative clinical findings and recommended early surgical intervention[36,37,38].Regarding the time interval prior to hospital admission, 58 patients from the total number (36.25%) had come to the hospital within 24 hours from the start of their illness, and 24 patients (42.85%) with strangulated obstruction had their symptoms for longer than 3 days , while 48 patients (46.15%)with simple obstruction had their symptoms for less than 24 hours compared to 13 patients (12.5%) with simple obstruction who had presented to hospital after 3 days . This proves that the delay in admission may adversely affect the state of bowel , which may increase the morbidity and mortality. The conservative treatment was successful in 52 patients (table 10), so the success rate was 61.9%. The mean duration of conservative treatment was 48 hours ,and 44 patients (84.61%) had responded to conservative treatment within 48 hours (table 13). A period of observation will give sufficient time to achieve optimum rehydration, gastric decompression and the observation of patients to see if spontaneous resolution of obstruction will take place[36]. Patients with small intestinal obstruction secondary to adhesions may be treated non-operatively for 24-48 hours provided that no signs of strangulation are present or developed. Failure to show improvement during this 48 hours usually requires immediate operative intervention[24].

The morbidity rate for the entire series was 22.5% (table 14), and it was higher among the operative group (30.5%) as compared to the conservative group in which only 3 patients had complications (5.7%). The most common complication in operative group was wound infection in 12% of cases followed by pulmonary complications in 8.3% of cases. The factors that increase postoperative complications include bowel resection , malignant obstruction , and delay in surgery [15]. The mean of hospital stay was longer in the operative group and it was 8 days, while in the conservative group, it was 4 days (table 15). There was no death among patients of the conservative group, while the mortality rate in operative group was 7.4% (8 patients), (table 16). Four of these patients who died had mesenteric vascular thrombosis , 2 patients had obstructed external hernia and they died because of septicaemia , one had adhesive intestinal obstruction , and another one had malignant tumour of large bowel . The last 2 patients died because of cardiac ischaemia. The major factors influencing mortality rate are old age, comorbidity, non-viable strangulation and delayed treatment. Non viable strangulation is more common in old patients[39]. Malignant large bowel obstruction is associated with high morbidity and mortality due to the following factors : high incidence of advanced disease, advanced age , delay in tumour excision and unprepared bowel [38]. The morbidity and mortality are dependent on the early recognition and correct diagnosis of obstruction. If untreated, strangulated obstruction causes death in 100% of patients, while if surgery is performed within 36 hours, the mortality decreases to 8%. The mortality rate is 25% if surgery is postponed beyond 36 hours in these patients[23]. In our study most patients who died were old age (above age of 60 years), they had gangrenous bowel and the duration of their illness was more than 3 days.

Conclusions and Recommendations

Intestinal obstruction is a common and dangerous surgical emergency . Predictive factors for strangulated intestinal obstruction include : constant abdominal pain , feculent vomiting, generalized tenderness , rebound tenderness, rigidity , absent bowel sounds, tachycardia(PR>110\min.), fever (temperature $> 38^{\circ} C$) , sings of shock (systolic BP<90 mm Hg) ,and WBC count above 18000\ $mm^{3.}$ The patients with intestinal obstruction especially small intestinal obstruction secondary to adhesions

with no evidence of strangulation should be given a chance of conservative treatment for 24-48 hours , and these patients should be followed up by repeated physical examination , chart of vital signs, and plain abdominal radiography . The most common cause of gangrenous bowel is obstructed external hernia , so there should be an early elective repair of hernia to avoid such complication. Since , the most common cause of intestinal obstruction is adhesions , we have to be serious in dealing with the factors that limit adhesions formation which include: good surgical technique , washing of the peritoneal cavity with saline to remove clots and other debris, minimizing contact with gauze , and covering the anastomosis and raw peritoneal surfaces.

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