Mechanical small Bowel Obstruction

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Summary:

A prospective study conducted at Baghdad Teaching Hospital for a period of two years (February 2001 to January 2003) involving 80 cases of mechanical small bowel obstruction.
The average age of the patients was 47.71 years with a range of 6-87 years . adhesive small bowel obstruction involved 43 patients (53.75%), hernias 22 patients (27.25%), inflammatory bowel disease 6. patients (7.5%), tumors 5 (6.25 %), and a group of miscellaneous causes which accounts 4 patients (5%)
The patients were divided into the following groups according to our management:
** Group A managed by early surgery (36 patients).*
**Group B managed by conservative treatment (44 patients).*
Further division of group B into :
**BI- successful conservative treatment in 28 patients .*
**BII-in 16 patients, When delayed surgery was needed.*
The mean period for a successful conservative treatment was the initial 31.3 hours after admission . period of hospitalization was shorter in the conservative group in comparison to the operative group The morbidity rate was obviously higher in the operative group especially when the operation involved opening of bowel lumen . The mortality rate was related to the age, patients medical condition and the state of the bowel involved by the obstruction .
The mortality rate was 3.75%.

Introduction:

Mechanical bowel obstruction is arrest or serious impairment of the passage of intestinal contents caused by a mechanical blockage (1)
Small bowel obstruction remains a frequently encountered problem in abdominal surgery (2,3,4,5)

The causes of mechanical bowel obstruction vary in different countries and various reports have indicated that the incidence for each cause have changed over the years (6). Thus, although the most common cause of small bowel obstruction in the western countries is adhesive bands (7,8), external hernia is still the most common etiological factor responsible for small bowel obstruction in most of Africa and Middle East countries (9,10,11,12) '

In modern-day surgery, post-operative adhesions remained an important impact to patients; surgeons; and health system (13)

After laparotomy , almost 95% of patients are shown to have adhesions at subsequent surgery (14) . adhesions are internal " scars " that form after trauma through complex processes , involving injured tissues and the peritoneum . most patients , adhesion formation has little effect . Some patients however, have clinical consequences , and intestinal obstruction is the most severe consequence of adhesion (13)

The lack of sufficient epidemiological data on adhesions combined with an inability to prevent their formation limiting the work to investigate them thoroughly (13)•

Prompt recognition of the need for operative intervention when clinically indicated remains the cornerstone of the modern-day surgical management of acute intestinal obstruction (2,15,16,17,18)

Balanced against this aggressive sugical approach must be an apprecitation of the significant morbidity and mortality associated with surgically managed small bowel obstruction and the simple fact that a large number of obstruction might very well resolve with non- operative Management (19)• A better understanding of the pathophysiologic aspects of intestinal obstruction and in turn to the concept of the rapid correction of patients, physiological deficits before early surgical intervention . the result was a decrease in the mortality from intestinal obstruction from 50 percent to about 6-16 percent in most recently reported series (20)

- Today although the pathophysiogic aspect of intestinal obstruction are better understood, the mortality and morbidity rates associated with strangulation obstruction are still high (21,22,23,24,25)

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Patients and methods

A prospective study conducted on 80 patients who where admitted at Baghdad Teaching Hospital over a period of two years (February 2001 to January 2003).

The diagnosis of small bowel obstruction was based on symptoms and clinical signs assisted by the radiological evidence. Causes of small bowel obstruction not related to mechanical bowel obstruction as mesenteric vascular occlusion and paralytic ileus were excluded from the study. Special forms included informatio 3 about history, physical findings, laboratory results, radiological findings, and treatment modalities were used in the study.

Eighty patients were included in our study (43 female and 37 male) with age ranging from 6-87 years with a mean of 47.71y. The patients were divided into: -

Group A those subjected to emergency surgery after initial period of resuscitation (36 patients)

Group B those received initial conservative treatment (44 patients)

Further subdivision of group B into: -

Group BI successful conservative treatment (28 patients)

Group BII delayed, surgery was done due to failure o ~nserva.tive, treatment (16 patients)

The conservative treatment consisted of a monitoring charts for vital igns (temperature, pulse rate, blood pressure, fluid input and output) and resuscitation with intravenous fluids, blood, nasogastric suction, correction of electrolytes deficits and antibiotics when needed. Finally the data were expressed by number of patients, (%) and statistical analysis carried out by t-test.

Results:

Sex distribution of the cases enrolled in, the study revealed a slight female predominance 43 patients (53.75%). (Table I).

Table I: - sex and age prevalence.

Sex	Male	37(46.25%)
	female	43(53.75%)
Age (years)	Range	6-87 y.
	mean	47.71 y.

Age distribution revealed that 52 patients aged between (31-60 y.);

were the most commonly involved ages by the obstruction, while patients below 10 y. were the least group involved by the obstruction. As shown in table II.

Age (years)	No.	(%)	Male	Female
<10y	3	3.75	1	2
11-20y	5	6.25	3	2
21-30y	9	11.25	3	6
31-40y	13	16.25	7	6
41-50y	18	22.50	11	7
51-60y	21	26.25	8	13
61y+	11	13.75	4	7
Total	80	100	37	43

According to the obstruction type, patients were divided into two major subdivisions: - (1) simple obstruction; involved 62 patients (77.5%). (2) Strangulated obstruction; involved 18 patients (22.5%). The study revealed that adhesion was the most common cause of small bowel obstruction (43 patients, 53.75%), followed by hernias which involved 22 patients (27.5%), inflammatory bowel diseases (tuberculosis and crohn's disease) 6 patients (7.5%), tumors were encountered in 5 patients (6.25%), and a final group of miscellaneous causes (volvulus, intussusception, and . foreign body) 4 patients (5%).

The incidence of strangulation was obviously higher in patients with hernias (40.9%), in comparison to (14%) in-patients with adhesive bowel obstruction group. (Table(III)

Table III :- The etiology of small bowel obstruction.

Etiology of obstruction	No. of cases		Simple obst.		Strangulated obst.	
	No.	(%)	No.	(%)	No.	(%)
Adhesions	43	53.75	37		6	14
Hernias Iguinal Paraumbilical Incisional	22 11 7 4	27.5	13	59.1	9	40.9
Inflammatory Bowel dis.	6	7.5	6	100%	0	
Tumors Carcinoma Lymphoma	5 4 1	6.25	5	100%	0	
Miscellaneous	4	5	1	20%	3	80%
Total	80		62		18	

In adhesive bowel obstruction category, we divided the patient according to the site of the initial abdominal operations into three major

subdivision :

- Mid and hind gut related operations (small intestine, abdominal wall, appendix, rectum and colon), involved 20 patients(46.5%)
- Female reproductive tract related operations, involved 12 patients (27.9%).
- Fore gut and other abdominal organs (stomach , gall bladder, pancreas , kidneys, urinary bladder , and hernias) involved 11 patients (25.6%).

In adhesive intestinal obstruction the study revealed that 25 patients (58.1 %) had only one hospital admission after the initial surgery due to adhesive bowl obstruction, 15 patients (34.8%)had two -five hospital admissions, and 3 patients (7.1 %) had more than six admissions (Table IV).

Table (IV) readmission rates due to adhesive obstructions.

Hospital Admissions	No.	(%)
One hospital admission	25	58.1
Two - five hospital admissions	15	34.8
Six admissions +	3	7.1

Our series showed that 18% of readmissions which were due to adhesive bowel obstruction occurred during the first year after the initial surgery. This percentage of readmissions decreased with the progress of time.

Our study revealed that abdominal pain was the most common presenting symptom . in simple obstruction , colicky abdominal pain (88.7%) and bilious vomiting (70.69%) were more predominant symptoms, while constant abdominal pain (44.44%) and feculent vomiting (44.44%) were commonly encountered with strangulated obstruction. (table V)

Table (v) Distribution of cases according to the presenting symptoms.

Presenting symptoms	Simple obst.		Strangulated obst.	
	No.	(%)	No.	(%)
Abdominal Pain				
Colicky.....	55	88.7	10	55.6
Constant	4	6.4	8	44.4
Vomiting				
Bilious.....	44	70.69	6	33.33
Feculent.....	5	8.06	8	44.44
Distention	33	53.2	10	55.55
Constipation	48	77.41	15	83.33

The analysis of the presenting physical signs revealed the prsence of statistically significant corelation between strngulation obstruction and both of temperature > 38 Co , and rigidity. Tachycardia , absent bowel sound, tenderness and rigidity were commoner in strangulation obstruction.

Four patients (22.22%) with strangulated bowel obstruction had WBC count more than 18000 /mm3 , in comparison to one patient (1.61%) with simple bowel obstruction This result was of significance by t-test analysis. (Table VI).

Table VI :- Intestinal obstruction and WBC count

WBC count	Simple obst.		Strangulated obst.	
	No.	(%)	No.	(%)
$<10000/mm^3$	29	46.77	6	33.33
$10000\text{-}18000/mm^3$	32	51.6	8	44.44
$>18000/mm^3$	1	1.61	4	22.22
Total	62		18	

Forty-nine patients (73.03%) with simple intestinal obstruction had positive X-Ray findings, while 15 patients (83.3%) with strangulated obstruction group had positive X-Ray findings. (table VII)

Table VII :- X-Ray finding

X-Ray finding	Simple obst.		Strangulated obst.	
	No.	(%)	No.	(%)
Multiple dilated bowel loops With air And fluid level	49	79.03	15	83.3
Normal findings	13	20.97	3	16.6

The mean period for a successful conservative treatment was 31.3 hours Meanwhile 22 patients (78.56%) were successfully treated within the first 48 hours. (Table VIII)

Table VIII:- Response of intestinal obstruction to conservative treatment.

Time	Successful conservative treatment	
	No	(%)
Within 24 hours	9	32.14
Within 48 hours	13	46.42
Within 72 hours	5	17.85
Within 96 hours	1	3.57

When surgery was required for adhesive bowel obstruction , Adhesiolysis was the most common, operation carried out in 8 patients (50%) , followed by resection with direct anastomosis operation in 6 patients (37. 5%). (Table IX).

Table IX:- operations carried for adhesive bowel obstruction .

	NO. of patients	(%)
Adhesiolysis (enterolysis)	8	50
Bowel resection with direct anastomosis When compromised bowel encountered	6	37.5
Formation of a cuetaneous stoma proximal to the obstruction	1	6.25
Short circuiting anastomosis around anobstruction	1	6.25

The morbidity rate encountered during the study was higher in the operative group , and wound related complications were more common (8patients) , in comparison to the complications . (Table X) .

Table X:- Complications encountered during the study .

	Operative group	Conservative group
Gastrointestinal related complications		2
Recurrent SBO.....		
Intra-abdominal abscess	1	
Enterocutaneous fistulae	2	
Cardiac related complications	1	
Respiratory system related complications	3	1
Urinary system related complications	2	1
Wound related complications		
Infection	6	
Dehiscence.....	2	
Total	17	4

Mean hospital stay for the operative group was 8.1 days , while in the conservative group was 5 days.

The mortality rate in this series was 3.75% (3 patients);

- The first was a male with 51 years with strangulated obstruction due to adhesions, and septicemia was the cause of death.
- The second case was a female 63 years old with simple obstruction due to metastatic adenocarcinoma of stomach .
- The third case was a female 66 years old with strangulated obstruction due to obstructed incisional hernia , and myocardial infarction was the cause of death .

Discussion:

Intestinal obstruction with its attendant conditions remains a major problem of surgery(23)

The complexities of the modern day surgery management of small bowel obstruction continue to focus on avoiding operative delay, and in turn, the always dreaded consequences o strangulation .

In this study bowel obstruction was most prevalent in adults between (30-60y) of age (65%) and less common over 60 years of age (13.75%),and this is similar to Mucha(2) and Mohamed et al (6)results,

Postoperative adhesions have long been the most common cause of obstruction in western countries (6) . This has also been the case in our study, while obstructed external hernia is still the main cause of obstruction in other parts of Middle East, revealed by steitiyeh et al (26) and fuzm et a(27). The observed increased incidence of obstruction due to adhesions is probably due to the improved provision of health care resulting in an increase in the number of abdominal operations and an increase in early treatment of hernia (6). In our series adhesion was the main etiological factor (53.75%), followed by hernia (27.5%), inflammatory obstruction (7.5%), and tumors (6.25%). These approximate the results of Mohamed el a&. The rates of readmission after initial mid gut and hind gut surgery was substantially higher than the rates after gynecological and other abdominal surgeries. . This finding provides an indication of the relative risk of directly related adhesion disorders after initial surgery site• and this information may be useful in the planning of adhesion-prevention strategies. This approximate really Ellis et al 13) results.

In our study, it is important to stress on early surgical intervention in cases presented with obstructed hernia, since strangulation encountered in this group was really high and similar to Mucha(2) results.

the statistical analysis in this study for a reliable conventional clinical indicators that may assist in the early identification of strangulation obstruction showed a significant statistical correlation between strangulation obstruction and the presence of preoperative constant abdominal pain. feculent vomiting, temperature > 38 C°, rigidity, or

WBC count > 18000 /mm3\ Our results really approximate Bizer (171

and Leffal et al (28)

In contrast, other studies failed to establish strangulation obstruction based on pre-operative clinical findings and recommend early operation for all patients with small bowel obstruction (16_24_25_29_30)

As in all categories of small bowel obstruction,

we found that blood biochemical studies proved to be absolutely of no value in determining the presence or absence of obstruction, also in clarifying the need for operative intervention (16_21_31_32)

Plain abdominal films (erect, supine) represent the. appropriate initial investigations for all patients suspected with small bowel obstruction and in majority of cases it is the only investigation adequate for diagnosis(35) . This study showed that plain abdominal films were capable of diagnosing intestinal obstruction in about (80%) of cases, compared to (60-70%) reported by Nolan et al (33) and Nilson et al (34).

However, contraindication to barium use in perforation accompanied by inadequate evidence that partial obstruction may be converted to complete obstruction and a serious complication arise due to intraperitoneal leakage of barium from intestine lumen really limits its use in our study, as in other studies (33,36,37,38).

From other studies barium may be useful in selective cases when the diagnosis is in doubt, unclear etiology of obstruction, and when a choice between continuous conservative treatment and surgery needs To be made (33,35,36,39) *

Ultrasound examination has been described in the diagnosis of small bowel obstruction (40141042) Also CT examination which recently other studies showed that it can accurately diagnose small bowel obstruction, cause, location, and the presence or absence of strangulation (43,44,45,46)• In this study we did not resort to these investigations because of lack of facilities.

In our series 36 patients received early surgery while the remaining 44 patients were managed conservatively with nasogastric tube decompression, intravenous fluids, vital signs charts and electrolytes replacement.

Successful conservative treatment was achieved in (63.63%), corresponding to 73% reported by Seror et al (47). The success rate of conservative treatment during the first 48 hours was 78%.

The present study does not recommend emergency operative intervention in all patients with small bowel obstruction and nonoperative treatment in selected patients is sometimes a good choice. Otherwise patients should undergo operation if conservative treatment does not result in improvement within the first 48 hours.

In that sense we agree wdth Sarr et al (16) and Bizer et al (17) results.

Other reports suggested that the period of conservative treatment for obstruction should not exceed 24 hours unless there is clear Clinical and radiological evidence that the obstruction is resolving (48) while others advice 48-72 hours (151735) .

Adhesiolysis was the most commo ly used procedure in the series although sometimes due to unhealthy segment resection was inevitable.

A number of authors consider some form of plication operations to patients subjected to repeated episodes of small bowel obstruction, of them are Noble plication, transmesenteric plication, and jejunal tubes brought out through a jejunostomy to act as an internal splint holding the bowel in gentle curves and preventing kinking while adhesions form (49,50) In this study we did not use any of ti'ege procedures. Complication rate was higher in the operative group as compared to conservative group. Wound infections involved 6 patients, which was the most common complication encountered during the study. On the other hand more than one complication was encountered in the same patient in some cases, similar results were revealed by Mucha (2) and Mohamed et al (6)'

Finally mortality rate were related to patients age, state of bowel involved by the obstruction, and the pre-operative medical condition of the patient.

Conclusions:

- Adhesions were the cause of small intestinal obstruction in 53.75%, and hernias in 27.5% of patients.
- The incidence of strangulation obstruction was higher in obstructed hernia as compared to adhesive obstruction.
- Mid and hindgut related operations were the most common site of initial open surgery that could cause a subsequent adhesive bowel obstruction.
- Clinical criteria that can be of help in predicting strangulation

obstruction were constant abdominal pain; feculent vomiting, temperature > 38 C°, rigidity, or WBC count> 18000 cell/ mm3.

- uccessful results by conservative treatment can be achieved.
- orbidity rates, mortality rates, and hospital stay were higher in The operative group in comparison to conservative group.

References:

1.*David L: Acute abdomen and surgical gastroenterology. Merck Maneual 2001;25: 1-4.*
2. Mucha PJ; Small intestinal obstmction. Surg. Clin. North Am. 1987; 67: 597-620.
3. Ellis H; Mechanical intestinal obstruction. British Med. J 1981, 283: 1203-1204.
4. Chakrabarty PB, et al. Acute intestinal obstruction. J.

Indian M. A. 1976; 67; 64-68.
5. Charles VM; intestinal obstruction. In baily and love'sshort practice of surgery 22nd ed.: chapman and hall.1995, 51: 810.
6. Mohamed A.Y, Al-Gaithi A,Langevin J.M, Nassar A.H.M. causes and management of intestinal obstruction in a Saudi Arabian hospital. J. R. Coll.Edinb. 1997; 42:21-23.
7. Cole WH, Robert S. intestinal obstruction in adults. A Surg. 1962; 28:133.
8. Coletti L, Admonds R, Togut AJ. Mechanical bowel obstruction. Am. J.Surg.1962; 104:370.
9. Adesola AO. Intestinal obstruction in Africa. West Afr. Med. J.1 968; 17:185..
10. Cole GC. Revi ew of 436 cases of intestinal obstruction in Ibaden. Gut.1965; 5:151.
11. Omo-Dare P. Observations on strangulated himia in Nigera. J. Nigeria Med. Assoc. 1966:3:289.
12. Johnson RH. Bowel obstruction in Botswana hospital. East Afr. Med.J.1975;52:319.
13. Ellis H, Moran J B, Thompson N J, Parker M, Wilson M, Menzies D. Adhesion-related hospital readmission's after abdominal and pelvic surgery: a retrospective chorot study. LANCET, 1999; 353:1476-1480.
14. Menzies D, Ellis H. Intestinal obstruction from adhesions: how big is the problem! Ann. R. Coll. Surg. Engl. 1990; 72: 6063.
15. Tanphiphat C, chittmittrapaps; adhesivesmall bowel obstruction, a review of 321 cases in a Thai Hospital. Am. Surg. 1987,154:283-7.
16. Sarr MO et ah preoperative recognition of intestinal strangulation obstruction. Am. Surg. 1983,145: 176-82.
17. Bizer LS et al. Small bowel obstruction. Surgery. 1981, 89: 407-113.
18. Hofstetter SR; Acute adhesive obstruction of the small intestinal. Surgery, Gyu. and Obst. 1981, 152:141
19. Richrds W, Williams L.F; Obstruction of the large and small intestine. Surgical clinics of North America. 1988, 68:355-376.
20. Schwartz SI, Storer EH. Manfestations of gastrointestinal disease. In:Schwartz S, ed. Principles of surgery. New York: McGraw-Hill, 1974:980.
21. Evans WE, Careu LC; Review of small intestinal obstruction at Milwaukee county General Hospital. Am. J. surg. 1966,111: 884887.
22. Scott J; Intestinal obstruction. In: Sabiston, Textbook of surgery 14* ed. Philadelphia: Saunders, 31:835.
23. Chukwuma L, et al. Mechanical Bowel obstruction, Review of 316 cases in Benin city, Am J Surg. 1980; 139: 389-93.
24. Shatila A et al. Current Status of diagnosis and management of strangulation obstruction of the small bowel. Am. J; Surg. 1976; 132: 299-303.
25. Otamiri T, Inse I; Intestinal obstruction with strangulation of the small bowel. Acta Chir Scand. 1987,153:307-10.
26. Steitiyeh MR, Garaiben KI, Ammari FF. Current pattern of intestinal obstruction in Northern Jordan. Saudi Med. J.1 993; 14(1): 50-2.
27. Fuzum M, Kaymaki E, Harmancioglu 0, astarcioglu K. Principal causes of mechanical bowel obstruction in surgically treated adults in Western Turkey. Br. J. Surg. 1991; 78:202-3.
28. Leffal LD, Syphax B. Clinical aids in strangulation intestinal obstruction. Am.j.Surg.1970; 120:755-y.
29. Silen W, Hein MFG Goldman L. Strangulation obstruction of the small intestine. Arch. Surg. 1962; 85:121-9.
30. Zollinger RM, Kinsey DL: Diagnosis and management of intestinal obstruction. Am. Surg. 1964; 30:1-5.
31. Cohn I J, Bronside GH: Imbalance of the normal microbial flora: Influence of strangulation obstruction upon the bacterial ecology of the small intestine. Am. J. Dis.1965; 10:873-882.
32. Davidson AT: Early operation in the treatment of the small bowel obstruction. J. Natl. Med. Assoc. 1981; 73:245-264.
33. Nolan D6, Marks CG: The Barium infusion in small intestinal obstruction. Clin. Radiology. 1981; 32:651-655.
34. Nelson SW, Christoforidis AJ: The use of Barium sulphate suspensions in mechanical obstruction of the small intestine. A. J. R. 1967; 101:367-378.
35. Ericksen AS, et al. Use of Gastrointestinal contrast studies in obstruction of the small and large bowel. Dis. Col. and Rect. 1990; 33:56-64.
36. Goldbery HI, Dodds J: Roentgen evaluation of small bowel obstruction. Dig. Dis. And Scien.1979; 24:245-251.
37. Play forth RH et al. Mech. small bowel obstruction, a plea for earlier surgical intervention. Ann. Surg.1970; 783-788.
38. Peterson LA et al. Enteroclysis in partial small bowel obstruction. Am. J. Surg.1984; 147:325-329.
39. HANSY et al. How and when to use barium for diagnosis of small bowel obstruction. Southern med. J. 1979; 72:1519-23.
40. Matce JR, Codon RE. Prospective evaluation of abdominal sonograghy for the diagnosis of bowel obstruction. Ann. Surg. 1996; 223:237-41.
41. Blard KI. Abdominal sonograghy for the diagnosis of bowel obstruction.Ann. Surg. 1996; 223:235-236.
42. Czechowski J. conventional radiology and sonograghy in the diagnosis of the small bowel obstruction and strangulation. ActaRadiol.1996; 37:186-9.
43. Mellins HZ, Rigler LG: The roentgen findings in strangulating obstructions of the small intestine. Am. J. Roentgenol.1954; 71:404414.
44. Nelson SW, Eggleston W: Findings on plain roentgenograms of the abdomen associated with mesenteric vascular occlusions with possible new signs of mesenteric venous thrombosis. Am. J. Roentgenol. 1960; 83:886-894.
45. Frimann-Dahl J:Roentgen examinations in acute abdominal diseases 3d ed. Springfield, III, Thomas, 1974.
46. Dixon JA, Harman CG, Nichols RL, Englert E:Intestinal motility following luminal and vascular occlusion of the small intestine. Gastroenterology. 1970; 58:673-678.
47. Seror D, et al. How conservatively can postoperative small bowel obstruction betrenledAm. J. Surg. 1993; 65:121-126.
48. Nassar AHM. The delay of operation related to the mortality in acute intestinal obstruction. Presented at the Annual Clinical and Scientific Meeting, Royal College of Surgeons, Edinburgh, May 1988.
49. Charles VM. Intestinal obstruction. In bailey and love's Short Practice of Surgery 23rd ed.: Chapman and hall.2000; 58:1064-1066.
50. Bartolo DCC, Johnstone JMS, Macleod IB, Rintoul R.F. Operations on the intestine. In; Farquharson's Textbook of Operative Surgery 8th ed. New York: Churchill Livingstone; 22:466-467.