



COMPARATIVE STUDY OF SIMPLE VERSUS STRANGULATING OBSTRUCTION OF THE SMALL BOWEL

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ABSTRACT

Background and Objectives: The aim of present study has been conducted in the view of early diagnosis of strangulating obstruction and management of mechanical bowel obstruction in adult population in small-bowel obstruction and reduce an increased risk of morbidity and mortality for strangulating obstruction in our hospital.

Methods: Sixty two patients underwent an emergency exploratory laparotomy because of acute small bowel obstruction between 1st, October, 2017 to 30th, September, 2018 in the surgery department of Assam Medical College, Dibrugarh, Assam. In present study, we examined the different clinical findings between simple obstruction and strangulation obstruction. Plain supine and upright abdominal radiographs, ultrasonography of abdomen and total leukocyte count were done in all patients.

Results: All sixty two patients underwent exploratory laparotomy for acute small bowel obstruction. Thirty nine patients (62.9%) were simple obstruction and Twenty three patients (37.1%) were strangulating obstruction. Twenty two patients (56.41%) were male and seventeen patients (43.59%) were female for simple obstruction. Fifteen patients (65.23%) were male and eight patients (34.77%) were female for strangulating obstruction. Adhesions and bands (59.67%) were the most common cause of both simple and strangulating small bowel obstruction in present study^{2,3}. No mortality was recorded in simple obstruction but 7 patients expired in strangulating obstruction with mortality rate of 30.43%.

Conclusions: All age groups were involved. Male patients dominated in both simple and strangulated small bowel obstruction. Pain abdomen was a chief complaint, followed by distension, vomiting and obstipation^{1,2,3,4,5,10}. Classically, an intractable constant non-cramping abdominal pain, tachycardia, fever, white blood cell count > 12,000/mm³, and abdominal tenderness with guarding and rigidity were predominant finding of strangulated obstruction^{1,2,3,10}. Plain X-ray abdomen^{2,3} and ultrasonography were important radiological tool. Etiology ranged from simple bands to malignant obstruction. Postoperative adhesions were the most common cause of obstruction^{2,3}. A better the outcome was seen in the patients with earlier the presentation.

KEYWORDS :

INTRODUCTION

Mechanical small-bowel obstruction is one of the most commonly encountered surgical emergency of the small intestine³. Strangulation obstruction is mostly associated with a high morbidity and mortality risk, and so early recognition and prompt management of strangulation is important^{1,2,4,5}. A clinical diagnosis of strangulation obstruction is difficult and delayed in diagnosis can lead to severe complications, like peritonitis, sepsis, or multiple organ failures (MOF). In present of classic signs of strangulation, such as tachycardia (>90 beats/minute), fever (>38 degree centigrade), rebound tenderness, muscle guarding, absent bowel sound, leukocytosis (>12,000 cells/mm³), and a constant noncramping abdominal pain, one can differentiate strangulating obstruction from simple obstruction. A number of studies have reported the importance of classical physical findings which surgeons are able to easily evaluate at any time, in the diagnosis of strangulating obstruction.

MATERIALS AND METHODS

This study included 62 consecutive patients above the age of 18 years with small-bowel obstruction who admitted to the Department of General Surgery, Assam Medical College, Dibrugarh, Assam, over a period of one year from 1st October 2017 to 30th September 2018. These Sixty two patients were divided into simple obstruction and strangulation obstruction. Patients with adynamic obstruction, age < 18 years and large-bowel obstruction were excluded from the study. The criterion for strangulation was the presence of a closed loop obstruction with gangrenous bowel. Patients having mesenteric infarction secondary to mesenteric vascular disease were excluded from this study. We determined viability small bowel, ischemic changes or necrosis of small

bowel by the intraoperative inspection of intestinal color, furthermore, the resected specimens were given biopsy for confirmation of ischemic and necrotic changes. A viability of the strangulated intestinal loop were judged after releasing of band or torsion, giving 100% oxygenation and packing of gangrenous changing part of small bowel with hot-towel for 5-10 minutes. Simple small bowel obstructions were treated in the same period. The diagnosis was made in each patient after taking a detailed history and clinical examination, laboratory investigations, radiological and ultrasonography.

RESULT:

All sixty two patients underwent exploratory laparotomy for acute small bowel obstruction. Thirty nine patients (62.9%) were simple obstruction and Twenty three patients (37.1%) were strangulating obstruction. All patients with strangulating obstruction were suspected to be strangulation clinically before laparotomy.

Table.1.Number of Patients and Percentage

	Number of Patients (n = 62)	Percentage (%)
Simple Obstruction	39	62.9%
Strangulating Obstruction	23	37.1%

Duration of Presentation:

Half of patients were admitted to our Medical College within 48 hours with very good prognosis. Rest of patients presenting more than 48 hours of acute small bowel obstruction had the higher rate of hospital stay, morbidity and mortality. 7 patients out of 12 patients, presenting to hospital more than 72 hours of acute obstruction expired with mortality rate of 58.33%.

Table.2.Duration of presenting

Duration of Presentation	Simple Obstruction (n = 39) n (%)	Strangulating Obstruction (n = 23) n (%)
within 24 hours	1 (2.56%)	-
< 48 hours	31 (79.49%)	2 (8.7%)
<72hours	7 (17.95%)	9 (39.13%)
<96 hours	-	10 (43.48%)
>96 hours	-	2 (8.7%)

Gender:

Twenty two patients (56.41%) were male and seventeen patients (43.59%)were female for simple obstruction. Fifteen patients (65.23%) were male and eight patients (34.77%) were female for strangulating obstruction. In present study, male population (60.82%), had a significant preponderance in both simple and strangulated small bowel obstruction, on the basis of sex distribution.

Table.3.Sex Distribution

Sex	Simple Obstruction n (%)	Strangulating Obstruction n (%)
Male	22 (56.41%)	15 (65.23%)
Female	17 (43.59%)	8 (34.77%)

Age Distribution:

In the present study, on the basis of age distribution, acute small bowel obstruction mainly occurs in age group of 41-50 years(23%) in simple obstruction and 51-60 years(34.78%) in strangulated obstruction. Eighty five years, male patient was the oldest patient in present study.

Table.4.Age Distribution

Age Group (in years)	Simple Obstruction (n)		Strangulating Obstruction (n)	
	Male	Female	Male	Female
18-20	1	2	1	1
21-30	6	1	3	0
31-40	4	2	3	1
41-50	4	5	2	1
51-60	2	3	3	5
61-70	3	2	0	0
71-80	2	0	2	0
81-90	0	2	1	0

Cause:

In present study, the most common cause of both simple and strangulating small bowel obstruction was adhesions and bands (59.67%) followed by hernia (17.74%), tuberculosis (6.45%), Meckel's diverticulum (4.84%), neoplasm (3.23%), intussusceptions (3.23%), worm (3.23%) and gall stone ileus (1.61%).

Table.5.Etiology

Cause	Simple Obstruction (n)		Strangulating Obstruction (n)	
	Male	Female	Male	Female
Adhesion /Band	14	11	7	5
Inguinal Hernia	3	0	5	0
Internal Hernia	0	1	1	1
Intussusception	0	0	1	1
Gall Stone Ileus	0	1	0	0
Worm Ascariasis Species	1	1	0	
Tuberculosis Inflammation	2	2		0
Neoplasm	1	1	0	0
Meckel's Diverticulum	1	0	1	1

Complaints on Admission (Symptoms):

Colicky abdominal pain, abdominal distension and obstipation were the most common presenting symptoms followed by vomiting in simple small bowel obstruction. Colicky abdominal pain became a constant, non-cramping abdominal pain in strangulated obstruction.

Table.6.Symptoms

Symptoms	Simple Obstruction n (%)	Strangulating Obstruction n (%)
Colicky Abdominal Pain	39 (100%)	5 (21.74%)
Intractable Continuous Non-Cramping Abdominal Pain	0	18 (78.26%)
Vomiting	30 (76.92%)	22 (95.65%)
Obstipation	39 (100%)	23 (100%)
Abdominal Distension/Fullness	37 (94.87%)	23 (100%)

Physical Findings in Abdomen:

Signs: Tachycardia, tenderness, rebound tenderness, muscle guarding, absent bowel sound and fever were the most common signs of strangulating obstruction. Previous surgical scars were seen in all patients diagnosed with adhesion or band.

Table.7.Signs

Signs	Simple Obstruction n (%)	Strangulating Obstruction n (%)
Previous Surgical Scar	25 (64.1%)	12 (52.17%)
Tachycardia	5 (12.82%)	23 (100%)
Tenderness	6 (15.38%)	23 (100%)
Rebound Tenderness	2(05.12%)	21(91.3%)
Muscle Guarding	1(02.56%)	22(98.65%)
Increase Bowel Sound	35 (89.74%)	0
Absent Bowel Sound	0	23 (100%)
Decreased Bowel Sound	0	0
Groin Swelling	3 (7.69%)	5 (21.74%)
Increase Body Temperature	0	21 (91.3%)

Operation:

All patients underwent exploratory laparotomy except for 3 patients of obstructed inguinal hernia. Twenty one patients required resection and anastomosis in strangulating obstruction. Right hemicolectomy was done in two patients of strangulating obstruction for ileocolic intussusceptions. Three required resection and anastomosis in simple obstruction for Meckel's diverticulum and neoplasm. Adhesiolysis or release of band was done in twenty six patients in simple obstruction.

Table.8.Operation

Operation	Simple Obstruction n (%)	Strangulating Obstruction n (%)
Adhesiolysis	26 (66.67%)	-
Resection And Anastomosis	3 (7.69%)	21 (91.3%)
Right Hemicolectomy	-	2 (8.7%)
Ileo-Transverse Anastomosis	4 (10.26%)	-
Herniorrhaphy	3 (7.69%)	-
Enterotomy (Removal of Gallstone or Worms)	3 (7.69%)	-

Postoperative Complications :

Out of 23 strangulating obstruction patients, 18 patients (78.26%) were required to keep in Intensive Care Unit immediately after operation for 2-4 days.15 patients (65.22%)developed respiratory infection in strangulating obstruction.11patients developed surgical site infection in

strangulating obstruction.No mortality was recorded in simple but 7 patients expired (2 patients expired within 48 hours and 5 patients expired after 96 hours) in strangulating obstruction with mortality rate of 30.43%.

Table.9.Postoperative Complication

Complications	Simple Obstruction n (%)	Strangulating Obstruction n (%)
Respiratory Tract Infection	5 (12.82%)	15 (65.22%)
Wound Infection	2 (5.13%)	11 (47.83%)
Wound Dehiscence	0	2 (8.69%)
Faecal Fistula	0	1 (4.35%)
Septicaemia	0	5 (21.74%)
Death	0	7 (30.43%)

Duration of Hospital Stay:

Duration of hospital was less than 7 days in more than 70% of simple obstruction patients but more than 70% of strangulation obstruction required to stay more than 14 days in hospital.

Table.10.Duration of Hospital Stay

Duration of Hospital Stay (in days)	Simple Obstruction n (%)	Strangulating Obstruction n (%)
upto 7	28 (71.79%)	0
7-10	10 (25.64%)	2 (8.7%)
11-14	1 (2.56%)	4 (17.39%)
15-18	0	8 (34.78%)
19-22	0	9 (39.13%)

DISCUSSION

Strangulating obstruction of the small bowel is one of the most common surgical emergencies with high morbidity and mortality^{1,2,3}. The small bowel obstruction is more common than the large intestinal obstruction⁹.

Age:

All age groups from newborn to elderly were involved. In the present study, on the basis of age distribution, acute small bowel obstruction mainly occurs in age group of 41-50years in simple obstruction and 51-60 years, which is comparable with the previous studies by Nandyala VNR et al⁹.Average age 30-50 years in simple obstruction and Average age 40-60 years in strangulated obstruction.

Sex:

Male patients dominated in both simple and strangulating small bowel obstruction. Takayuki M et al⁸, founded that 53.55% of patients were male. In present study, the incidence male patients(60.82%) were more as compared to female patients(39.18%).

Symptoms and Signs:

- Colicky abdominal pain, vomiting, abdominal distension and obstipation were the most common presenting symptoms in an acute simple small bowel obstruction. A colicky abdominal pain became a continuous non-cramping abdominal pain in strangulating obstruction^{1,2,3,4,5}. Tachycardia, tenderness, rebound tenderness, muscle guarding, absent bowel sound, raise body temperature and shock, were a cardinal signs of strangulating obstruction^{2,3,4,10}. Comparison of clinical symptoms and signs are shown in below.

Table.11.Simple small bowel obstruction (Symptoms)

study	Colicky Abdominal pain	Vomiting	Obstipation	Abdominal distension/fullness
Present	100%	76.92%	100%	94.87%

Takayuki M et al ⁸	45.5%	72.7%		81.2%
Alexander A et al ⁷	97%	81%	54%	

Table.12.Strangulating small bowel obstruction (Symptoms)

Study	Non-cramping abdominal pain	Vomiting	Obstipation	Abdominal distension
Present	78.26%	95.65%	100%	100%
Takayuki M et al ⁸	94.7%	52.7%		10.5%
Alexander A et al ⁷	98%	78%	55%	

Table.13.Simple Obstruction (Signs)

Study	Tenderness	Rebound Tenderness	Muscle Guarding	Increase bowel sound	Decrease bowel sound	Tachycardia
Present	15.38%	5.12%	2.56%	89.74%	-	12.82%
Takayuki M et al	63.6%	9.1%	27.3%	72.7%		
Alexander A et al	89%	27%	19%			

Table.14. Strangulated obstruction (Signs)

Study	Tenderness	Rebound Tenderness	Muscle Guarding	Decrease bowel sound	Tachycardia
Present	100%	91.3%	98.65%	100%	100%
Takayuki M et al	100%	63.2%	73.6%	57.9%	
Alexander A et al	96%	33%	25%		

Radiological and laboratory investigation:

Plain X-ray abdomen^{1,2,3,4,5} is the single important diagnostic tool for diagnosing acute small bowel obstruction in present study(96.8%). Accuracy of diagnosis of acute small bowel obstruction was seen in books like Sabistone Textbook of Surgery(>60%)² and Schwartz’s Principles of Surgery(70-80%)⁵.A raised leukocytosis (>12, 0000 cells/mm³)^{1,2,3,4,5,10} was seen in all strangulating obstruction which was also reported by Nandyala VNR et al⁹ and Takayuki M et al⁸.

Cause:

Adhesions and bands accounted for majority of small bowel obstruction (59.76%).Adhesion was the most common cause of acute small bowel obstruction in Sabiston Textbook of surgery(~60%)² and Bailey and Love’s Short Practical Of Surgery(40%)³.

It was observed that patients presenting late to the hospital, had high rate of strangulating obstruction with prolong hospital stay, poor prognosis and high mortality. All strangulating obstruction required resection anastomosis with high rate of complications like anastomotic leak, surgical site infection, chest infection, wound dehiscence and septicaemia. Similar complications were recorded by Alexander A et al⁷. No mortality was found in the patients presenting earlier to hospital. Patients, presenting to hospital more than 72 hours of acute small bowel obstruction had high rate of strangulation with high morbidity and mortality. .7 patients out of 12 patients, presenting to hospital more than 72 hours of acute obstruction expired with mortality rate of 30.43% which is comparable with Alexander A et al(28.6%)⁷. Early recognition and timely intervention is the precious factor to prevent the small bowel going for gangrenous changes.

CONCLUSION

A strangulated small bowel obstruction is the one of a

surgical emergency^{1,2,3}. The diagnosis of strangulating small bowel obstruction is difficult but one should suspect and promptly perform emergency exploratory laparotomy when there is a constant non-cramping abdominal pain, tenderness with rigidity abdomen, absent bowel sound, tachycardia, fever, hypotension and raised leukocytosis^{1,2,3,4,10}. So early recognition and aggressive intervention are the most crucial part of surgeon in preventing strangulation of bowel and thereby in decreasing high rate of morbidity and mortality

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