

Intestinal obstruction in a tertiary care centre in India: are the differences with the Western experience becoming less?

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Abstract

Background: Patients with intestinal obstruction consist of a major proportion of emergency room visits and the complication is associated with significant morbidity and mortality. It has a diverse etiology and varies from region to country. In developed countries it is mainly due to adhesions and in developing countries due to obstructed hernias. Although there are numerous studies from the western world there have been few recent publications from the developing world.

Method: We retrospectively analyzed all the patients admitted for intestinal obstruction to our department from January 1996 to December 2019. Their demographic data, duration of symptoms before presenting to the hospital and duration of stay before surgery in the hospital were noted along with cause and level of obstruction. The type of procedure, any post-operative complications, mortality or re-exploration were also noted. Post-operative complications were graded as per Clavien Dindo classification.

Results: A total of 986 patients presented with intestinal obstruction during this period out of which 743 patients underwent surgery. There were 429 (57.74%) males 314 (42.26%) females who had a mean age of 50.1 years (range 11 to 96 years). The commonest cause of obstruction was adhesions in 273 (36.7%) followed by carcinoma [130(17.5%)], tuberculosis [111(14.9%)], stricture [94(12.7%)] and hernia (5.4%) patients. Colorectal surgery was the most common previous procedure in the adhesive group [85(31.1%)]. Colon cancer was the common cause in carcinoma group. Ileum was the most common site of obstruction [329(44.3%)]. The overall operative mortality was 41 (5.5%).

Conclusion: Postoperative adhesions are now the commonest cause of intestinal obstruction in our referral center with a comparable mortality rate with western reports. Though the etiology of intestinal obstruction is shifting towards the western pattern, tuberculosis, obstructed inguinal hernia still consists a major chunk of patients in developing countries.

Introduction

Despite being one of the most common surgical emergencies, intestinal obstruction even today is often difficult to manage and is associated with significant morbidity and mortality. Its etiology differs not only between countries, at times across different regions of the same country. Adhesive obstruction has been reported to be the most common reason for intestinal obstruction in Western countries since the end of the last century while obstructed hernias are continuing to be the most common cause in developing countries.^[1,2,3,4] Though the mortality has now decreased from 60% to less than 10% over the last century due to advances in diagnostic and operative technique along with postoperative intensive care, but there is considerable variation with age and different etiological diagnoses.^[5, 6]

Although there have been numerous reports on intestinal obstruction from western countries there are very few publications from the developing world. There is stark difference not only in etiology, treatment but also the management resources between both.^[7,8,9] Nevertheless, with the improvement in living standards and better access to health care facilities, previously reported causes and outcomes of

intestinal obstruction from developing countries might be changing, particularly for patients admitted to tertiary care hospitals in larger cities which might be towards the western pattern. Because of the emergency nature of presentation and associated risk of bowel strangulation prompting emergency surgery, an early establishment of cause and diagnosis is of paramount importance for prevention of morbidity and mortality.

With this in mind, this retrospective study was conducted in our department, a tertiary care centre in India with patients who presented with intestinal obstruction over 23 years, and results were compared with those reported from western countries.

Patients And Methods

We retrospectively analyzed all the patients admitted for intestinal obstruction to the Department of Surgical Gastroenterology and Liver Transplantation, Sir Ganga Ram Hospital, New Delhi from January 1996 to December 2019, from a prospectively maintained database. Their demographic data, duration of symptoms before presenting to the hospital and duration of stay before surgery in the hospital were noted along with cause and level of obstruction. The type of procedure, any post-operative complications, mortality or re-exploration were also noted. Post-operative complications were graded as per Clavien Dindo classification. The data were compared with those published from western countries as well as from India.

Statistical analysis

Numeric continuous data was expressed as arithmetic mean \pm standard deviation for symmetrical data and median for asymmetrical data. Difference of means was tested using unpaired Student t-test or Mann Whitney U test depending upon the distribution. Nominal data was expressed as frequencies or proportions. SPSS17 was used for analysis and a p value of <0.05 was considered to be significant.

Results

A total of 986 patients presented with intestinal obstruction during this period out of which 243 patients were managed conservatively and 743 patients underwent surgery. There were 429 (57.74%) males and 314 (42.26%) females who had a mean age of 50.1 years (range 11 to 96 years). The largest number of patients were in the age group of 41-60 years (133 of 380, 35%).

Etiology

Adhesive obstruction was the most common cause in 273 (36.7%) followed by carcinoma in 130 (17.5%). Tuberculosis was present in 111 (14.9%) and strictures of the intestine in 94 patients (12.7%). Hernia accounted for only 5.4%. A few presented with intussusception, volvulus and vascular disorders which is showed in Table 1.

Among the patients admitted with adhesive obstruction, 93 (34%) patients had not undergone any previous surgery. Colorectal surgery was the most common procedure preceding adhesive obstruction in 85 patients followed by small bowel surgery in 43 patients. A smaller number of patients had hepatobiliary, upper gastrointestinal and gynaecological surgery preceding adhesive obstruction as outlined in Table 2.

A total of 130 patients had carcinoma as the cause of intestinal obstruction of whom 75 (57.7%) had colonic cancer. Gynaecological malignancy led to obstruction in 17 cases and carcinoma of the stomach in 12 patients. Some patients had gall bladder and jejunal carcinoma as shown in Table 3.

Strictures of the intestine were the cause for intestinal obstruction in 94 patients. These were possibly due to ischemia in 26 patients (with equal numbers found in the jejunum and ileum), tuberculosis in 16 patients (14 in ileum and 2 in jejunum) and preceding abdominal trauma in 14 patients (6 of whom had a stricture in the ileum and 2 in the jejunum). Radiation and pancreatitis were responsible for stricture in 12 patients each being localized in the splenic flexure or transverse colon in all patients with pancreatitis. Other less common causes were diverticulitis and crohn's disease. In 10 patients, the cause was not found.

Hernia was responsible for obstruction in 40 patients. 14 patients had obstructed ventral, 13 had incisional hernias, 8 parastomal hernias and 5 patients had internal herniation with adhesions.

In fifteen patients, intussusception was the etiology with the ileocaecal segment involved in 9 and ileo-ileal intussusception in 4 patients. The jejunum and transverse colon were involved in 1 patient each. 12 patients presented with volvulus with an ileal loop involved in 6 patients and the sigmoid colon and caecum in 3 patients each.

Site

The ileum was the most common site of obstruction in 329 (44.3%) patients with the ileo-caecal region involved in 76 (10.3%). The jejunum was involved in 109 (14.7%) patients. Primary colonic involvement, apart from the ileo-caecal region, was present in 98 patients (13.2%). 70 patients had carcinomatosis with diffuse peritoneal and visceral involvement and 55 patients had diffuse adhesions.

Presentation

The median time from the onset of the first symptoms to presentation in our hospital was 6 days (range 1-90) and the mean duration of stay in hospital before surgery was 3.5 days (range 0-28).

More patients underwent surgery for a benign as compared to a malignant etiology (78.5% vs 21.5%). In all patients with malignant cause, diagnosis was established before surgery. Patients with malignancy had a higher mean age (53.4 vs. 49.1 years), longer duration of symptoms before admission (median 13 vs. 8 days) and a higher mortality (10.7% vs. 4.1 %. P value 0.03) but their postoperative stay was similar.

226 (30.4%) patients had a comorbid illness before surgery. Hypertension, coronary artery disease and diabetes mellitus were the three most common comorbid conditions present in the patients in this study group. Compared to patients without any comorbidities, patients with comorbidities had a higher mean age (59.6 vs. 47.4 years), higher postoperative complication rate (42.6% vs. 30.5%) and a higher mortality (7.9% vs. 4.6%, $P = 0.4$)

Procedures

Overall 411 patients underwent some form of resection and anastomosis procedure while 183 patients had stoma. Adhesiolysis was the most common surgical procedure performed in 189 patients (Table 4) being the only procedure done in 88 and accompanied by a resection procedure in 81 patients.

Postoperative complications

34.5% (257 of 743) patients had postoperative complications. Grade I complications were seen in 137 (53.3%), grade II in 59 (22.9%) patients. Grade IIIa complications were seen in 27 (10.5%), while IIIb in 25 (9.7%) patients and grade IVa complications in 9 (3.5%) patients. Prolonged ileus was the most common in 42 patients followed by wound infection in 36 patients. 6 patients had a repeat episode of obstruction during the same admission. Acute renal failure, fever, intra-abdominal bleeding occurred in 18 patients each. 25 patients required re-exploration in the postoperative period 9 for recurrent obstruction, 9 had post-operative anastomotic leak, 3 for intra-abdominal bleeding, enterocutaneous fistula, burst abdomen and stoma site obstruction in 1 patient each and 1 underwent pancreatic necrosectomy. 8 patients had new onset arrhythmia postoperatively. Patients who had complications had a higher mean age (51.7 vs. 47 years) and had a longer postoperative stay (11.8 days vs. 6.8 days) than those who did not.

Mortality

The overall operative mortality was 5.51% (41 of 743) with sepsis and multi-organ failure being the most common cause. Patients who died were older with a mean age of 55.3 years and more likely to have malignancy, strangulation and perforation (Table 5), but only the differences in outcome of the groups with malignancy and strangulation reached statistical significance on univariate analysis (Table 6).

Discussion

Intestinal obstruction remains one of the commonest causes of acute abdomen worldwide amounting to 5% of emergency admission. The pattern of intestinal obstruction varies from country to country and time to time with in a same country. A steady rise in the number of major abdominal operations, together with earlier diagnosis and elective treatment of groin hernias and intra-abdominal malignancy, has resulted in a dramatic change in the spectrum of intestinal obstruction faced in Western society and other developed countries over the past 50 years, when strangulated hernias accounted for half of the total case. In under developed and developing countries the ratio of volvulus and strangulated hernia is still high. Changes in the etiology of intestinal obstruction have been reported in developing countries over the last few years,

and adhesion tends to be the most common cause in both the Western world and parts of Asia and the Middle East. [10]

Our patients differ from the west in various ways. For instance their mean age of was 50.1 years (range 11 weeks to 96 years) compared with 66.8 year in the west, while most of our patients (35.7%) being between 40 and 60 (although they were slightly older than the patients in other reports from developing countries where the mean age was 39.6 years) [11,12,13].

Older studies, especially from the developing world, report a male predominance of the order of 2:110, possibly because the main cause of obstruction, hernia is more prevalent in males. [10,14] With adhesive obstruction now becoming more frequent, this gender difference has decreased. In our study, 57.6% of patients were males as compared to 42.4% females. Studies from other centers in this region have also shown similar trends with males outnumbering females. [13,15] However in the west, male-female ratio is nearly equal with only isolated reports of a male predominance. Fevang et al in their study have reported the proportion of females with intestinal obstruction increasing from 29% in 1960 to more than 40% in 1990. [9]

Around the turn of the century, adhesive obstruction became the most common cause of intestinal obstruction with only a few isolated studies still showing obstructed hernia to be more common. [12] However in the developing world, though the incidence of adhesive obstruction has been showing a steady increase, most centers still report strangulated and obstructed hernia to be the most common cause of intestinal obstruction. Bjorg et al in study of over 35 years have shown that the incidence of adhesions increased from 43% to 53% while that of incarcerated hernia decreased from 41% to 24%. [9] In India, a study from Chandigarh described adhesions to be the cause in 27% patients compared to obstructed hernia in 22%, while a study from Calcutta reported obstructed hernia to be more common (35.9%) and from Pondicherry, of 572 patients reported, external hernia was seen 38% as compared to adhesive obstruction in 32%. [13,16]

Results from other developing countries have also shown variable results. Akgun Y et al from Turkey reported volvulus to be the most common cause in 28.6% patients followed by 25.3% for adhesions. [21] Two studies from Pakistan reported adhesions and tuberculosis as the most common causes. [10,12] Recent reports from Jordan and Turkey have shown adhesions to be the most common cause and the Nigerian and Ghanaian experience is that there is a decrease in the proportion of obstructed hernias but they are still the most common cause of intestinal obstruction. [14,17,18,21] Advances in health care with more operations being performed electively for hernia have decreased the number of emergencies and hence the incidence of obstruction episodes.

However developed countries have uniformly reported adhesive obstruction to be the most common cause of intestinal obstruction, with the more recent studies reporting rates of 60-75%. [1,2,3,4]

Colorectal operations were the most common procedures preceding adhesive obstruction in 85 patients followed by small bowel surgery in 43 patients out of a total number of 273. Barmparaset al opined that the incidence of adhesive obstruction depended on the type of previous surgery.^[18] Appendectomy and gynaecological procedures were reported to be the most common causes in analyses by Malik et al (60%) and Cox et al (23%).^[9,12,19] Similar to our study, most western institutions report colorectal surgery to be the most common surgery preceding adhesive obstruction.^[11, 14]

The second most common cause in our patients was malignancy which was present in 130 (17.5%) patients. Developed countries have also reported carcinoma to be the second most common cause after adhesions with an incidence of approximately 20%.^[22] Carcinoma causes obstruction via various mechanisms but carcinomatosis was the most common cause in 70 patients with 35 patients having luminal growths and 37 having local recurrence with adjacent intestinal loops infiltrated/ adhered. Yemlaz et al also identified malignancy as the cause in 102 patients of which 85 were colorectal in origin.^[20] Similarly Naseer et al reported malignancy as the second most common cause and colon as the site in 33 of 44 patients with malignancy.^[10] Karakoc et al compared two groups of patient during different era and found the incidence of carcinomatosis to increase from 3.26% in 1980-1985 to 27.03% in 2000-2005.^[23]

In our study tuberculosis was directly related to obstruction in 111 (14.9%) patients but was also present in 34 patients with other causes. The western literature reports very few cases of obstruction due to tuberculosis even with the resurgence of the disease after the increase in HIV infection. However tuberculosis continues to be an important cause in Asian population. Bhansali et al in their study found tuberculosis as a cause in 15.5% cases.^[24] 42 of 59 patients had disease localized to the ileocaecal region. Similar to study by Vij et al the effected population is young with the disease localized mainly to the ileocaecal region.^[25]

94 (12.7%) patients were diagnosed with non-specific strictures of the intestine. Salem et al reported these strictures in 8.3% of their patients with intestinal obstruction. A recent study from India has reported these strictures to be the cause in 27.2% although the exact cause is not known ischemia might be the most common etiology with most strictures localized to ileum and jejunum.^[27] Lalwani et al from our department have also shown the ileum to be the most common site in patients with post-traumatic strictures which probably develop after the segmental blood supply is compromised after injury to the mesenteric vessels.^[28] Since malignancy was a frequent cause, adjuvant radiation treatment was responsible for strictures in 12 patients. Pancreatitis was the preceding etiology in 12 patients. Aldridge et al reported pancreatitis as the cause for strictures, with 8 of the 10 strictures located in the splenic flexure and transverse colon.^[29]

The ileum was the most common site for intestinal obstruction in 329 (44.3%) with the colon involved in 98 (13.2%) patients. In our experience the small bowel was the more frequent site of obstruction as reported in other studies.

Patients with malignancy compared with those who had benign conditions had a higher mean age (53.4 vs. 49.1 years), equivalent male to female ratio, a longer interval between the onset of symptoms and presentation to hospital (13 vs. 8 days). Their mortality rates were also higher (10.7% vs. 4.1 %. p value 0.03) but their postoperative stay was similar.

226 (30.4%) patients had associated comorbidities before surgery. The mean age of these patients was higher at 59.6 years compared to those who were free of other disease conditions (47.4). These patients with comorbidities had longer postoperative stays (9.6 days) compared to without (7.4 days). Fevang et al and Kapan et al in their study on intestinal obstruction have reported the presence of preoperative comorbidities to be a predictor of death but in our study although their mortality was higher it was not statistically significant.^[9, 14]

Postoperative complications occurred in 257 (34.5%) patients, which is the same as in the study from Asbun et al who also found complications in 31%.^[30] The most common complication was postoperative ileus in 42 patients. 6 patients had a second episode of subacute intestinal obstruction. Wound infection was present in 36 patients. Most studies mention systemic complications and wound infection to be the most common complications. Re-exploration was required in 25 patients with 9 patients undergoing surgery for adhesions and one each for intra-abdominal bleeding, enterocutaneous fistula and pancreatic necrosis.

The mortality rate in our study was 5.51% which is comparable to other studies reporting between 2.0 to 11%.^[31,32] The patients who died were older, more likely to have malignancy and intestinal strangulation.^[33] Bjorg et al found old age, comorbidities, nonviable strangulation, and a treatment delay of more than 24 hours increased the death rate.^[9] Ti and Yong also reported increasing age, gangrene and malignancy to be associated with higher mortality rates.^[34] Strangulation and malignant etiology are the two most significant factors for mortality in our study with sepsis being the most common cause of death. 8 patients had new onset arrhythmia (6 had atrial fibrillation and 2 had supra-ventricular tachycardia). A recent study has shown that new onset AF in sepsis is associated with higher mortality.^[35]

Conclusions

Compared to previous reports, post-operative adhesions are now a common cause of intestinal obstruction in developing countries especially in referral centers. The most common preceding surgery is on the colon and rectum. The mortality rate is also comparable with those reported from the west. Old age, malignancy and strangulation were associated with a higher risk of mortality as is the experience in other centers. The developing world, however still has some differences in that the patient population is younger, males predominate and tuberculosis continues to be an important cause for intestinal obstruction.

Declarations

1. **Ethics approval and consent to participate:** Ethical committee approval was not needed as per the regulations of the local committee.
2. **Consent for publication:** Waiver of consent taken.
3. **Availability of data and materials:** All the data and material is available with the author.
4. **Competing interest:**
5. **Funding:** The research received no specific grant from any funding agency in public, commercial or not-for-profit sector.
6. **Authors' Contributions:**
 - a. Dr Suvendu Sekhar Jena - Data collection and analysis, Writing full article.
 - b. Dr Ravi Chandra Reddy Obili – Data collection and analysis, Proofing of article.
 - c. Dr Sri Aurobindo Prasad Das – Study conceptualization and designing, Article proofing.
 - d. Dr Ruchir Bhavsar – Data Collection and Excel formulation.
 - e. Dr Sanket Solanki- Data collection and Excel formulation.
 - f. Dr Samiran Nundy – Final proofing of article and final approval.
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Tables

Table 1. Aetiology of intestinal obstruction

<i>Aetiology</i>	<i>Number of patients</i> <i>(n = 743)</i>	<i>%</i>
Adhesive obstruction	273	36.7
Carcinoma	130	17.5
Tuberculosis	111	14.9
Stricture of intestine	94	12.7
Hernia	40	5.4
Intussusception	15	2
Perforation of gut	13	1.7
Volvulus	12	1.6
Crohn's disease	7	0.9
Blind loop syndrome	3	0.4
Vascular disorders	12	1.6
Meckel's diverticulum	4	0.5
Faecolith	4	0.5
Ladd's band	5	0.7
Miscellaneous	20	2.67

Table 2. Operations preceding adhesive intestinal obstruction

No	Surgery	No. (%)
1.	Colorectal	85(31.1)
2.	Small bowel	43(15.8)
3.	Hepato-biliary	13(4.8)
4.	Upper GI	13(4.8)
5.	Gynaecological	11(4)
6.	Hernia repair	9(3.3)
7.	Liver transplant	4(1.5)
8.	Peritoneal disease	2(0.7)
9.	No previous surgery	93 (34)
	Total	273

Table 3: Site of malignancy as primary cause for intestinal obstruction

No.	Site of malignancy	No of patients(%)
1.	Colon	75(57.7)
	• Ileocaecal	• 25
	• Rectal	• 24
	• Sigmoid	• 16
	• Transverse colon	• 6
	• Descending colon	• 4
2.	Gynaecological	17(13.1)
3.	Stomach	12(9.2)
4.	Gall bladder	10(7.7)
5.	Peritoneum	10(7.7)
6.	Jejunum	6(4.6)
	Total	130

Table 4. Surgical procedures

No.	Procedure	No of patients
1.	Adhesiolysis	189
	• Adhesiolysis alone	• 88
	• Adhesiolysis with resection	• 81
	• Adhesiolysis with bypass	• 8
	• Adhesiolysis with stricturoplasty	• 3
	• Adhesiolysis with other intervention	• 9
2.	Ileal resection and anastomosis	108
	Ileal resection with ileostomy	48
	Ileostomy	40
3.	Jejunal resection and anastomosis	80
	Jejunostomy	41
	Jejunal resection with colectomy	1
4.	Right hemicolectomy	76
	Right hemicolectomy with ileostomy	23
	Left hemicolectomy	26
	Sigmoidectomy	40
	Anterior resection with ileostomy	31
5.	Miscellaneous	40
	Total	743

Table 5. Mortality group vs. Survivors

No	Parameters	Mortality n = 41	Survivors n = 702
1	Mean age (years)	55.3	49.86
2	Malignant aetiology	17 (41.5%)	139 (19.8%)
3	Duration of symptoms before admission(median)	5.3 days	6 days
4	Comorbidities	7.9%	4.6%
5	Strangulation	7 (33.3%)	35 (9.7%)
6	Postoperative stay(mean)	13.85 days	8.6 days

Table 6. Univariate analysis of factors predicting mortality

No	Mortality predictors	p value
1	Age>75 Age<75	0.11
2	Strangulation / Viable bowel	0.01
3	Benign/Malignant	0.02
4	Co-morbidity	0.21