

Original article

Factors Associated with Intestinal Obstructions among Adults in Keysaney Hospital, Mogadishu-Somalia

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Abstract

Background: Intestinal obstruction (IO) is the failure of propagation of intestinal contents, and may be due to a mechanical or functional pathology. **Objective:** The aim of this study was to find out the factors, causes, management, and complications associated with IO among adults at Keysaney Hospital. **Materials and Methods:** A three-year hospital based cross-sectional study was carried out between January 1st, 2014 and December 31st, 2016 with use of the data collected from 180 patients' medical files including demographics, duration of the disease process, year of admission, hospital stay, causes of IO, operative findings, management, outcomes and complications. **Results:** In the study group, 148 (82.2%) patients were men, whereas 32 (17.8%) were women, and among all admitted patients, 88 (48.8%) patients lived in Mogadishu. The peak age was between 21-40 years, with a second peak age among elderly patients between 51-70 years. A majority of the patients of 73% presented within more than a week of illness, while 67 (37.2%) patients were discharged within the first week, 47 (26.1%) were discharged within the second week, and 66 (36.6%) stayed in the hospital for more than two weeks. Mechanical obstruction accounted for 142 (78.9%) of all cases. Mechanical small bowel obstruction (SBO) was the most common type with a rate of 61.1%, followed by mechanical large bowel obstruction (LBO) with a rate of 15.6%, while mechanical SBO/LBO was found in 2.2% as compounds of volvulus. Paralytic ileus was found in 9.4% of the cases. The type of obstruction could not be determined in 11.6% of the cases. Overall, adhesions and bands (36.7%) were the most common cause of obstruction followed by strangulated hernias (16.7%) and volvulus (12.7%). Tuberculosis peritonitis (7.8%) was the most common cause of paralytic ileus. Nonoperative management was carried out in 94 (60%) patients while the remaining 64 (40%) cases underwent surgery. Common post-operative complications were wound infection (3.3%) and peritonitis (2.8%). Other rare post-operative complications included wound dehiscence and organ failure. **Conclusions:** Several factors contribute to either the cause, or the management of IOs. Some of these determinants may include the time since the onset of illness because of late presentation due to lack of health facilities, lack of health awareness, ignorance and poverty. Poor clinical judgment and lack of management guidelines are also the negative factors leading to poor prognosis in these patients.

Keywords: Intestinal obstruction; general surgery; complications; health facilities; prognosis

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Introduction

Intestinal obstruction (IO) is a common medical problem and accounts for a large percentage of surgical admissions for acute abdominal pain.¹

Globally, IO is the failure of propagation of intestinal contents, and may be due to a mechanical or functional pathology. Acute mechanical IO is one of the leading causes of surgical admissions

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in most emergency departments worldwide² and is a significant cause of morbidity and mortality, especially when associated with bowel gangrene or perforation.^{3,4} The incidence of IO varies in different countries where it is rare in the USA and Western Europe while it is the most common cause of acute abdomen in certain parts of Latin America, Asia- India, Iran and Afghanistan. IO been the leading cause of acute abdomen in Sub-Saharan countries but still acute appendicitis is the most frequent cause of acute abdomen even in the developed world. There are several causes of IO and their relative incidence varies in different populations, between countries and has also changed over the last decades. Several factors are described to be responsible for these differences. Socioeconomic factors and diet have mostly been incriminated to be responsible for the observed difference.⁵⁻⁷

In Africa, the leading causes of IO have mostly been hernia and volvulus whereas adhesions are the most frequent reason for IO in the developed world. There are, however, some African studies which are pointing to the change in these established patterns.⁸⁻¹⁰ The few studies that have evaluated the epidemiology of abdominal surgical emergencies in this area of the world found IO to be the most common cause for acute surgical interventions. In the developed world, however, it has held true for some time that appendicitis is the major cause of abdominal surgical emergencies. Some of these studies suggest socioeconomic factors and cultural diet accounting for the differences of causation for abdominal surgical emergencies (ASE) between developed and less developed countries in the past. Though evidences are showing pattern change in Africa, little is known about the change in the causative pattern.^{8,11} According to the few reports available in Northern and Central Ethiopia, sigmoid volvulus was the leading cause of IO. In Southern Ethiopia, small intestinal volvulus (SIV) was the most frequent cause of IO as of the 235 patients with acute IO, 98 (41.7%) had SIV. On the other hand, sigmoid volvulus was the second most common cause of IO with a rate of 13.2%.^{1,12}

In Somalia, little is known about the general pattern and the relative incidence of IO. Two reports from Yirgalem and Hosanna, Southern Ethiopia, showed that small intestinal volvulus (SIV) was the most frequent cause of IO.^{7,8,13} According to the few reports, the annual mortality rate per 100,000 people from IO in Somalia has increased by 2.8% since 1990, which accounts to

an increase of an average of 0.1% per year.

The three most deadly digestive diseases in Somalia during 2013 were peptic ulcer disease, paralytic ileus and IO, followed by other digestive diseases, respectively. KeysaneyHospital is the main referral and teaching hospital in Northern Mogadishu. It receives emergencies from Mogadishu and its surroundings as well as referrals from other health institutions all over the country. Therefore, some patients are finally seen and examined at the hospital several days after the onset of IO. The trends and patterns of IO have been shown to vary over time, and because of this fact, it was worthwhile to undertake this study.

The aim of this study was to find out the factors, causes, management strategies, complications and outcomes associated with IO among adults in KeysaneyHospital, Mogadishu-Somalia by using the data that was collected during the last three years. In addition, the secondary aims of this study were to assess the management of IO and to explore the complications, morbidity and mortality among patients.

Materials and Methods

Research design

The study was carried out at KeysaneyHospital. It was a hospital-based retrospective cross-sectional quantitative study covering the three-years-period between January 1st, 2014 and December 31st, 2016.

Files were retrieved from the Records Department and necessary data was obtained and statistically analyzed.

Source population

All adult patients diagnosed with IO that whether got operated or not at KeysaneyHospital during the reference period between January 1st, 2014 and December 31st, 2016.

Study population

Adult patients with IO who fulfilled our inclusion criteria at Keysaney Hospital within the study period.

Inclusion criteria

All adult patients (>13 yrs) recorded as having IO during the period of the study.

Exclusion criteria

Case files with incomplete, inadequate or missed information.

Study variables & their indicators

The complications after management of IO such as wound infection, peritonitis, wound dehiscence and organ failure were taken as dependent variables. Age, sex, residence, time since illness

or duration of illness before arrival, annual distribution, management of IO as operative or non-operative, and main causes of IO including mechanical small bowel obstruction (SBO), mechanical large bowel obstruction (LBO), mechanical SBO/LBO, and paralytic ileus were chosen as independent variables.

Study limitations

IO was not a direct diagnosis in some cases, and therefore, a number of files may have been missed. Several other files had incomplete information while others could not be traced at the records department.

There is possibility of omission or error during filling Performa questionnaire.

Ethical considerations

Ethical approval to carry out the study was obtained from Benadir University, Research Ethical Review Committee. Additionally, permission was obtained from the Ethical and Research Committee of Keysaney Hospital. Confidentiality of the information obtained has been maintained.

Operational definitions

Management outcome: The condition of the patient after the procedure, whether he/she was discharged alive or died in the hospital.

Initial management: The initial management of patients with IO with adequate IV access for resuscitation, placement of NGT or initiation of antibiotics.

Operative management: Surgical exploration of the abdomen which was determined by the nature of the obstruction.

Surgical site infections (SSI): Infection following surgical incisions.

Fascial dehiscence: Fascial disruption due to abdominal wall tension overcoming tissue or suture strength, or knot security.

Postoperative pneumonia: Suspected in patients with clinical findings of infection including fever, cough or purulent sputum in the post-operative period.

Procedure: Main procedure done as laparotomy to relieve the obstruction.

Length of hospital stay: Time from admission to discharge or death of the patient classified as prolonged if it is more than eight days.

Anastomosis: Surgical procedure to reconnect section to section of intestine following the removal of diseased tissue.

Fistula: Breakdown along anastomosis which causes fluid to leakage.

Data management and statistical analysis

Information was collected from the main files of the patients in the record room as per age, sex, residence, time since illness, duration of hospital stay, year of admission, main cause of illness or preoperative diagnosis, operative findings, management instituted, complications and outcomes. Data was collected by the researcher via structured data collecting Performa developed for this purpose. Data was entered and analyzed in the SPSS (version 20) program. According to type of variable, the mean and standard deviation or count and percent frequencies were calculated. The relationships between variables were determined by using the suitable chi-squared test (Pearson's chi-squared test or Fisher's exact test). If P value of the test statistics was less than 0.05, it was accepted as statistically significant.

Results

The age ranged was between 13 to 94 years. Majority of the patients were in the two age groups which were between 21-30 years and 51-60 years accounting for 35.5%, followed by 31-40 years age group accounting for 15%, while the least number of patients were in the group between 61-70 years (11.1%).

There were 148 (82.2%) male patients and 32 (17.8%) female patients giving a male to female ratio of approximately 4:1.

The majority of cases accounting for 88 (48.8%) patients came from Mogadishu while 47 (26.1%) came from regions outside Mogadishu. The residence of the remaining 45 (25.0%) patients could not be determined.

When the annual distribution was investigated, there was minimal trend of decrease of cases through the study period revealing 63 cases (35%) in 2014, 59 cases (32.8%) in 2015, and 58 cases (32.2%) in 2016, respectively.

The duration of symptoms before being admitted to the hospital was shown as below. These were divided into intervals of three days for simplicity. Majority of the patients had symptoms for 7-9 days (36%), and for >9 days (37%), followed by those seen in the first three days of illness. The duration of symptoms was not documented in 45 (25%) patients.

67 (37.2%) patients were discharged within the first week, and 47 (26.1%) were discharged within the second week, while 66 (36.6%) stayed in the hospital for more than two weeks.

Overall, mechanical SBO accounted for 61.1% while mechanical LBO accounted for 15.6%.

Other types of obstructions had lower rates as shown in the Table 1 below except undetermined cases.

Table 1. The distribution of the various types of intestinal obstructions

Type of intestinal obstruction	n	%
Mechanical	142	78.9
SBO	110	61.1
LBO	28	15.6
SBO/LBO	4	2.2
Paralytic ileus	17	9.4
Undetermined	21	11.6

Mechanical obstruction was recorded in 142 (78.9%) cases, paralytic ileus in 17(9.4%), while in 21 (11.6%) patients the obstruction type was not determined (Table 2).

Overall, adhesions and bands (n=66, 36.7%) were the most common cause of obstruction followed by strangulated hernias (n=30, 16.7%) and volvulus (total=12.7%, large gut volvulus= 8.3%, and small gut volvulus=4.4%). Tuberculosis (TB) peritonitis (7.8%) was the main cause of paralytic ileus (Table 2).

Table 2. Causes of intestinal obstructions

Type of intestinal obstruction	n	%
Mechanical SBO		
Adhesions And Bands	66	36.7
Strangulated/ Obstructed Hernia	30	16.7
Volvulus	8	4.4
Worms (Ascaris)	1	0.6
Intussusception	3	1.7
Mechanical LBO		
Tumours	2	1.1
Volvulus	15	8.3
Fecal Impaction	5	2.8
Neoplasms	4	2.2
Inflammatory Strictures	3	1.7
Intussusception	1	0.6
Mechanical SBO/LBO		
Compound Volvulus	4	2.2
Paralytic ILEUS		
Tuberculosis Peritonitis	14	7.8
Ischemia	3	1.7
Undetermined	21	11.6
Total	180	100.0

Overall, non-operative management was carried out in 94 (60%) patients while the remaining 64 (40%) underwent surgery.

Of the 64 patients managed operatively, 9.4% had herniorraphy with or without resection and anastomosis, 7.8% had adhesiolysis and band release while 6.7% underwent segmental bowel

resection.

Post-operative complications were encountered in 16 (8.9%) patients, while the remaining 164 (91.1%) were free of complications.

Association between types of IO, hospital stay and patient age were found statistically significant (P=0.001, P=0.001, and P=0.001, respectively). In addition, the relation between residence and time since illness was found statistically significant (P=0.001, Table 3).

Table 3. The relation between residence and time since illness

Residence	Time Since Illness				Undetermined
	0-3 Days	4-6 Days	7-9 Days	>9 Days	
Mogadishu	33	29	26	0	0
Outside Mogadishu	0	0	10	37	0
Undetermined	0	0	0	0	45

In addition, the association between types of IO and hospital stay were significant (P=0.001). Volvulus, LBO, fecal impaction, neoplasms, inflammatory strictures, intussusception, compound volvulus, TB peritonitis, and mesenteric ischemia were found more frequent in cases with hospital stay durations of 15 days or longer. Other types of IOs such as adhesions and bands, strangulated or obstructed hernia, volvulus, worms (ascaris), Intussusception and tumors were more frequent in patients with hospital stay durations of 14 days or shorter.

The relationships between hospital stay and gender was found significant as well (P=0.001). According to the results, it was observed that, all female patients stayed in the hospital for more than 21 days. On the other hand, most of the male patients generally stayed in the hospital for less than 21 days.

Discussion

IO continues to be a frequent emergency, which surgeons have to face (1-4% of emergency operations). A total of 180 cases were included in this study for the three-years-period between January 2014 and December 2016. The study aimed to determine the factors associated with IO among adults during the study period.

Residence of the patients

The study showed that the majority of 88 (48.8%) patients were from Mogadishu, while 47 (26.1%)

patients that represented a large proportion of the remaining cases were from regions outside Mogadishu. This issue brings about the fact that most of these cases couldn't be handled outside Mogadishu at district and provincial levels, while the remaining 45 (25.0%) were undetermined. In the study, it appears that residence of the patients is also much related with time since illness as those come from outside Mogadishu present late, already complicated, which in turn affects the type of nonoperative or operative management, post-operative complications, hospital stay and mortality rates.

Demographic factors

In the present study, 148 (82.2%) cases were males while 32 (17.8%) were females showing a male predominance with a male to female ratio of approximately 4:1. This compares to a study done in CMH Rawalpindi where the male to female ratio was found to be 5:1.¹⁴ Gender also affects hospital stay, causes, complications and mortality. Over half of the patients were aged between 21-40 years. There was a second peak age among elderly patients between 51-70 years. This finding was consistent with a study over a period of ten years at Wesley Guild Hospital, in Nigeria.¹⁵ The peak age group was in the third decade accounting for 17.8%. This age group comprises the most productive work force of any country. Additionally, age affects hospital stay, complications, causes and mortality as well. Most of these patients had previous laparotomies for different pathologies ranging from appendicitis to trauma with subsequent development of adhesions and bands. This age group is vulnerable to abdominal trauma through violence, stab wounds, bullet injuries, sports and even road traffic accidents, especially in the male population which explains the male preponderance. Also the incidence of strangulated hernias in the general population is more common in this age group, especially in the male gender.¹⁶ Inflammatory diseases like pelvic inflammatory disease in females and appendicitis which are also common in this age group lead to increased number of laparotomies and therefore increased chances of adhesion formations.¹⁷

A prospective, observational, cross sectional study, conducted at Bahri (Northern Khartoum) Teaching Hospital (KNTH), Khartoum, Sudan, showed that 42 out of 54 patients (77.8%) were

males while 12 patients (22.2%) were females.¹⁸ The age range was from 10 to 80 years and above. The highest rates found among patients were in the fourth, fifth and sixth decades. In fact, 78% of the patients were above 40 years. The maximum number of patients were in the sixth decade (n=23, 25%). The male:female ratio was about 2:1, and this ratio was relatively constant for the entire age groups.¹⁸

In a study conducted in Uganda, 144 patients were admitted with acute bowel obstruction. Twelve cases were excluded from the study due to incomplete records and the results were based on the remaining 132 patients. There were 91 males and 41 females, giving a male:female ratio of 2.2:1. The ages of patients ranged from one week to 80 years with a mean of 31.5 years. The duration of symptoms ranged from one to 14 days with a mean of four days. Only 35 patients presented within 24 hours after the onset of symptoms.¹⁹

Causes of intestinal obstruction

In this study, mechanical obstruction accounted for 142 (78.9%) of all cases. Mechanical SBO was the most common type with a rate of 61.1%, followed by mechanical LBO with a rate of 15.6%, while mechanical SBO/LBO was found in 2.2% as compound volvulus. Paralytic ileus was found in 9.4% of the cases. The type of obstruction could not be determined in 11.6% of the cases due to missing information in the patients' files. Mechanical SBO occurrence is more frequent since the main causes of mechanical obstruction (adhesive obstruction and hernia strangulation) mainly occur at the level of small bowel. The pattern of IO in Keysaney Hospital may be compared to that in the western world as seen in our study. Many studies recently done in this region showed an obvious change in the pattern of IO. The common causes were postoperative adhesions and abdominal TB instead of obstructed inguinal hernias.¹⁰ Similarly a number of recent studies have found adhesive obstruction to be replacing obstructive hernias as the most common cause in contrast to earlier studies where strangulated hernias were found to be the most common cause in the developing countries with a rate of 39.0%.¹² Adhesions were third in those patients with a rate of 17.1%.

The main cause of IO at Keysaney Hospital was due to adhesions and bands (36.7%), mainly associated with previous laparotomies. Intra-

abdominal adhesions following surgery occur after 50-100% of all surgical interventions in the abdomen. Factors that limit adhesion formation in abdominal surgery include good surgical technique, minimization of contact with gauze, covering of the sites of anastomoses and peritoneal surfaces as well as irrigation of the peritoneal cavity with saline to remove clots.²⁰ A small group of adhesions may occur due to peritoneal infections or inflammatory conditions for those laparotomy has not been done previously. Finally, this pattern may differ from other developing countries where the most common cause of IO was obstructed inguinal hernia followed by adhesions.²¹

Somalia is a developing country that health delivery in urban tends to be nearly nonexistent. As hernias are not electively repaired, obstructive hernias are common, but still, adhesive obstruction is the leading cause of IO. The second most frequent cause of mechanical small bowel obstruction according to this study was strangulated external hernias (16.7%). A hernia strangulates due to a narrow neck, and therefore, becomes a surgical emergency since the viability of the gut is threatened and any delay of treatment would only increase the risk of gangrene formation and related complications.²² The third frequent cause of IO was sigmoid volvulus (8.3%), which was the main cause of large bowel mechanical obstruction. This pattern is comparable to a study by Liaqat et al, but contrasts with other studies which state that volvulus was the most common causes of IO followed by adhesions and small bowel volvulus.²³ Sigmoid volvulus is a common problem in Africans where predisposing factors include high residue diet and chronic constipation, as well as bands of adhesions.

The other causes of mechanical colonic obstruction were fecal impaction (2.8%), and neoplasms (2.2%). Overall, adhesions and bands (36.7%) were the most common cause of mechanical IOs followed by strangulated hernias (16.7%), colonic volvulus (8.3%), TB peritonitis (7.8%), ileal volvulus (4.4%), fecal impaction (2.8%), and large gut neoplasms (2.2%).

With a rate of 7.8%, TB peritonitis was the main cause of paralytic ileus, while ileus due to ischemia from mesenteric thrombosis occurred in 1.7%, overall. Therefore, TB appears to be an important cause of functional IO resulting from ileus due

to peritonitis, especially with the increasing incidence of TB cases the epidemiology of which varies considerably from region to region.²⁴ Adhesions are the cause in 80% of instances. They are usually from previous abdominal surgeries as well as the use of abdominal mopping gauze swabs or towels, but may also arise from previous intra-abdominal sepsis. They produce kinking of the bowel or obstruction from pressure of a band or volvulus. Intestinal adhesions are the most common cause of mechanical small bowel obstructions in the western world due to the greater number of operations performed.³ Intestinal adhesions to other vascular structures occur as the injured peritoneal cavity needs to gain some extra blood supply during the healing process. Thus, minimizing the disruption of the peritoneal cavity may be achieved by minimally-invasive surgery.

According to a study from Eastern India on 3717 patients admitted for acute abdomen, 376 (9.87%) patients were diagnosed with IO and the common causes were strangulated hernia (36%), malignancies (17%), adhesions (16%), intestinal TB (14%), volvulus (6%) and intussusceptions (2%).²⁵

The results of a one-year-retrospective review on acute bowel obstruction in Northern Uganda also showed a male to female ratio of 2.2:1. The duration of symptoms ranged from one to 14 days with a mean of four days. The most common causes of obstruction were hernias, adhesions, volvulus and intussusceptions. Of the 23 patients with volvulus, 17 involved the sigmoid colon, but other presentations of volvulus were also seen as ileosigmoid knotting, caecal volvulus, volvulus neonatorum, and small bowel volvulus.¹⁹ In a retrospective study of the pattern of adult IO at Tenwek Hospital, in Southwestern Kenya between 2009 and 2013, 445 cases were evaluated and the major cause of IO accounted for a rate of 78.5% for all cases as SV was 25.6%, adhesive bowel disease was 23.1%, SBV was 21.3%, ileo-sigmoid knotting was 8.5%, obstructing large bowel tumors was 2.5%, and incarcerated hernias was 1.1% among all causes.²³

Time since illness (presentation time)

Majority of the patients (73%), presented within more than a week of the onset of illness, as this is usually the case in Keysaney Hospital, which has great impact on the management, complications

and outcome. Time since illness has significant effects on the complications, management and outcomes of the patients.

Management of intestinal obstruction

The mode of treatment was determined by the underlying condition. Overall, surgery was performed in 40% of all patients, the type of which depended on cause and intra-operative findings. The rest of the patients that accounted for 60%, were managed conservatively. Of all the patients managed operatively, 9.4% had herniorraphy, 7.8% had adhesiolysis and band release, 6.7% had detortion, 4.4% had gut exteriorization, 4.4% had resection and anastomosis. Thus, prophylactic use of antibiotics is recommended since the risk of contamination and sepsis is quite high in such patients. Management has effects on complications and mortality because if the patients' management isn't adequate he or she may have complications and may die as a consequence.

In a study from Western Kenya, a total of 361 patients underwent laparotomy. Bowel gangrene was noted in 112 (31%) cases. Sigmoid volvulus, small bowel volvulus and ileo-sigmoid knotting accounted for 84% of all cases of bowel gangrene. The main operative procedures performed included resection and anastomosis (n=170, 47.1%), detortion and decompression (n=73, 20.2%), and adhesiolysis. At discharge, a total of 49 (13.6%) morbidities were noted in patients who underwent laparotomy, including surgical site infections (n=16, 4.4%), enterocutaneous fistula (4,1%), wound dehiscence (n=3, 0.8%), and intra-abdominal abscess formation (n=2, 0.5%). Nineteen deaths were noted during the admission period, leading to a postoperative mortality rate of 5.3%. Patients with gangrenous bowel at laparotomy had a higher morbidity rate (22.3%), and a higher mortality rate (9.8% vs. 3.2%, P=0.02) and longer duration of hospital stay of 7.6-9 days.²³

In a study in Libya, among 108 patients who were diagnosed with IO, 45 were treated surgically and 4 (8.8%) patients were subjected to laparotomy due to the post-operative adhesion with evidence of strangulation as no operative adhesive intestinal obstruction was found in 3 (6.6%) of them. They had undergone laparotomy soon after resuscitation, because the cause of obstruction was not clear. In the hernia group 15 (33.3) were

treated surgically and three of them had bowel resection. Fourteen (31.1%) cases of large bowel tumors were treated surgically with resection and primary anastomosis, 4 case of sigmoid volvulus (8.8) underwent laparotomy, 3 (6.6%) cases of Crohn's disease were treated surgically by right hemicolectomy, one (2.2%) case of gallstone ileus underwent laparotomy and enterotomy and one (2.2%) foreign body (intestinal bezoars) underwent laparotomy and enterotomy.²⁶

Post-operative complications

In the present study, the common post-operative complications were wound infection (3.3%), and peritonitis (2.8%). Rare post-operative complications included wound dehiscence and organ failure. Complications were affected by time since illness, residence, sex, age, cause, management. In a study of 877 patients who underwent 1,007 operations for IO, which was published in 2000, it was reported that age, comorbidity, nonviable strangulation, and a treatment delay of more than 24 hours were significantly associated with an increased death rate. The rate of nonviable strangulation increased markedly with patient age. Major factors increasing the complication rate were old age, comorbidity, a treatment delay of more than 24 hours, and the need for repeat surgery.²⁷ According another study published in 2017, among the total of 210 patients with features of acute IO who underwent surgery, 43 cases (20.47%) developed complications. Wound infection (10.47%) was the most common followed by respiratory infection (7.14%), enterocutaneous fistula (2.86%) and burst abdomen (4.29%). Majority of the cases who developed wound infection (86.4%), respiratory infection (100%), burst abdomen (100%) and enterocutaneous fistula (83.3%) were above 40 years of age. Males were more commonly having wound infection (77.3%), burst abdomen (60%) and respiratory infections (93.3%) when compared to females. Enterocutaneous fistula was seen in males and females in equal proportion. The mortality rate was 8.09%. The main causes of mortality were colon carcinoma (23.5%), acute mesenteric ischaemia (17.6%), sigmoid volvulus (17.6%) and compound volvulus (17.6%). The causes having high mortality rates were acute mesenteric ischaemia and ileosigmoid knotting (75% in each pathology). The main cause of

mortality in the majority of cases (52.3%) was septicaemia which led to multiorgan failure. Most of the deaths (88.2%) occurred in the first postoperative week.²⁸

Hospital stay

A majority of 67 (37.2%) patients were discharged within the first week, and 47 (26.1%) were discharged within the second week, while 66 patients (36.6%) stayed in the hospital for longer than two weeks. Hospital stay was affected by age, gender, time since illness, type of disease or cause, and management.

Recommendations

Proper history taking and physical examination

with documentation should be emphasized as this would reduce the study limitations encountered during this study.

Careful evaluation of patients is important so as to avoid unnecessary laparotomies which would effectively reduce the number of laparotomies in the general population and therefore lower occurrence rate of adhesive IOs.

Public awareness of the need for elective repair of hernias would reduce the occurrence of hernial obstruction in the general population.

It is necessary to build and improve health facilities capable of handling patients with IO within the reach of the community to promptly treat patients.

References

1. Helton W, Fisichella P. Intestinal obstruction. In: *Souba W, ed. ACS Surgery Principals and Practice (6th ed). New York, NY: WebMD; 2007.*
2. Arshad MM, Madiha S, Rafique P, Krishan Si. Pattern of Acute Intestinal Obstruction: Is There a Change in the Underlying Etiology? *Saudi J Gastroenterol. 2010;16(4):272-274.*
3. Eren T, Boluk S, Bayraktar B, Ozemir IA, YildirimBoluk S, Tombalak E, Alimoglu O. Surgical indicators for the operative treatment of acute mechanical intestinal obstruction due to adhesions. *Ann Surg Treat Res. 2015;88(6):325-333.*
4. Ellis H. 1997. The clinical significance of adhesions: focus on intestinal obstruction. *Eur J Surg Suppl. 1997;577:5-9.*
5. Demissie M. Small intestinal volvulus in Southern Ethiopia. *East Afr Med J. 2001;78(4):208-211.*
6. Tegegne A. Small intestinal volvulus in adults of Gonder Region, northwestern Ethiopia. *Ethiop Med J. 1992;30(2):111-117.*
7. Kotiso B, Abdurahman Z. Pattern of acute abdomen in adult patients in TikurAnbessa Teaching Hospital, Addis Ababa, Ethiopia. *East and Central African Journal of Surgery. 2007;12(1):47-52.*
8. Tsegaye S, Osman M, Bekele A. Surgically treated acute abdomen at Gondar University Hospital, Ethiopia. *East and Central African Journal of Surgery. 2007;12(1):53-57.*
9. Osuigwe AN, Anyanwu SNC. Acute intestinal obstruction in Nnewi Nigeria: a five-year review. *Nigerian Journal of Surgical Research. 2002;4(3):107-111.*
10. Lawal OO, Olayinka OS, Bankole JO. Spectrum of causes of intestinal obstruction in adult Nigerian patients. *S Afr J Surg. 2005;43:34-36.*
11. Asefa Z. Pattern of acute abdomen in Yirgalem Hospital, Southern Ethiopia. *Ethiop Med J. 2000;38(4):227-235.*
12. Ntakiyiruta G, Mukarugwiro B. The pattern of intestinal obstruction at Kibogola Hospital, a rural hospital in Rwanda. *East and Central African Journal of Surgery, 2009;14(2):103-108.*
13. Okello TR, Ogwang DM, Kisa P, Komagum P. Sigmoid volvulus and ileosigmoid knotting at St. Mary's Hospital Lacor in Gulu, Uganda. *East Cent Afr J Surg. 2009;14:58-64.*
14. Irfan M, Hussain SF, Mapara K, Memon S, Mogri M, Bana M, Malik A, Khan S, Khan NA. Community acquired pneumonia: Risk factors associated with mortality in a tertiary care hospitalized patients. *J Pak Med Assoc. 2009;59(7):448-452.*
15. Adesunkanmi AR, Agbakwuru EA. Changing pattern of acute intestinal obstruction in a tropical African population. *East African Medical Journal. 1996;73(11):727-731.*
16. Rai S, Chandra SS, Smile SR. A study of the risk of strangulation and obstruction in groin hernias. *Aust N Z J Surg. 1998;68(9):650-654.*
17. Stewart B, Khanduri P, McCord C, Ohene-Yeboah M, Uranues S, Vega Rivera F, Mock C. Global disease burden of conditions requiring emergency surgery. *Br J Surg. 2014;101(1):e9-22.*
18. Terayo AA, Hamza AA, El-Kheir IS, Ibrahim OM, Abdel-Wahab M, Fatehella N. Intestinal obstruction in the first year of age: Pattern and outcome of management. *SAS J Surg. 2015;1(4):165-171.*
19. Okeny PK, Hwang TG, Ogwang DM. Acute bowel obstruction in a rural hospital in Northern Uganda. *East and Central African Journal of Surgery. 2011;16(1):65-70*
20. Brüggmann D, Tcharchian G, Wallwiener M, Münstedt K, Tinneberg HR, Hackethal A. Intra-abdominal adhesions: Definition, origin, significance in surgical practice, and treatment options. *DtschArztebl Int. 2010;107(44):769-775.*
21. Khan JS, Alam J, Hassan H, Iqbal M. Pattern of intestinal obstruction: A hospital based study. *Pak Armed Forces Med J 2007;57(4):295-299.*
22. Kingsnorth A, LeBlanc K. Hernias: Inguinal and incisional. *Lancet. 2003;362:1561-1571.*
23. Ooko PB, Sirera B, Saruni S, Topazian HM, White R. Pattern of adult intestinal obstruction at Tenwek hospital, in South-Western Kenya. *Pan Afr Med J. 2015;20:31.*
24. Essig KM, Kienast K, Ferlinz R. Ileus caused by tuberculosis. *Pneumologie. 1997;51(8):828-831.*
25. Adhikari S, Hossein MZ, Das A, Mitra N, Ray U. Etiology and outcome of acute intestinal obstruction: A review of 367 patients in Eastern India. *Saudi J Gastroenterol. 2010;16(4):285-287.*
26. FM Mikael, M Patro, O Issa, MA Bakr, HI Fadeel. Intestinal obstruction at El Thowra Teaching Hospital, El Beida, Libya. *East and Central African Journal of Surgery. 2012;17(2):77.*
27. Fevang BT, Fevang J, Stangeland L, Søreide O, Svanes K, Viste A. Complications and death after surgical treatment of small bowel obstruction: A 35-year institutional experience. *Ann Surg. 2000;231(4):529-537.*
28. Mohamed A, Sahoo N, Das SK, Das BB, Pradhan SK, Gouda PK. Profile of operated acute intestinal obstruction patients at a tertiary health care institution. *J Evolution Med Dent Sci. 2017;6(15):1215-1219.*