

Proportion, Associated Factors and Management Outcome Intestinal Obstruction Among Acute Abdomen in Tibebe Ghion Specialized Hospital, Bahr Dar, Ethiopia, 2021

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Abstract: *Background;* One of the most prevalent acute abdominal illnesses, intestinal obstruction (IO), frequently necessitates immediate surgical treatment in a hospital setting. Surgical care, however, can occasionally result in unfavorable results marked by both fatal and nonfatal postoperative sequelae. *Objective;* to assess the proportion and associated factors of the results of the management of intestinal obstruction at TGSB Bahir Dar Ethiopia 2021 *Methods;* an institution-based cross-sectional study was conducted among patients who were surgically treated for IO during the last 1 year at the TGSB. Patient participants were selected using a systematic random sampling technique. A structured research tool was used to collect all the necessary data from the patients' medical records. Data was analyzed by using SPSS version 21 Frequencies with percentages was used to describe the surgical management outcome of IO. Binary logistic regression model was used to explore the determinant factors associated with the surgical management outcome of IO. Factors at P value < 0.05 were declared statically significant. *Result:* There were 2023 total surgical admissions in the TGSB surgical ward over the course of the 12-month study period. The adjusted odds ratio (AOR) for intestinal obstruction is 3.24 with a 95% confidence interval (CI) for men ($p=0.003$). AOR=12.53 and 95% CI showed a significant association between living in a rural area and intestinal blockage. Duration of illness before operation (in days) had also significantly associated with intestinal blockage. *Conclusion:* The second most typical cause of acute abdomen in TGSB was intestinal obstruction. Hence, this study found that small intestinal obstruction was more common than large bowel obstruction. The most common causes of minor and large bowel blockage were, respectively, adhesion/band and sigmoid volvulus. IO was more prevalent in rural areas and among men. Most patients were relatively old, in the 5th and 6th decades of life.

Keywords: Intestinal Obstruction, Prevalence, Causes, Management Outcome

1. Introduction

1.1. Background

Intestinal obstruction occurs when the normal flow of intestinal contents is interrupted. Intestinal obstruction is one of the most common causes of acute abdomen worldwide. It was recognized, described, and treated by Hippocrates (460-370 Before Christ.). At that time, it was believed that living for God than for man is better if patients with Intestinal obstruction have reached stage of bowel perforation. At that time had ileus developed in consequence of Intestinal obstruction, the mortality rate reached 100%. Both surgical and conservative treatment options were tried since 350 Before Christ, but success rate of both treatments was minimal until the 20th century. Surgical (Protagoras, 350 Before Christ., enter coetaneous fistula) and conservative (reposition of incarcerated hernias, analgesic like opium, ingestion of heavy metals like mercury or lead and leeches to remove toxic agents from the blood) were among documented treatment options at that time [1].

An improvement took place after 1912, when Hartwell and Hogget noticed that infusion of the physiological solution prolonged the survival of dogs with Intestinal obstruction. The second chief therapeutic principle—suction by nasogastric or intestinal tubes was gradually introduced into clinical practice in the 1920's (McIver, 1926). Antibiotics began to present a standard part of therapy algorithms of intestinal obstruction in the 1940' and 1950's. The introduction of this management options reduced mortality rate from 50% in 1930s to about 10% in 1960s [2].

The pessimism of leaving for God, if the patient presents with perforated intestine, are now gradually disappeared as safe techniques evolved for intestinal suturing and anastomosis. Infusion therapy, intestinal suction, antibiotics, somatostatin, new imaging methods like ultrasonography and computed tomography scanning, together with improved surgical and anesthetic techniques has substantially reduced the mortality rate [3].

The most common cause of Intestinal obstruction is adhesion i developed countries but is either Volvulus or hernia in most African countries. It is common to see patients with huge groin hernias which grows down to their scrotum or thigh and presents late after they developed Intestinal obstruction which is of course gangrenous in majority of cases and hence carries high risk of morbidity and mortality in Ethiopia and TGS in particular. It is also common to see an old man with grossly distended abdomen from sigmoid volvulus seeking tube decompression or coming so late after intestinal ischemia has occurred needing colostomy (artificial intestinal opening the abdomen) in TGS [4].

Acute bowel obstruction is an ever-increasing clinical problem. Successful management depends on comprehensive knowledge of the etiology and pathophysiology of the

obstruction, familiarity with imaging methods, good clinical judgment, and meticulous surgical technique. The mortality of intestinal obstruction depends on the presence of associated co morbid disease and presence of strangulation which increase it by five folds [5].

Most of the gas that accumulates originates from swallowed air, although some is produced within the intestine. The fluid consists of swallowed liquids and gastrointestinal secretions (obstruction stimulates intestinal epithelial water secretion). With ongoing gas and fluid accumulation, the bowel distends and intraluminal and intramural pressures rise. If the intramural pressure becomes high enough, micro vascular perfusion to the intestine is impaired, leading to intestinal ischemia, and, ultimately, necrosis. This condition is termed strangulating bowel obstruction [6].

1.2. Statement of the Problem

Bowel obstruction is a significant contributor to morbidity and mortality, accounting for close to 30,000 fatalities and more than \$3 billion in annual direct medical expenses. In the USA, it accounts for 15% of hospital admissions for acute abdominal pain and 20% of cases requiring urgent surgical treatment. IO is a significant global source of morbidity. One of the most frequent abdominal surgical emergencies is IO. The patient may pass away if IO is not eased in time. Thus, early diagnosis and fast treatment are essential. IO is a widespread issue that uses a lot of surgical treatments. It is a severe health issue and a frequent surgical emergency in Ethiopia. In several African nations, IO has been the major cause of acute abdomen, whereas acute appendicitis is the most frequently seen cause in the developed world [7].

IO continues to remain a challenge to surgeon despite advances in field of medicine, pathophysiology, surgical technique and conservative management and accounts for a large percentage of surgical admissions for acute abdominal pain and high mortality ranges from 3% to 30% all over the world. Universally, intestinal obstruction varies from country to country or regions in terms of its incidence, causes and management outcomes depending on ethnicity, age group, dietary habits, and geographical location, among other factors as well as living condition of community. In 90% of cases, small bowel obstruction caused by adhesions, hernias, and neoplasms. Adhesive small bowel obstruction represents 55–75% of small bowel obstruction cases while hernias and small bowel tumors account for the remainder [8]. Large bowel obstruction is provoked by cancer in about 60% of cases; volvulus and diverticular disease are responsible of other 30% [9]. Other various causes (carcinomatosis, endometriosis, inflammatory bowel disease stenosis, etc.) account for the remaining 10–15% of bowel obstructions. The leading causes of IO in Africans have mostly been hernia and volvulus whereas adhesions are the most frequent in the

developed world. There are, however, some African studies which are pointing to a change in these established patterns. Late presentation in case of intestinal obstruction accounts for disastrous outcomes, notably high rate of complication, long hospital stays and high mortality rate [38]. Of all IO, mechanical IO forms an important part of pathologies that necessitate emergency surgical interventions in parts of Asia, including India, Iran and Pakistan [10]. With certain exceptions, mechanical IO can generally be relieved through conservative treatments like nasogastric tube insertion, intravenous antibiotics or intravenous fluid resuscitation; unrelieved IO necessitates further exploration. Previous studies revealed that repeat IO will recur in about 12 % of patients after primary conservative treatment, and in between 8 and 32% of patients after operative management for adhesive bowel obstruction [11]. In 80 % of cases, IO occurs in the small bowel, while in 20 % of cases it occurs in the large intestine [12]. And Ethiopia is one of the countries where intestinal obstruction constitutes a major cause of morbidity and mortality [13]. While significant research has been done to evaluate the prevalence and causes of IO in Western nations, the disorder has received less attention in the context of Ethiopia. There is a dearth of research on the frequency and causes of IO in Ethiopia, especially in the northern, western, and eastern regions of the nation, with only a few studies completed in north and center Ethiopia. Additionally, IO in rural and regional hospitals has not been studied in any recently published literature. In order to close this information gap and produce baseline data on the prevalence, etiology, and treatment effectiveness of IO in Bahir Dar, north Ethiopia, this study was carried out. [14].

1.3. Significance of the Study

The outcomes of this study may give epidemiological and clinical information that will act as a crucial input for policy makers to build suitable measures to manage IO. The study's findings will also be used as a resource by others who want to do their own research on the prevalence, etiology, and prognosis of IO. The findings might offer a foundation for bettering these patients' treatment outcomes. The study may provide basis for improvement of treatment outcome of these patients.

1.4. Objectives

1.4.1. General Objective

To assess the proportion and associated factors of intestinal the results of the management of intestinal obstruction at TGSH Bahir Dar Ethiopia 2021.

1.4.2. Specific Objectives

- 1) To determine the proportion of intestinal Obstruction at TGSH Bahir Dar, Ethiopia 2021.
- 2) To identify associated factors of intestinal Obstruction at TGSH Bahir Dar Ethiopia 2021.
- 3) To determine the management Outcome Of intestinal Obstruction at TGSH Bahir Dar Ethiopia, 2021.

2. Literature Review

Colicky stomach discomfort, distension, vomiting, and constipation are the four defining characteristics of IO. Acute intestinal obstruction is a major cause of illness and mortality in rural Africa, and the location and kind of obstruction have an impact on how these symptoms appear. [15].

Despite advancements in medicine, pathology, surgical technique, and conservative care, intestinal blockage still poses a challenge to surgeons. It is responsible for a significant portion of surgical hospitalizations for acute abdominal discomfort and has a high mortality rate of 3% to 30% worldwide. Overall, the incidence, etiology, and therapy of intestinal blockage vary from one country or region to another based on, among other things, the ethnicity, age group, dietary preferences, and location of the community. [8].

The leading causes of intestinal obstruction in Africans have mostly been hernia and volvulus whereas adhesions are most frequent in the developed world. There are, however, some African studies which are pointing to a change in these established patterns. Late presentation in case of intestinal obstruction accounts for disastrous outcomes, notably high rate of complications, long hospital stays and high mortality rates [9].

Of all IO, mechanical IO forms an important part of pathologies that necessitate emergency surgical interventions in parts of Asia, including India, Iran and Pakistan [16]. With certain exceptions, mechanical IO can generally be relieved through conservative treatments like nasogastric tube insertion, intravenous antibiotics or intravenous fluid resuscitation; unrelieved IO necessitates further exploration. Previous studies revealed that repeat IO will recur in about 12 % of patients after primary conservative treatment, and in between 8 and 32 % of patients after operative management for adhesive bowel obstruction [17].

In 80 % of cases, IO occurs in the small bowel, while in 20 % of cases it occurs in the large intestine [18]. There are four cardinal features of IO: colicky abdominal pain, distension, vomiting, and constipation. The presentation of these symptoms is affected by the site and type of obstruction [19].

One of the most difficult tasks in general surgery is deciding when to operate on patients with intestinal obstruction. (Timed surgical intervention). Whether it is of the strangulated or the non-strangulated variety; the mortality from acute intestinal obstruction arises with each passing hour from the onset of symptom [20].

In present study repeat x-ray abdomen and USG was done in those cases who managed conservatively in view of resolution and progress. After initial clinical, radiological evaluation (x ray and USG of abdomen) and current status, decision was taken to manage accordingly. Sensitivity of abdominal radiograph x-ray in the detection of bowel obstruction ranges 70-80% and specificity is low. In present study out of 60 cases, multiple air fluid level in dilated loops of bowel seen in 44 cases (73.33%) and dilated bowel loops

seen in 44 cases (73.33%) which is compared with results of Priscilla et al in which multiple air fluid level in dilated loops of bowel seen in 81% cases and dilated bowel loops seen in 52% cases. In Kumar et al multiple air fluid level seen in 31%, dilated bowel loops seen in 32% and coffee bean appearance seen in 5% [21].

Diagnosis of small bowel obstruction can be made with the help of ultrasound abdomen, when the diameter of intestine measures more than 25mm and when the distal ileum is collapsed. Sensitivity of USG is 85% and specificity is 85% and 82% accuracy. It is helpful in identifying causes of intraluminal obstruction. On USG out of 60 cases dilated bowel loops were seen in 46 cases (76.66%) due to obstruction and collection of fluid, obstructed bowel loops seen in 14 cases (23.33%) at inguinal hernia orifice. In every patient of obstructed inguinal hernia looked for bowel ischemic/necrosis changes due to compromised bowel blood supply due to obstruction/strangulation at hernia. Free fluid or inter bowel fluid seen in 7 cases (11.6%). Patient with thick edematous bowel loop mainly at ileocecal junction seen in 4 cases (6.6%), these patients further evaluated for abdominal tuberculosis as most common site of abdominal intestinal TB [22].

Acute intestinal obstruction is more common in male than female. In present study males were affected more than female. Males were 68.3% (41 cases out of 60 patients) and female were 31.7% (19 cases out of 60). Present study was compared with Sivakumar et al study in which 66 % male affected which is more than female 34%. In Soressa et al 65.8% males and 35.2 females were affected [23].

In the present study, pain in abdomen was complained by all 60 cases (100%) vomiting by 38 cases (63.3%), distension also by all 60 cases (100%) and constipation by 48 cases out of 60 (80%). Patients with vomiting were suggestive of proximal bowel obstruction. Shukla et al reported that pain in abdomen was complained by 100% cases, vomiting by 58% and distension by 34.5 % and constipation by 25% cases. So present study result is consistent with study of Shukla with the findings of pain in abdomen and vomiting [24].

Acute intestinal obstruction is emergency condition and most common causes of intestinal obstruction are post-operative adhesion and hernia worldwide. In the present study, post-operative adhesion was most common cause for acute intestinal obstruction. Post-operative adhesion was seen in 19 cases (31.66%) out of 60 cases. Patient with intestinal obstruction with previous history of surgery suggest adhesion and band formation [25].

Among 15,857 patients who presented to ED over the study period of 6 months, the prevalence of AIO was 0.6%. There were 90 patients with AIO out of 120 suspected intestinal obstructions in our prospective study. The remaining 30 patients were diagnosed as non-obstruction [26].

A complete history along with physical exam and laboratory tests should be performed upon presentation to the emergency unit. Patients should be asked about their last defecation/bowel gas passage. Having a history of previous

abdominal surgery has 85% sensitivity and 78% specificity to predict adhesive small bowel obstruction [27].

The study was done in all age groups ranging from newborn to 75 years with a mean age of 35.9 years. The occurrence of intestinal obstruction was common in male (80%) with comparison to female (20%). There were 42 male and 18 females with male to female ratio with 2:1. There were more of small bowel obstructions (73%) when compared to large bowel obstruction (27%). The analysis of the sign and symptoms showed that tenderness was the major symptoms seen in the patients, next symptoms was vomiting followed by abdomen in pain. Other symptoms and signs analysed in patients are distension, constipation of stomach, increased in bowel sounds. Plain x-ray erect abdomen was done in 50 cases out of 60 cases. Positive interpretation was when it correlated with exact site of pathology and negative when it did not. [28].

There were 245 patients with intestinal obstruction seen during the study under review. Males accounted for 62% of cases. The ages of patients ranged from 2 days to 80 years with mean age of $38.9 \pm SD 11.9$ year. The average duration of symptoms was 4 days. Acute abdominal pain, vomiting and absolute constipation were the commonest symptoms. The leading cause of intestinal obstruction was obstructed/strangulated external hernias found in 66 (27%) of patients and was followed by adhesions with 54 (22%) patients and the third being volvulus occurred in only 47 (19%) patients. One hundred and four (42%) patients underwent intestinal resection and anastomosis. The hospital stay ranged between 1 and 36 days with a mean stay of 10.4 days. The overall mortality rate was 17 (8%) [29].

The magnitude of an unfavorable management outcome of IO at Chiro General Hospital was 21.3%. The most unfavorable management outcome of IO was wound site Infection. In current study old age, late presentation of illness and pre-operative diagnosis of gangrenous bowel were significantly associated with the occurrence of unfavorable management outcome of Intestinal Obstruction [30].

The second common cause of acute abdomen in patients admitted at APH surgical ward was intestinal obstruction 48 (28%). 27 (56.25%) of obstruction occupied by those age greater than 45 years and 62.5% were farmers. Males were 61.9% and females were 38.1% and male to female ratio was 1.6:1. Most of the patients were from rural area 38 (79%) [31].

The leading cause of intestinal obstruction was small bowel obstruction 30 (62.5%) and adhesion/band were 13 (43%) of which 94.9% had history of abdominopelvic operation and nine primary volvulus, five hernias and three intussusceptions contributed 57%. Abdominal pain (100%), vomiting (96.6%) and abdominal distension (84%) were the common presentations. 20% of patients were in hypotension, tachycardia (48.3%) whereas 36% were febrile $T^{\circ} \geq 37.5$ c. Abdominal distension was the commonest physical finding (78%) followed by tenderness (62%) [32].

The prevalence of IO was 21.8 % among patients admitted with the acute abdomen conditions, and 4.8 % among total

surgical admission patients. Out of the 242 patients with IO who underwent further analysis, 64 % had cases of small bowel obstruction and 36.0 % had cases of large bowel obstruction. Of these 242 patients, 13.6 % had a previous

history of abdominal operation: in 30 patients (12.4 %) the operation was for adhesion, and in ## patients (31.2 %) the operation was for acute appendicitis [33].

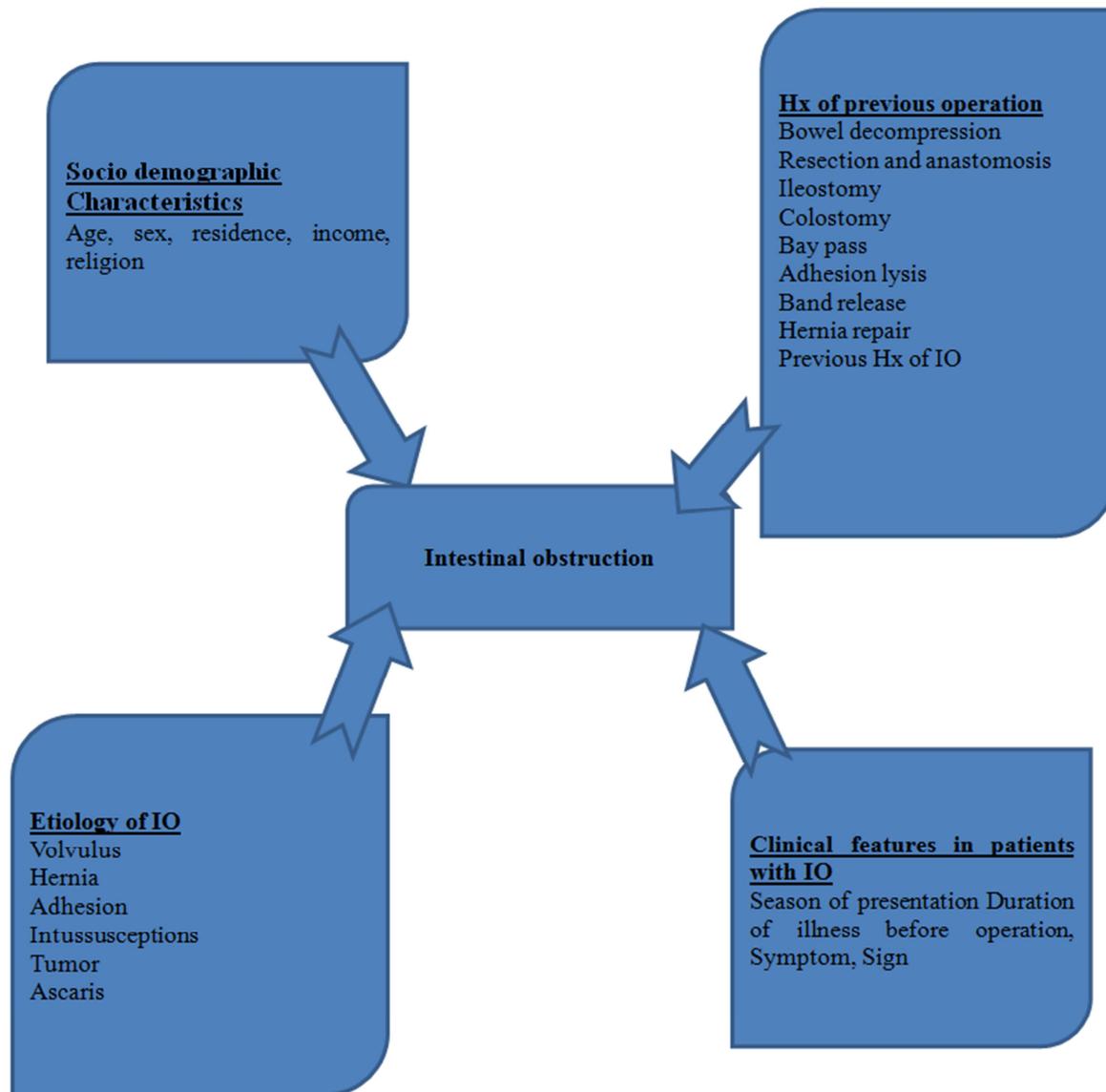


Figure 1. Conceptual frame work on proportion and associated factors of intestinal obstruction and its management outcome at TGSB Bahir Dar Ethiopia 2021 (36).

3. Methodology

3.1. Study Area and Period

The research was done from May 2020 to May 2021G.C in TGSB department of Surgery, which is located in Bahir Dar town, Western Ethiopia. Bahir Dar town is found at 545 Km to the west of Addis Ababa. The hospital located around Sebatamit and has been provided health care service for more than 5,400,000 populations in its catchment area in the western part of Ethiopia. It has 11 departments and has 460 beds. The surgical department has 100 beds and has been

giving both major and minor surgical services.

3.2. Study Design

Cross-sectional study methodology was used in hospital.

3.3. Population

3.3.1. Source Population

The study population consisted of all acute abdominal cases admitted to the surgical ward of TGSB and those who met the inclusion criteria.

3.3.2. Study Population

From May 2020 to May 2021G.C., all patients who

underwent surgical and non-surgical treatment for IO at the TGSH.

3.4. Inclusion and Exclusion Criteria

3.4.1. Inclusion Criteria

From May 1, 2020 to May 1, 2021 G.C., all adult patients who received surgical and conservative therapy of IO at the TGSH were included.

3.4.2. Exclusion Criteria

- 1) Patients whose records were missing, incomplete, or contained critical information on the causes and management outcome variables were not included in the analysis. Traumatic, gynecological, pediatric and medical acute abdomen.
- 2) Patients were admitted to TGSH following surgery and had operations there.

3.5. Sample Size Determination

All surgical and conservative treated acute abdomen patients admitted at TGSH surgical ward during May 2020 to May 2021.

3.6. Data Collection Tools

Using a pre-tested, structured questionnaire, data was collected.

It was written in English and changed in accordance with the test results prior to the study time. Two trained data collectors and two general practitioners working in the surgical department gathered information from the adult surgical department and from the review of patient charts. The lead investigator was verifying the quality and completeness of the data gathering forms once again.

3.7. Study Variables

3.7.1. Dependent Variable

Intestinal obstruction.

3.7.2. Independent Variables

Socio-demographic variables

Age, sex, residence, religion, and income

History of previous operation

Bowel decompression, Resection and anastomosis, Ileostomy, Colostomy, Bay pass, Adhesion lysis, Band release, Hernia repair and Previous History of IO.

Etiology of IO

Volvulus, Hernia, Adhesion, Intussusceptions, Tumor and Ascaris

Clinical features in patients with IO

Season of presentation, Duration of illness before operation, Symptom and Sign

3.8. Operational Definitions

Acute abdomen: - Any acute illness that has its primary symptom as recent-onset stomach pain and may call for immediate surgical treatment.

Adult: - age greater than or equal to 18 years.

Ethiopia seasons: - TSEDAY (September, October, November) BEGA (December, January, February) BELG (March, April, May) and KREMT (Jun, July, August).

Favorable management outcome the condition of the patient following the treatment, and postoperative issues do not manifest themselves until the patient is released from the hospital.

Unfavorable management outcome: condition of the patient after the procedure, and postoperative problems do not become apparent until the patient is discharged from the hospital.

Complete colectomy is the surgical removal of the entire colon, including the cecum, the ascending, the transverse, the descending, and the sigmoid colon. Complete proctocolectomy:

In this technique, the ileum is brought to the skin as a Brooke Ileostomy after the entire colon, rectum, and anus are removed.

3.9. Data Quality Management and Data Processing and Analysis

A modified and prepared version of a standard and correctly built data collection tool. Before the actual data collecting began, these staff had a two-day theoretical and practical training. The pre-testing of the questionnaire was place at the Felege Hiwot Referral Hospital, which was not chosen for the study and only had access to 5% of the TGSH study sample subjects. Daily completion of the questionnaire was verified by direct superiors. To correct any errors made by data collectors, the principal investigator would exercise tight oversight. Supervisors completed questionnaires were given to the primary investigator after each one was reviewed for consistency and completeness. Records that were incomplete or incorrectly filled out were returned to the appropriate data collector for repair. The lead investigator double-checked all of the completed surveys every day to ensure the accuracy of the data obtained and to maintain data quality. Data was coded, revised, cleaned, appropriately arranged, and then examined after being verified as complete. The primary investigator oversaw daily on-site operations for the duration of the data collection period. Each day's questionnaires were reviewed by the investigator for consistency, accuracy, and completeness, and remedial talks were held with each data collector.

Each data set was examined for completeness following data collection using the scripts provided. The statistical software SPSS version 21 was used to enter the data. Prior to entering the data into the software, the coding of each individual questionnaire was examined. Before the data were run through the software for analysis, additional data cleaning was done to look for outliers, missed values, and any inconsistencies. The managerial outcome IO and the independent variable were described using descriptive statistics. The binary logistic regression was used in bivariate and multivariate analyses to determine if dependent and independent variables were related.

A confidence limit of 95% and p-value less than 0.05 was considered statistically significant. A draft of the results was submitted to the advisors for approval.

3.10. Ethical Considerations

The Institutional Review Board (IRB) of the College of Medicine and Health Sciences at Bahir Dar University in Ethiopia granted ethical approval. The college of medicine and health sciences at Bahir Dar University received an official letter of clearance from the college. Also, an official letter was sent to all parties involved in order to request their cooperation. Avoiding writing the patient's name and ensuring that the data is not accessible to third parties helped to ensure confidentiality.

4. Result

4.1. Proportion and Types of Intestinal Obstruction

There were 2023 total surgical admissions in the TGSH surgical unit over the course of the one-year study period.

There were 696 patients admitted with an acute abdominal diagnosis.

From study subjects 280 (39.9%) cases were intestinal obstruction the remaining 286 (41.16%), 57 (8.20%), 31 (4.42%), 8 (1.10%), 3 (0.47%), and 1 (0.3%) case were due to acute appendicitis, acute cholecystitis, Perforated peptic ulcer disease (PPUD), primary peritonitis, intra-abdominal abscess and pancreatitis respectively. (See Figure 2)

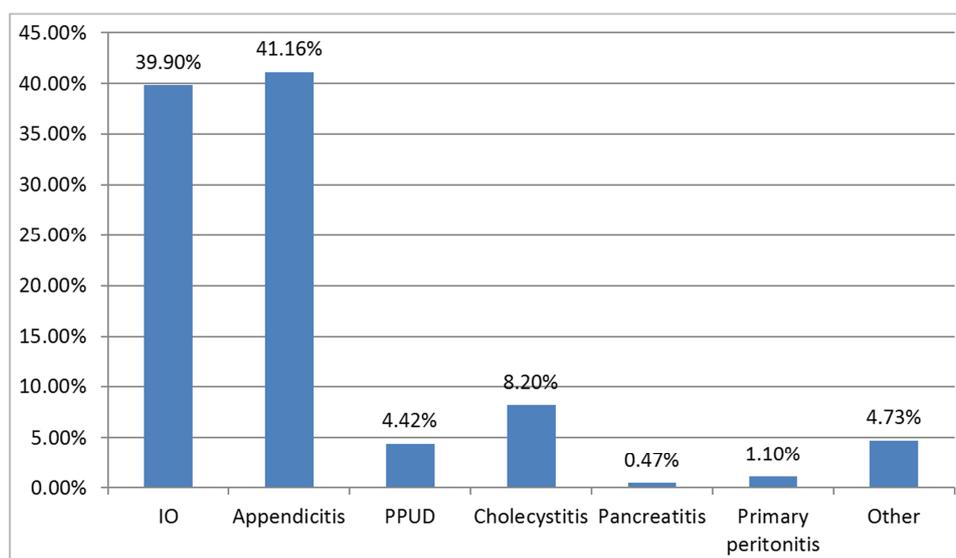


Figure 2. Proportion of intestinal obstruction in TGSH from (May 1, 2020-May 1, 2021 G.C), Bahir Dar, Ethiopia.

4.2. A Etiology of Intestinal Obstruction

Table 1. Aetiology of intestinal obstruction and status of bowel in TGSH from (May 1, 2020-May 1, 2021 G.C), Bahir Dar, Ethiopia, (N=280).

Variable	Category	Frequency	%
Intestinal obstruction	LBO	136	48.57
	SBO	144	51.43
LBO	GLBO	64	47.06
	SLBO	72	52.94
SBO	GSBO	44	30.56
	SSBO	100	69.44

Small intestinal obstruction affected 48.57% and big bowel obstruction affected 51.43% of the 280 IO patients that underwent additional study. 69.44% of cases of small bowel blockage were straightforward obstructions. From the cases

with major bowel blockage, 52.94 percent were only uncomplicated cases. See (Table 1).

In this study, the common causes of IO detected were Sigmoid volvulus 110 (39.29%), adhesion and bands 68 (24.29%), Small bowel volvulus 36 (12.86%), Hernia 16 (5.71%), Intussusception 14 (5%), Iliosigmoid knotting 12 (4.29%), and mesenteric ischemia 12 (4.29%).

The most typical kind of small bowel obstruction was adhesion and band 68 (47.22%). The second, third, and fourth reasons for small intestinal blockage were intussusceptions, hernias, and small bowel volvulus.

Sigmoid volvulus 110 (80.88%) and colonic tumor (1.47%) were the two most common causes of large bowel obstruction, respectively. 4 (2.94%) were the least causes of large bowel obstruction. See (Table 2)

Table 2. Aetiology of intestinal obstruction and its proportion in TGSH from (May 1, 2020-May 1, 2021 G.C), Bahir Dar, Ethiopia, (N=280).

Variables	Frequency	Percent	Categories	Frequency	Percent
Causes of Small bowel obstruction					
Intussusceptions	12	8.33	Viable	6	50.00
			Non-viable	6	50.00
Small bowel volvulus	36	25.00	Viable	24	66.67
			Non-viable	12	33.33

Variables	Frequency	Percent	Categories	Frequency	Percent
Adhesion and bands	68	47.22	Viable	56	82.35
			Non-viable	12	17.65
Hernia	16	11.11	Viable	8	50.00
			Non-viable	8	50.00
Others (MI, Ascaris, fecal impaction)	12	8.33	Viable	6	50.00
			Non-viable	6	50.00
Total	144	100	Viable	44	30.56
			Non-viable	100	69.44
Causes of large bowel obstruction					
Sigmoid volvulus	110	80.88	Viable	66	60.00
			Non-viable	44	40.00
Colonic tumor	4	2.94	Viable	0	0.00
			Non-viable	4	100
Intussusceptions	2	1.47	Viable	0	0.00
			Non-viable	2	100
Iliosigmoidal knotting	12	8.82	Viable	2	16.67
			Non-viable	10	83.33
Other (TCV, Fecal impaction)	8	5.88	Viable	4	50.00
			Non-viable	4	50.00
Total	136	100	Viable	72	52.94
			Non-viable	64	47.06

4.3. Socio-Demographic Characteristics of Study Participants

Out of 210 (or 75%) of the 280 IO patients were men. With a mean age of 49.5 17.4 (SD) years, the age varied from 18 to 91 years.

Among 280 patients of IO, 18 (6.42%), 120 (42.86%) and 142 (50.72%) were in the age range 18-24, 25-54, and greater than or equal to 55 years respectively. The largest age group of IO were greater than or equal to 55 years.

Patients with large bowel obstruction, the age range from 18-24, 25-54 and greater than or equal to 55 years were 1.47%, 30.88% and 67.65% respectively.

Patients with small bowel obstruction, the age range from 18-24, 25-54, and greater than or equal to 55 years were 11.11%, 54.67% and 34.72% respectively.

Regarding the residency 75.7% patients were rural dwellers. About 96.4% were Orthodox and 3.6% were Muslims. (See Table 3)

Table 3. Socio-demographic characteristics of study participants in TGSH from (May 1, 2020-May 1, 2021 G.C), Bahir Dar, Ethiopia, (N=280).

Variables	Category	Frequency	Present (%)
Sex	Male	70	25.00
	Female	210	75.00
Age	18-24	18	6.42
	25-54	120	42.86
	>=55	142	50.72
Religion	Orthodox	270	96.40
	Muslim	10	3.60
	Catholic	0	0.00
Resident	Protestant	0	0.00
	Rural	212	75.7
Income (per month)	Urban	68	24.30
	<1500 birr	59	21.07
	1500-3000 birr	143	51.07
	>3000 birr	78	27.86

4.4. Clinical Presentation of Intestinal Obstruction

The average number of days that patients are unwell before to surgery is 3.24, ranging from 1 to 21 days.

After being ill for two days, 66.43% appeared. Patients are seen at Tsedey season in 27.86%, Belg, Kremt, and Bega seasons in 25.71%, 25%, and 21.43% of cases, respectively.

Abdominal pain (100%), vomiting (83.37%), constipation (78.57%) and abdominal distension (77.86%) were the main presenting symptoms whereas abdominal distension (80.00%), tenderness (56.43%) and guarding (20.71%) were the most frequent clinical signs.

Regarding to vital sign 32.86% patients were in shock, 81.43% of patients were Tachycardic and 32.86% of patients were febrile.

From 280 patients, 64 (22.86 %) had a previous history of abdominal operation. (See Table 4).

Table 4. Clinical presentation of intestinal obstruction in TGSH from (May 1, 2020-May 1, 2021 G.C), Bahir Dar, Ethiopia, (N=280).

Variables	Category	Frequency	Present (%)
Abdominal pain	Yes	280	100
	No	0	0
Vomiting	Yes	234	83.37
	No	46	16.43
Nausea	Yes	22	7.86
	No	258	92.14
Distension	Yes	218	77.86
	No	62	22.14
Constipation	Yes	220	78.57
	No	60	21.43
Previous abdominal surgery	Yes	64	22.86
	No	216	77.14
Duration of illness before operation (in days)	<2	94	33.57
	>=2	186	66.43
Abdominal tenderness	Yes	158	56.43
	No	122	43.57
Guarding	Yes	58	20.71
	No	222	79.29
Abdominal distension	Yes	224	80.00

Variables	Category	Frequency	Present (%)
Rectum empty	No	56	20.00
	Yes	198	70.71
Visible bowel peristalsis	No	82	29.29
	Yes	56	20.00
Blood pressure	Hypotensive	92	32.86
	Normotensive	163	58.21
	Hypertensive	25	8.93
Pulse rate	Normal range	52	18.57
	Tachycardic	228	81.43
	Hypothermic	38	13.57
Temperature	Normothermic	150	53.57
	Hyperthermic	92	32.86
Respiratory rate	Normal range	212	75.71
	Tachypnic	68	24.29
	Tseday	78	27.86
Season of presentation	Bega	60	21.43
	Beleg	72	25.71
	Kremt	70	25.00

4.5. Management of Intestinal Obstruction

From all 280 cases of intestinal obstruction 84 (30.0%) and

196 (70.0%) were treated conservatively and surgically respectively. Rectal tube deflation was used in 56 of simple large bowel obstruction cases while Ng tube decompression was used in 28 post operation adhesion of small bowel obstruction cases. Failure rate of rectal tube deflation was about 4 (1.43%) only.

From 196 operated cases 116 (59.18%) were small bowel obstruction cases and 80 (40.82%) were large bowel obstruction cases. Gangrenous small bowel obstruction, Gangrenous large bowel obstruction, simple small bowel obstruction and simple large bowel obstruction were the four stated reason for operation accounting 44 (22.45%), 64 (32.65%), 72 (36.74%) and 16 (8.16%) of operated cases respectively.

The most common intra-operative procedure was done end-colostomy (29.59 %) followed by resection and anastomosis (25.51 %). Six patients with viable sigmoid volvulus resection & anastomosis and 4 patients with viable sigmoid volvulus derotation & decompression was done. (See Table 5)

Table 5. Types of procedure in patients with intestinal obstruction admitted to TGSH from (May 1, 2020-May 1, 2021 G.C), Bahir Dar, Ethiopia, (N=280).

Variable	Category	Frequency	%
Treatment types for intestinal obstruction	Conservative	84	30.00
	Surgical	196	70.00
Conservative	Ng tube + iv fluid	28	33.33
	Rectal tube + iv fluid	56	66.67
	Simple SBO	72	36.74
Reason for surgery	Gangrenous SBO	44	22.45
	Simple LBO	16	8.16
	Gangrenous LBO	64	32.65

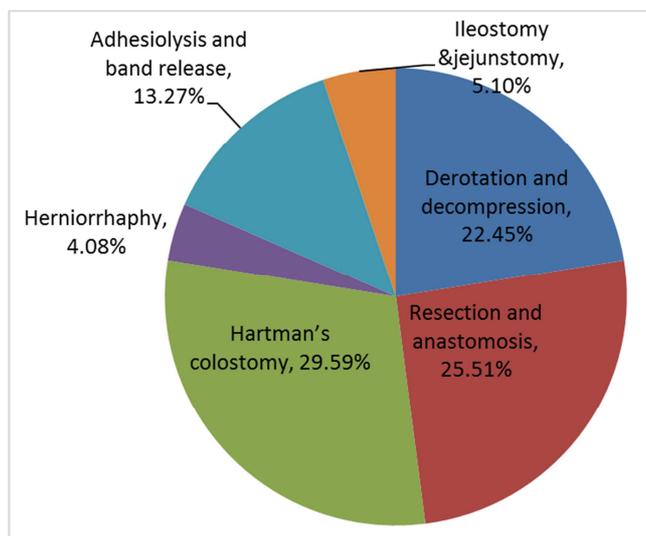


Figure 3. Pie chart of different surgical procedures of patients with intestinal obstruction at TGSH 2020/21.

4.6. Proportion of Management Outcomes

Among 280 IOs, 226 (80.71%) were favourable outcomes and 54 (19.29%) were unfavourable surgical management outcomes.

Postoperative wound infection was the complication that

was seen the most commonly, appearing in 18 (25.71%) of all performed patients.

Relaparotomy was performed in 16 (5.71%) operated cases with anastomotic leakage 4 (25%), Intra-abdominal collection 3 (18.75%), colostomy prolapse 6 (37.5%) and wound dehiscence 3 (18.75%) each were the reasons for second operation. From these 16 reported patients 6 were died (2=leakage with intra-abdominal collection, 2=colostomy prolapse with sepsis, 1=colostomy prolapse with MI and 1=wound dehiscence with pneumonia & intra-abdominal collection).

Patients spent a total of 1-35 days in the hospital; the mean, median, and SD of hospital stays in days were established to be 9.07, 7, and 7.32, respectively. After receiving treatment for IO, the majority of 208 (74.29%) patients stayed in the hospital for no more than 8 days.

From the study subjects 264 (94.29%) of were discharged with improvement and 16 (5.71%) of cases died. None of patient died during conservative treatment. All 16 deaths occurred after operative treatment. Septic shock 14 (87.5%) and MI (Myocardial infraction) 2 (12.5%) were causes of death. Seventy-five present expired patients were higher extreme age group (>60 years) with mean age of 63.6 years. Most of patients who died were managed for large bowel obstruction 10 (62.5%) followed by small bowel obstruction 6 (37.5%). Ten (62.5%) of all death patients were presented

after 3 days of illness before operation (mean 3.6 days). (See Table 6)

Table 6. Outcome of the treatment patients with intestinal obstruction at TGSH from (May 1, 2020-May 1, 2021 G.C), Bahir Dar, Ethiopia, (N=280).

Variable	Category	Frequency	%
Outcome of the treatment	Favourable	226	70.71
	Unfavourable	54	19.29
Relaparotomy done	Yes	16	5.71
	No	264	94.29
Reason for relaparotomy	anastomotic leakage	4	25.00
	Wound dehiscence	3	18.75
	Intra-abdominal collection	3	18.75
	Colostomy prolapse	6	37.50
Treatment outcome	Improved and discharged	264	94.29
	Died	16	5.71
Possible cause of death	Sepsis/ Septic shock	14	87.50
	Other (MI)	2	12.50
Length of hospital stay (days)	<=8	208	74.29
	>8	72	25.71

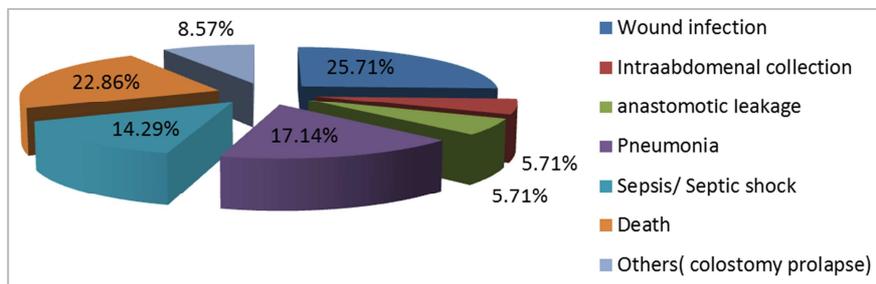


Figure 4. Post-operative complication of intestinal obstruction at TGSH from (May 1, 2020-May 1, 2021 G.C), Bahir Dar, Ethiopia, (N=280).

4.7. Factors Associated with Intestinal Obstruction at TGSH

Bivariate and multivariable logistic regression analysis was used to calculate odds ratios and corresponding 95% confidence intervals for associated factors of intestinal obstruction in TGSH. Sex, place of residency, and length of illness prior to surgery are independent variables that significantly predict intestinal blockage. These variables were once again entered into multivariate logistic regression after being checked for the existence of an association ($p < 0.25$) in

binary logistic regression. This time, the confounding effect of other variables was taken into account to determine how strongly these variables were associated with intestinal obstruction. Being male sex is a risk for intestinal obstruction ($p=0.003$) and adjusted odds ratio (AOR) of 3.24 and 95% CI [2.23, 4.70]. Rural residence is also significantly associated with intestinal obstruction with AOR=12.53 and 95% CI [10.61, 17.41]. Duration of illness before operation (in days) is also significantly associated with intestinal obstruction ($p=0.017$), AOR=1.49 and CI [1.25–2.97]. (See table 7)

Table 7. Multivariate analysis of patients with intestinal obstruction at TGSH from (May 1, 2020-May 1, 2021 G.C), Bahir Dar, Ethiopia. (N=696).

Variables	Categories	IO		COR (95%CI)	AOR (95%CI)	p-value
		Yes	No			
Sex	Male	210	101	2.05 (1.34,3.15)	3.24 (2.23,4.70)	0.003
	Female	70	315	1	1	
Residence	Rural	212	162	18.60 (10.32,33.51)	12.53 (10.61,17.41)	0.033
	Urban	68	254	1	1	
Income (per month)	<1500 birr	59	100	0.95 (0.35–2.56)	1.93 (0.56–6.56)	0.291
	1500-3000	143	142	2.28 (0.94–5.52)	3.28 (0.97–11.11)	
	>3000 birr	78	174	1	1	
Religion	Orthodox	270	409	1	1	0.443
	Muslim	10	7	1.25 (0.33–4.63)	1.95 (0.34–10.95)	
	Tseday	78	102	3.28 (0.97–11.11)	0.95 (0.35–2.56)	
Season of presentation	Bega	60	101	0.34 (0.04–2.48)	0.27 (0.04–1.64)	0.098
	Beleg	72	123	0.25 (0.023–2.69)	1.40 (0.04–43.13)	
	Kremt	70	90	1	1	
Duration of illness before operation (in days)	<2	94	237	1	1	0.017
	>=2	186	179	2.39 (1.21–2.74)	1.49 (1.25–2.97)	
Length of hospital stay (days)	<=8	208	234	0.03 (0.01–1.11)	0.05 (0.01–3.16)	0.214
	>8	72	182	1	1	

5. Discussion and Implication

Intestinal obstruction (39.90%) was the second most common cause of acute abdomen, similar with the studies done at Tikur Anbessa Specialized Hospital, Goba referral hospital and Nekemte referral hospital that shows the second common cause was intestinal obstruction [40, 41, 44] but in contradict to studies done at Gondar University Hospital and Wolaita Sodo teaching [45, 20].

Small bowel obstruction (51.43%) was more prevalent than large bowel obstruction (48.52%); similar studies also reported that small bowel obstruction was the most common type of IO whereas large bowel obstruction was relatively less common. A previous study in Ethiopian hospital found that small bowel and large bowel obstruction account for 52.3% and 46.7 % respectively [48]. Some other studies revealed that small bowel obstruction has taken the lion share and various studies agreed for the fact that small bowel obstruction was more prevalent than large bowel obstruction [39, 49]. This fact may help us to confirm that socio-economic factors and diet might be responsible for the causes of this problem in some developing countries.

The most commonly identified aetiology of intestinal obstruction in this study was sigmoid Volvulus 110 (39.29%). Sigmoid volvulus was also the leading cause of large bowel obstruction with 110 (80.88%) of the 136 cases are caused by Sigmoid volvulus. This was not surprising, as sigmoid volvulus has been reported to be a frequent cause of IO in African countries [25]. A study reported that sigmoid volvulus was the leading cause of IO in the northern part of Ethiopia [48]. Sigmoid volvulus was also the leading cause of large bowel obstruction in most of the sub-Saharan region [38]. There is similar finding to this from different parts of our country as well as other countries like Sudan, Eritrea and other developing countries. This might be due to consumption of high fiber diet of patients when compared to developed countries for example it accounts only for about 5-10% of causes of large bowel obstruction in USA' in which colonic tumour (colorectal cancer) is thought to be the main cause of large bowel obstruction [19].

The leading causes of small bowel obstruction in this study were adhesion/ band (47.22%) followed by primary small bowel volvulus (25%). This is in agreement with other studies done at Tikur Anbessa specialized hospital and Goba referral hospital [41, 44] but contradicts with studies done at Adama and Nekemte referral hospitals [37, 40] which had shown that intussusceptions (in 30.9% of the cases) and Primary small bowel volvulus (in 57.33% of small bowel obstruction respectively [33, 40]. In this study 64 of 68 patients who have previous history of abdomen pelvic operation developed intestinal obstruction. This might be due to higher proportion of abdominopelvic operation among people in developed countries and patients from urban areas previous abdominopelvic operation is clearly associated with intestinal obstruction [23]. In general, there are wide variations in the prevalence of IO throughout the world

depending on ethnicity, age group, dietary habits, and geographic location, among other factors. It varies from country to country and area to area in the same country [37].

Male sex has statistically significant association with intestinal obstruction than females with odd ratio of having intestinal obstruction is 3 times more common in males than females. From the above statement it is clear that males are 3 times more likely to develop intestinal obstruction than females.

Majority 212 (75.70%) of study subjects in this study were from rural areas. Rural residence has statistically significant association with intestinal obstruction than urban with odd ratio of having intestinal obstruction is 3 times more common rural residence than urban residence. From the above statement it is clear that rural residence is 12.5 times more likely to develop intestinal obstruction than urban residence. Majority of IO patients 50.72% in this study were in the age greater than or equal to 55 years. Whereas 67.65% were greater than or equal to 55 years, the largest age group of patients with large bowl obstruction and 54.67% were in the age range of 25- 54 years, the largest age group of patients with small bowl obstruction. Which was similar to other studies in Africa; large bowel obstruction commonly occurred in age above 60, while small bowel cases were more common in the second and third decades of life [27]. This may be due to large number of our patients had large bowel obstruction from sigmoid volvulus, and in our country, we mostly have males who suffer from this condition. This is similar to finding from study done in Gondar, Addis Ababa, Nigeria and other western countries. The other possible reason for difference in sex might be due to the irregular bowel habits of male patients [2, 4, 23, 9, 26].

Relatively smaller proportions 84 (30%) of patients were treated conservatively. From the total study subjects while 196 (70%) of patients were managed by surgery. Rectal tube defilation and Nasogastric tube decompression were the two commonly used conservative treatment methods. Failure rate of rectal tube defilation was about 4 (1.43%) only. This is similar to finding from other studies with 80-90% success rate [28].

From 196 operated cases 44 (22.45%) are diagnosed with gangrenous small intestine while 64 (32.65%) are gangrenous large intestine. This is higher than finding in other studies which demonstrated 10% strangulation rate for patients with small bowel obstruction [28]. This might be due to late presentation of patients with small bowel obstruction to hospitals 11 (73.3%) of 15 patients gangrenous small obstruction presented to hospital after 48 hours of onset of illness. Duration of illness before operation (in days) is also significantly associated with intestinal obstruction. From this statement it is clear that having ≥ 2 days is 1.49 times more likely to be intestinal obstruction compared with other acute abdomen. The possible reason for the dalliance of patients to attending a hospital might be due to lack of awareness about the symptoms of IO, inadequate infrastructures, and transport accessibility especially for those patients who reside in rural areas, their distance from the primary and/or tertiary healthcare facilities, and poor referral system between the

levels of health facilities. The reason for late presentation to the institution delivering the surgical treatment needs to be studied further.

The analyzed data showed that 54 (19.29%) of all cases had unfavorable surgical management outcomes of IO. The finding on this unfavorable outcome rate is in line with a study conducted in Debre Berhan Referral Hospital in north eastern Ethiopia [34]. This is less than as 24.2% complication seen in Ugandan study [22]. A study at Black Lion Hospital has also got higher finding (25.4%). The most frequently observed complication is post-operative wound infection which is seen in 18 (25.71%), of all operated cases. This is similar to findings from Black Lion Hospital [11].

Only 16 (5.71%) of patients expired all of them were operated cases. The overall death rate in this study was 5.71%, which was less than most other studies (3-30%), Ugandan study of 12.9% and the 15.3% mortality at Black Lion Hospital [19, 22, 23, 9]. and also is lower than the study done in Goba referral hospital 2017 (16%) but higher than the study done in Mekelle and Nekemte referral hospitals which had shown 2.4% and 3.05% mortality rate respectively [39, 40, 44].

This study also revealed that patients who stayed for less than 8 days were less likely to develop unfavorable outcomes compared with patients who stayed for more than 8 days. By comparison, one study of pattern of acute abdomen in Butajira, Ethiopia showed that the average hospital stay was 9 days and a third of patients developed one or more acute complications [38, 35]. The short length of hospital stay may decrease the chance of patients to acquire nosocomial infections, such as hospital-acquired pneumonia. The difference in IO outcome may be associated with late duration of patients' illness to hospital due to lack of awareness about the burden and impacts of the problem. The potential reasons for lower mortality rate in our study may be due to early intervention of the obstruction before complications occur, proper post-operative care and adequate preoperative resuscitation which might be expected to decrease mortality.

In this study, 14 (87.5%) of death was secondary to sepsis/septic shock and 75% in higher extreme age group (>60 years) with mean age of the expired patients (63.6 years). Most of patients who died were managed for large bowel obstruction 10 (62.5%) followed by small bowel obstruction 6 (37.5%). 10 (62.5%) of all deaths were those patients who were presented after 3 days of illness before operation (mean 3.6 days) which was similar to the study done in Nekemte referral hospital (66%) and Gondar university hospital [40, 41]. The outcome of laparotomy might be affected by different factors, such as cause of obstruction, duration of illness, age, presence of peritonitis and complication detection time.

6. Conclusion and Recommendation

6.1. Conclusion

The second most typical cause of acute abdomen in TGSH

was intestinal obstruction. Hence, this study found that small intestinal obstruction was more common than large bowel obstruction. The most common causes of minor and large bowel blockage were, respectively, adhesion/band and sigmoid volvulus. Most patients were in their fifth or sixth decade of life, making them rather old. Patients in their second and third decades suffered more from small bowel obstruction, while those in their fifth and sixth decades suffered greatly from large bowel obstruction. Bowel resection and end colostomies were the most frequently performed intraoperative procedures. Surgery was the most common method of IO management.

The majority of patients experienced successful surgical management of IO. Wound infection and then death were the most typical surgical consequences. Unfavorable patient outcomes were frequently caused by late patient presentation prior to intervention, a lengthier hospital stay following surgery, peritonitis, and gangrenous big intestinal blockage.

Even though it is greater in some locations, the total mortality found in this study was relatively lower than that of other studies in Ethiopia.

Male sex and rural residents were more likely to experience intestinal blockage. Intestinal blockage is three times as common in men than in women. Intestinal blockage is 12.5 times more likely to occur in rural areas than in cities.

When compared to other acute abdominal illnesses, intestinal blockage is 1.49 times more likely to occur when the sickness duration before surgery is ≥ 2 days.

6.2. Limitation of the Study

- 1) The study is not representative of the population at large, because it is headquartered in an institution.
- 2) This study may not show long term complications after discharged.

6.3. Recommendation

- 1) To lessen the reported magnitude, public knowledge of the risk factors for intestinal blockage should be raised through health education.
- 2) Based on our findings we suggest that health professionals in the hospital should increase public awareness on IO by providing appropriate health information.
- 3) Attention should be given to male sex and extreme of age patients IO is high in this age group.
- 4) Attention should be given to delay presented patient and patient comes from rural areas with IO.
- 5) Awareness should be given to mid and lower-level health professionals on the diagnosis, resuscitation and importance of early referral to higher center.
- 6) Physicians should diagnose intestinal obstruction early and appropriate interventions should be taken on time before the intestine develops gangrene.
- 7) Further research using prospective study design is warranted as a way to overcome the limitations of secondary data in the current retrospective research that

preclude generalization to the whole population.

Abbreviations

AOR, Adjusted Odds Ratio; I, Confidence Interval; GSBV, Gangrenous Small Bowel Volvulus; GSV, Gangrenous Sigmoid Volvulus; IO, Intestinal Obstruction; IV Intravascular; LBO, Large Bowel Obstruction; MRN, Medical Record Number; NG Nasogastric; SBO, Small Bowel Obstruction; TGSH, Tibebe Ghion Specialize Hospital; SD Standard Deviation; SPSS, Statistical Package for Social Science; SSBV, Simple Small Bowel Volvulus; SSI, Surgical Site Infection; SSV, Simple Sigmoid Volvulus; WHO World Health Organization.

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