

Proportion of Intestinal Obstruction and Associated Factors Among Patients with non Traumatic Acute Abdomen Admitted to Surgical Ward in Debre Birhan Referral Hospital, North East Ethiopia

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Abstract: Intestinal obstruction (IO) continues to be a major problem for human being since it was first recognized and treated in 350 Before Christ. Different treatment options were developed since then with only minimal reduction in morbidity and mortality. It occurs when the normal flow of intestinal content is interrupted. Intestinal obstruction is the most common causes of emergency surgical admission through out world. It is also one of the major causes of morbidity and mortalities associated with acute abdomen. The proportion and etiologies of intestinal obstruction differ not only from country to country but also with in the different regions of the same country. Knowing proportion of obstruction is very important to manage patients accordingly. Only very few data concerning proportion of intestinal obstruction is found in Ethiopia and none in Debre Birhan. The aim of the study is to assess the proportion of intestinal obstruction and associated factors among patients with non traumatic acute abdomen admitted to surgical ward in Debre Birhan Referral Hospital from December 8,2015 to January 9,2016. Facility based cross-sectional study was conducted by using 357 patient's record with acute abdomen from December 8,2015 to January 9,2016. Collected data was entered in to SPSS version 20. Adjusted Odds ratio with 95% confidence interval and p-value were used to measure associations. From 357 study subjects 181 (50.7%) and 141 (39.5%) were Intestinal obstruction and acute appendicitis cases respectively with response rate of 99.4%. large bowel obstruction (LBO) accounts for about 109 (60.2%) of cases while 72 (39.8%) of cases were small bowel obstruction (SBO). Male gender, residence and constipation are significantly associated with intestinal obstruction ($P<0.05$). From all study subjects those who had previous history of constipation were 61 (33.7%), previous history of abdominopelvic operation 25 (7%), previous history of intestinal obstruction 35 (9.8%), hernia 12 (3.4%) and previous history of rectal bleeding 5 (1.4%). Intestinal obstruction is the most common cause for non traumatic acute abdominal admission accounting 50.7%. In the study area Male gender, constipation and urban residence are significantly associated with intestinal obstruction. Postoperative adhesion and garoin hernias were found to be the commonest causes for intestinal obstruction next to Volvulus, but tumor was the rare cause of small bowel obstruction in the study area. Elective repair of hernia should be strengthened before it causes obstruction. Public awareness should be increased on the risk factors of intestinal obstruction through health education to reduce the observed magnitude. Moreover, health facilities and health professionals capable of handling patients with intestinal obstruction should be available with in the reach of the community.

Keywords: Intestinal Obstruction, Small Bowel Obstruction, Large Bowel Obstruction, Hernia

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 world wide. 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., enterocutaneous 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 Hoguet 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

represent 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 ultra sonography 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 in 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 Debre Birhan Referral Hospital 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 (artificialintestinalopeningtheabdomen) in Debre Birhan Referral Hospital [4].

1.2. Conceptual Frame Work

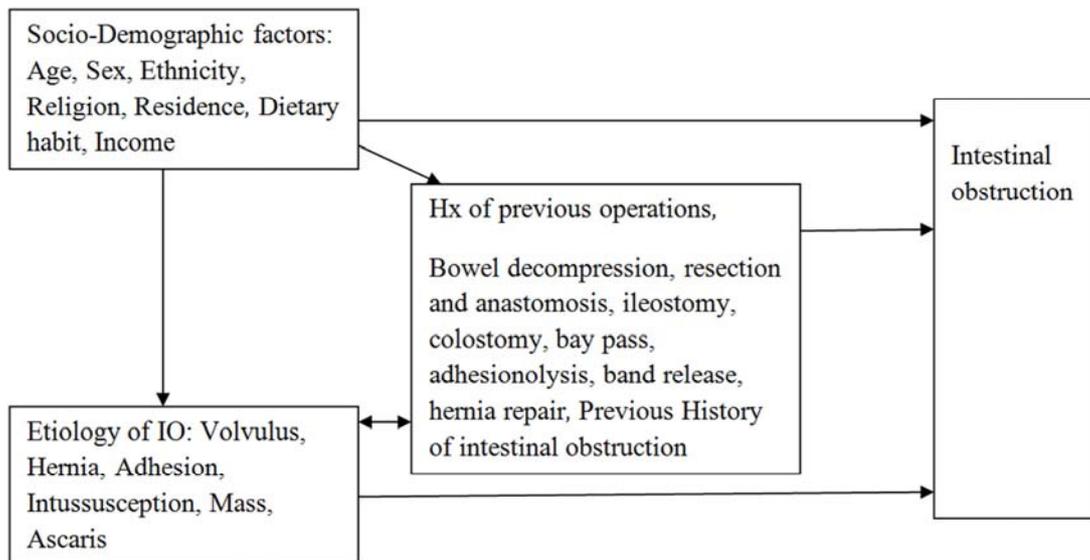


Figure 1. Conceptual frame work on intestinal obstruction modified from different literatures.

2. Methods and Materials

2.1. Study Area

The study was conducted at Debre Birhan referral hospital which is located in Debre Birhan town, 135 kms away from Addis Ababa and 695 kms from the capital city of the region,

Bahir Dar. The hospitals catchment total population is estimated to be 2,400,000 with females 50%. There are one private hospital, three health centers, twenty private clinics, twelve private pharmacies, one health science college and one university. The Debre Birhan Referral Hospital is staffed with 4 general surgeon, 2 gynecologist and obstetrician, 1 internist, 1 pediatrician, 4 emergency surgical professional

specialist, 24 general practitioners, 2 dental physicians, 2 Psychiatry Msc, 1 health officer, 147 nurses, 22 midwives, 231 laboratory professionals, 23 pharmacy professionals, 10 anesthetist, 2 environmental health professional, 1 health education professional, 5x-ray professionals, 2 ophthalmic and 2 physiotherapist. Totally the hospital has 121 beds. The department of Surgery has a total of 31 beds.

2.2. Study Design and Period

Facility based cross-sectional study was conducted from December 8,2015 to January 9,2016.

2.3. Source Population

All non traumatic acute abdominal cases.

2.4. Study Population

All non traumatic acute abdominal cases who were admitted to surgical ward of Debre Birhan Referral Hospital from July 8,2014 to June 8,2015.

2.5. Inclusion and Exclusion Criteria

2.5.1. Inclusion Criteria

All patients with diagnosis of non traumatic acute abdomen cases who were admitted to surgical ward from July 8,2014 to June 8,2015 were included.

2.5.2. Exclusion Criteria

Patient went home against medical advice before completion of treatment (data on final outcome can't be obtained) were excluded.

2.6. Sample Size Determination

A study conducted in black lion hospital by B.Kotiso and Z.Abdurahman showed that the proportion of patients with intestinal obstruction among all non-traumatic cases of acute abdomen is 26% [12].

Confidence level of 95% is specified.
Margin of error was 5%. Therefore:-

$$(1) n = Z^2 \frac{p(1 - P)}{d^2}$$

Where n=samplesize
P=0.26 (proportion of patients with intestinal obstruction)
d=marginal error between sample and population (0.05)
95% confidence interval.

$$(2) n = 1.96 * 1.96 * .26 * .74 / 0.05 * 0.05 = 297$$

The total sample size was=297 But, only 1,711 acute abdomen cases were found at the hospital during study period.

We used correction to get final sample as follows.

Let say -n₀=initial sample size which is 297.

-N= is finite population size which is 1,711

-n= is final sample size to be calculated=?

$$(3) n = n_0 / (1 + (n_0 / N)) = 297 / (1 + 297 / 1711) = 254$$

Considering non response rate of 10%, n=281

The above sample size is for first specific objective, but to check whether the above sample size is sufficient to assess associated factors for intestinal obstruction, sample size can be calculated for some independent variables using Epi info statistical program. Assumptions are taken as confidence level=95%, power=80%, Unexposed: Exposed ratio 1:1, odds ratio=2

Table 1. Total number of sample size by assuming confidence level = 95%, power= 80%, Unexposed: Exposed ratio 1:1, odds ratio=2).

Determinant factors	Assumptions (confidence level=95%, power=80%, Unexposed: Exposed ratio 1:1, odds ratio=2)	Sample size
Postopadhesion	Proportion of exposure among intestinal obstruction (51.2%) (source (13))	Exposed=128 unexposed=128 Total=296
Sigmoid volvulus	Proportion of exposure among intestinal obstruction (58.6%)(source(13))	Exposed=162 unexposed=162 Total=324

Therefore, the total number of sample size n=324. Considering non response rate of 10%, n=357.

2.7. Sampling Procedure

Medical record numbers were sorted from smallest to large stand coded from 1-1711. Required sample size was obtained by using simple random sampling technique. Selected charts were collected from the card room and presence of required information was checked and 3 Charts with very few information were replaced with 3 other charts from previously not selected charts by lottery method before data was filled in data collection tool.

2.8. Variables

2.8.1. Dependent Variable

Intestinal obstruction (Yes, No)

2.8.2. Independent Variables

a. Socio-Demographic characteristics

Age

Sex

Residence

Ethnicity

Religion

b. Patient history

History of Previous operation.

Previous History of intestinal obstruction.

History of rectal bleeding

History of constipation

c. Physical examination

Presence of abdominal wall hernia

2.9. Data Collection Procedures

Data was collected by using structured data extraction format which was prepared in English language. The data extraction format was pre-tested on 13 patient charts in Debre Birhan Hospital. Vague questions and other similar mistakes were corrected before the actual data collection began. The actual data collection was started after one day of training on data extraction format was given to data collectors. In the training session, the data collectors' were oriented on the objectives of the study, how to collect data and keep confidentiality of information obtained. The principal investigator was the leader of the data collection and checks daily the completeness and consistency of the data after collection.

2.9.1. Data Quality Control

To keep the quality of data, training was given for data collectors. Day to day activities during data collection was supervised and evaluated. Errors found were corrected by data collectors before the following day activity.

2.9.2. Data Entry and Cleaning

After data collection, each questionnaire was given a unique code by the principal Investigator. The principal investigator entered data to SPSS version 20 statistical software. Frequencies were used to check for missed values. Any errors identified at this time were corrected after revision of the original data using the code numbers.

2.9.3. Data Analysis

Frequencies and Proportions were used for description of the study population in relation to socio-demographic and other relevant variables. Binary logistics regression analysis was initially performed to assess the presence of association between independent and dependent variables. Multivariate logistic regression was then performed to control potential confounding variables. The strength of association between independent and dependent variables were assessed using adjusted odds ratio with 95% confidence interval and p-value.

2.10. Standard Procedures

Bowel anastomosis:-it is the type of suturing two parts of gastrointestinal system together after resecting diseased part or to bypass the diseased part in between. There are different types of bowel anastomosis based on the pathology. It can be end-to-end, end-to-side or side-to-end.

Bowel decompression:-it is the type of procedure to empty or to relieve the distended or obstructed intestine by either inserting nasogastric tube or rectal tube. It can also be done intraoperatively by milking the intestinal content either retrogradely towards stomach and then sacked out by anesthetist by NG tube or antegradely towards large intestine and then out through rectal tube. Rarely can it be done by making small opening on the antimesenteric border of intestine, but it is a futile exercise and not usually

recommended.

Bowel derotation:-is a procedure in which intestine is derotated or detwisted in its Owen mesenteric axis back in to its normal position as in case of small bowel volvulus or sigmoid volvulus after doing laparotomy and confirming that the bowel is viable.

Bowel Resection:-is procedure in which parts of intestine which is considered to be non functional or non viable is cut and removed surgically.

Colostomy:-The opening of a portion of the large intestine (colon) through the abdominal wall to its skin surface. This procedure is usually performed in patients with gangrenous large bowel obstruction, traumatic perforation of large intestine, to bypass distal anastomosis and other similar procedures.

Hartmann's Procedure:- It refers to a colon or rectal resection without an anastomosis in which a colostomy or ileostomy is created and the distal colon or rectum is left as a blind pouch. The term typically is used when the left or sigmoid colon is resected and the closed off rectum is left in the pelvis. If the distal colon is long enough to reach the abdominal wall, a mucus fistula can be created by opening the defunctioned bowel and suturing it to the skin.

Herniorrhaphy:-is a procedure which involves ligating the neck of hernia followed by cutting the sac (Herniotomy) and repair of the defect through which the sac has protruded. This is the procedure of choice in adults to reduce the risk of future recurrence.

Herniotomy:-is a procedure which involves ligating the neck of hernia followed by cutting the sac. This procedure is usually done in infants and children with congenital hernia.

Ileostomy:-A surgical opening in the abdominal wall, through which a segment of ileum is exteriorized through anterior abdominal wall.

Laparotomy:-is surgically entering in to peritoneal cavity by making one of the different incisions. The type of incision depends on site of pathology, type of procedure, experience of surgeon, diagnostic uncertainty and urgency. Based on this factors, incision can be midline (long midline, supraumbilical, infraumbilical or indeterminate), transverse and oblique.

Nasogastric tube decompression:-A long tube inserted through the nose into the stomach for decompression and its tip can be advancement into the small Intestine. The most common use is to relieve the abdominal distention associated with intestinal obstruction.

Rectal tube defecation:-Rigid or flexible tube is inserted through anus and into rectum to empty its contents. This procedure is usually done to relieve large bowel obstruction from sigmoid volvulus.

Relaparotomy:-it is operating the same patient for the second or more times. It can be done either due to complication of previous operation or to perform remaining procedures after previous damage control surgery.

Total colectomy:-it is surgical excision of colon (cecum, ascending, transverse, descending and sigmoid colon) with either iliorectal anastomosis or permanent ileostomy.

Total Proctocolectomy:In this procedure, the entire colon, rectum, and anus are removed and the ileum is brought to the skin as a Brooke ileostomy.

3. Results

3.1. SocioDemographic Factors

Larger proportion of study subjects 205(57.4%) were males with response rate of 99.4%. The age of patients ranged from 2 months to 88 years, of which 93(26.1%), 92(25.8%), 82(23%), 70(19.6%), 14(3.9%) and 6(1.7%) were in the age range 5-14, >60, 15-40, 40-60, 1-5 and less than 1 year respectively.

One hundred thirty two (37%) of patients were from Debre Birhan town while 225(63%) of patients were from outside Debre Birhan Town. Majority of patients 214(59.9%), belong to Amhara ethnic group followed by Oromo 134(37.6%), Tigrie 5(1.4%) and 4(1.1%) were others.

About 257(72%) were Orthodox and 84(23.5%) and 11(3.1%) were Muslims and Protestants by religion respectively. (SeeTable2)

3.2. Clinical Findings

Abdominal pain 341(95.5%), abdominal distension 220(61.6%) and Nausea and vomiting 306(85.7%) are the three most frequent history findings. Failure to pass feces 254(71.1%), failure to pass flatus 220(61.6%), Previous history of constipation 72(20.2%), previous history of abdominal/pelvic operation 25(7%), previous history of intestinal obstruction 35(9.8%), hernia 12(3.4%) and previous history of rectal bleeding 5(1.4%) are other history findings in the study subjects. From total cases 113(31.7%) presented to hospital within 24 hours and other 122(34.2%) of presented with in 24-48 hours of onset of illness while 69(19.3%) and 53(14.8%) of patients presented with in 48-72 hours and after 72 hours respectively. (SeeTable 3)

Blood pressure (BP) was not recorded (record not found) during data collection time in 41(12.1%) of cases. From patients whose BP recorded 29(8.1%) are hypotensive (systolic BP<90) and 17(4.8%) are hypertensive (systolic BP>140). In the remaining 270(75.6%) of cases BP is in normal range. Pulse rate is normal (60-99) in 319(89.4%) while it is elevated in remaining 38(10.6%) of cases. Fever (temperature >37.5) is seen in 124(34.7%) and in 41(11.5) of cases low temperature (<36) is recorded. Temperature record was found in normal range for 192(53.8%) of patients. Respiratory rate is recorded for all (100%) cases with 164(45.9%) are in normal range with remaining 150(42%) and 43(12) are having tachypnea (RR>20) and bradypnea (RR<16). From recorded cases 140(39.2%) and 212(59.4%) of WBC and hematocrit are with in normal range (WBC=4-11 and HCT>36) respectively.

Abdominal examination revealed hypoactive and hyperactive bowel sound in 157(44%) and 190(53.2%) of cases respectively. Abdomen was soft in 140(39.2%), direct tenderness in 46(12.9%) and rebound tenderness in

158(44.3%). Per rectal examination results showed full of stool, scanty stool, empty rectum and bleeding in the examining finger in 153(42.9%), 82(23%), 110(30.8%) and 1(0.3%) of cases respectively.

Table 2. Sociodemographic characteristics of patients with acute abdomen at Debre Birhan Referral Hospital 2014/15(N=357).

Variables	Number	%	
Sex	Male	205	57.4
	Female	152	42.6
Age in years	0-11month	6	1.7
	1-5	14	3.9
	5-14	93	26.1
	15-40	82	23.0
	40-60	70	19.6
	>60	92	25.8
Residence	Debre Birhan	132	37
	Outside Debre Birhan	225	63
Ethnicity	Amhara	214	59.9
	Oromo	134	37.6
	Tigrie	5	1.4
	Others ¹	4	1.1
Religion	Orthodox	257	72
	Muslim	84	23.5
	Protestant	11	3.1
	Others ²	5	1.4

¹Afar=4; ²Catholic=5

Table 3. Frequency table of history findings of patients with acute abdomen at Debre Birhan Referral Hospital 2014/15(N=357).

Variables	Number	%	
History of abdominal pain	YES	341	95.5
	NO	16	4.5
Nausea and vomiting	YES	306	85.7
	NO	51	14.3
Failure to pass feces	YES	254	71.1
	NO	103	28.9
Failure to pass flatus	YES	220	61.6
	NO	137	38.4
Duration of symptoms in hours	<24	113	31.7
	24-47	122	34.2
	48-72	69	19.3
	>72	53	14.8
Abdominal distention	YES	220	61.6
	NO	137	38.4
History of constipation	YES	72	20.2
	NO	285	79.8
History of diarrhea	YES	8	2.2
	NO	349	97.8
History of bleeding per anus	YES	5	1.4
	NO	352	98.6
History of previous abdominal or pelvic operation	YES	25	7
	NO	332	93
Previous history of intestinal obstruction	YES	35	9.8
	NO	322	90.2
Hernia	YES	12	3.4
	NO	345	96.6

3.3. Proportion of Intestinal Obstruction

From study subjects 181 (50.7%) cases were intestinal obstruction. From the total cases of obstruction 72(39.8%) are small bowel obstruction and 109(60.2%) are large bowel obstruction with the remaining 141(39.5%), 15(4.2%), 11(3.1%), 2(0.6%), 3(0.8%), 2(0.6%), 1(0.3%), and 1(0.3%) cases were due

to acute appendicitis, cholecystitis, Perforated peptic ulcer disease(PPUD), ilialperforation, Pelvic inflammatory Disease(PID), primary peritonitis, intraabdominal abscess and pancreatitis respectively. From small bowel obstruction 57(79.2%) cases are simple and 15(20.8%) are gangrenous small bowel obstruction. From the large bowel obstruction cases 97(89%) are simple and 12(11%) are gangrenous.

The commonest causes detected during preoperative period are Sigmoid volvulus 105(58%), Small bowel volvulus 36(19.9%), Adhesion 15(8.3%), Intussusception 8(4.4%) and Hernia 12(6.6%). From this data, I can say that the most common cause of intestinal obstruction is sigmoid volvulus. The most common causes of small bowel obstruction is Small bowel volvulus. It is the second most common cause of intestinal obstruction. Adhesion, hernia and intussusceptions are the third, fourth and fifth most common cause of intestinal obstruction in general and the second, third and fourth most common causes of small bowel obstruction in particular. Tumor [5] and a ganglionic megacolon [1] are rare causes of large bowel obstruction. From operated case of intestinal obstruction sigmoid volvulus was found in 45 cases while Small bowel volvulus, hernia, adhesion, intussusceptions and tumor are found to be the cause in 25, 12, 11, 8 and 5 respectively.

Table 4. Proportion of intestinal obstruction and associated factors among admitted patients at Debre Birhan Referral Hospital 2014/15(N=181).

Variable	Number	%	
Types of acute abdomen cases	SBO	72	20.2
	LBO	109	30.5
	Appendicitis	141	39.5
	PPUD	11	3.1
	Cholecystitis	15	4.2
	PID	3	0.8
	Ileal perforation	2	0.6
	Primary peritonitis	2	0.6
	Intra abdominal abscess	1	0.3
	Pancreatitis	1	0.3
Clinical classification before operation	Simple SBO	57	16
	Gangrenous SBO	15	4.2
	Simple LBO	97	27.2
Clinical classification of intestinal obstruction (from operated cases)	Gangrenous LBO	12	3.4
	Simple SBO	38	10.6
	Gangrenous SBO	15	4.2
	Simple LBO	33	9.2
	Gangrenous LBO	16	4.5

Table 5. Frequency table of treatment types and procedure in patients with intestinal obstruction admitted to Debre Birhan Referral Hospital 2014/15(N=181).

Variable	Number	%	
Treatment types for intestinal obstruction	Conservative	73	40.3
	Surgical	108	59.7
Conservative treatments	Ng tube + iv fluid	8	4.4
	Rectal tube + iv fluid	63	34.8
	Others ³	2	1.1
	Failed conservative management	54	29.8
	Strangulated hernia	12	6.6
Reason for surgery	Gangrenous SBO	11	6.1
	Gangrenous LBO	16	8.8
	Others ⁴	15	8.3
	Derotation and dedecompression	44	24.3

Variable	Number	%	
Etiology of obstruction Before operation	Sigmoid volvulus	105	29.4
	Hernia	12	3.4
	Adhesion	15	4.2
	Small bowel volvulus	36	10.1
	Tumor	5	1.4
Etiology of obstruction (from operated cases)	Intussusception	8	2.2
	Sigmoid volvulus	45	12.6
	Hernia	12	3.4
	Adhesion	11	3.1
	Small bowel volvulus	25	7
	Tumor	5	1.4
	Intussusception	8	2.2

3.4. Treatment of Intestinal Obstruction

From all 181 cases of intestinal obstruction 73(40.3%) and 108(59.7%) are treated conservatively and surgically respectively. Majority of conservatively managed cases are large bowel obstructions accounting for about 64(17.9%) and the remaining 9(2.5%) are small bowel obstruction cases. Rectal tube deflation is used in all 64 of simple large bowel obstruction cases while Ng tube decompression is used in all 9 of small bowel obstruction cases. This shows that conservative treatment most commonly used in large bowel obstruction cases when compared to small bowel obstruction cases. From 108 operated cases 56 (51.9%) are small bowel obstruction cases. From this data it is clear that majority of small bowel obstruction cases are managed by surgery, but majority of large bowel obstruction cases are managed conservatively.

Failed conservative management, Gangrenous small bowel obstruction, Gangrenous large bowel obstruction and strangulated hernia are the four most commonly stated reason for operation accounting 69(19.3%), 11(3.1%), 16(4.5%) and 12(3.4%) of operated cases.

Bowel derotation and decompression 43(39.8%), bowel resection and anastomosis 16(14.8%), Colostomy 16(14.8%), hernial operation 12(11.1%), reduction of intussusception 8(7.4%), bowel perforation repair 2(1.9%) release of band and adhesion 11(10.2%) are the operations (procedures) performed during operation.

All 108 operated cases took preoperative antibiotics and 4 of operated cases transfused with blood.

Variable		Number	%
	Bowel perforation repair	2	1.1
	Bowel resection and colostomy	16	8.8
	Bowel resection and primary anastomosis	15	8.3
	Reduction of intussusceptions	8	4.4
	Release of band and adhesion	11	6.1
	Hernial operation	12	6.6
Antibiotics given	Yes	131	36.7
	No	50	14
Blood transfused	Yes	4	2.2
	No	177	97.8

3Enema; 4SBV=9, Ascusis=3, HPS=2andganglionicmegacolon=1

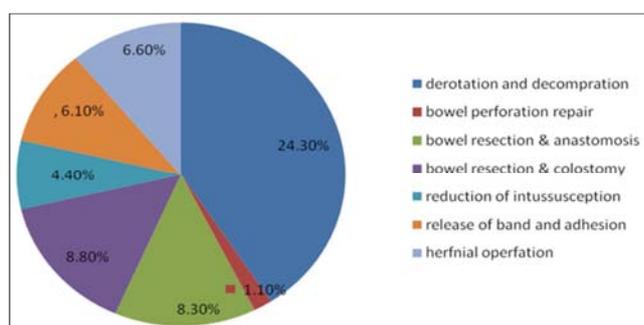


Figure 2. Piechart of different surgical procedures of patients with intestinal obstruction at Debre Birhan Referral Hospital 2014/15.

3.5. Out Comes of Treatment

Post operative complication were seen in 18(16.7%) of 108 operated cases making overall complication rates of about 9.9%. The most frequently observed complication is postoperative wound infection which is seen in 14(12.9%) of all operated cases. The other complications include anastomotic leakage in 1(0.9%), wound dehiscence in 2(1.8%), and pneumonia in one (0.9%) of case. Relaparotomy is performed in 3(2.7%) operated cases with anastomotic leakage 1(33.3%) and wound dehiscence 2(66.7%) each are the reasons for second operation. From these three reoperated patients one died after second operation making death rate after relaparotomy 33.3%. Total number of days patients stayed in Hospital range from 1-19days.

The over all success rate of treatment of acute intestinal obstruction is 98.3% with 181 of the study subjects improved discharged and 3(1.6%) of cases died. Non of patient died during conservative treatment. All 3 deaths occurred after operative treatment with 2 occurred after first operation and 1 occurred after second operation. Death rate after second operation is high with 1(50%) of 2 reoperated cases died when compered to 2(1.9%) of 107 cases who died after first operation. This implies death rate is high if the patient is reoperated during the same admission. Infectin and sepsis

were causes of death while fluid and electrolyte imbalance (shock) in 1 (seetable 6)

Table 6. Frequency table of treatment out come of patients with intestinal obstruction at Debre Birhan Referral Hospital 2014/15 (N=181).

Variables		frequency	%
Post operative complication	Wound infection	14	12.9
	Leakage	1	0.9
	Others ⁵	3	2.8
Relaparotomy done	Yes	3	2.8
	No	105	97.2
Reason for relaparotomy	Leakage	1	0.9
	Wound dehiscence	2	1.8
Treatment outcome	Improved and discharged	105	97.2
	Died	3	2.8
Possible cause of death?	Sepsis or infection	2	1.8
	Shock	1	0.9

¹Pneumonia=1andwounddehiscence=2

3.6. Bivariate and Multivariate Analysis

From the independent variables sex, residence and history of chronic constipation are significantly associated with intestinal obstruction. After cheking for the presence of association ($p<0.25$) in binary logestic regression, this variables werere-entered into multivariate logestic regression to assess the strength of association between this variables and intestinal obstruction by controlling the confounding effect of other variables.

Being male sex is arisk for intestinal obstruction ($p=0.001$) and adjusted odds ratio (AOR) of 3.048 and 95% CI [1.574-5.903]. From the above statement it is clear that males are 3 times more likely to develop intestinal obstruction than females.

Urban residence is also significantly associated with intestinal obstruction with $p<0.001$, AOR=21.355 and CI [9.6-47.4].

History of chronic constipation is also a risk for intestinal obstruction ($p<0.001$), AOR=13.729 and CI [5.542-34.009]. From thiss tatement it is clear that having constipation is 13.7 times more likely to develop intestinal obstruction. (Seetable 7)

Table 7. Bivariate and multivariate analysis of patients with intestinal obstruction at Debre Birhan Referral Hospital 2014/15.

Variables	IO		COR(95%CI)	AOR(95%CI)	p-value
	Yes	No			
Sex					
Male	86	119	2.054(1.340,3.150)	3.048(0.1.574,5.903)	.001
Female	95	57	1.00	1.00	
Residence					<0.001

Variables	IO		COR(95%CI)	AOR(95%CI)	p-value
	Yes	No			
Debre Birhan	17	115	18.603(10..325,33.519)	21.355(9.618,47.414)	
Outside Debre Birhan	164	61	1.00	1.00	
History of contipation					
Yes	61	11	7.625(3.794,14.890)	13.729(5.542,34.009)	<0.001
No	120	165	1.00	1.00	

4. Discussion

The leading causes of acute abdomen in the study area are intestinal obstruction 181(50.7%) and acute appendicitis in 141(39.5%) of cases. Majority of intestinal obstruction cases 60.2% are large bowel obstruction. Although this finding is similar to other studies in our country and other African country, it is different from recent study done in Black Lion Hospital which has shown that the most common cause of acute abdomen was acute appendicitis and the most common type of intestinal obstruction is small intestinal obstruction [3, 4, 5, 7]. This finding is also different from the global reference in which 80% of intestinal obstruction is due to small bowel obstruction and the leading cause for acute abdominal admission are due to acute appendicitis [9]. Majority 69.2% of study subjects in this study are from rural areas and this might be the reason for higher proportion of intestinal obstruction in contrast to findings from western countries and black lion hospital as acute appendicitis are common in urban area [4, 11].

Majority of patients in this study are in the age greater than 40 which is similar to other studies in Africa with large bowel obstruction commonly Occuring in age above 60 while small bowel cases are more common in the second and third deceds of life [14].

Male sex has statistically significant association with intestinal obstruction than females with odd of having intestinal obstruction is 3 times more common in males than females. This my 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, 10, 12, 13].

Having chronic constipation has stastistically significant association with intestinal obstruction than lacking it with odd of having intestinal obstruction is 13.7 times more common in those who had chronic constipation than who lacked it. It accounts about 33.7% of intestinal obstruction cases in this study. This may be due to inadequate intake of water because of the weather condition of the area. This is similar to finding from study done in black lion hospital which comprises 33.9% but different from finding at study done in Nijeria in which constipation comprises 65%. The possible reason for the difference might be due to inadequate sample size [11, 12].

The most commonly identified etiology of intestinal

obstruction in this study is sigmoid Volvulus. From 181 study subjects 58% are caused by sigmoid volvulus. Sigmoid volvulus is also the leading cause of large bowel obstruction with 100(95.2%) of the 105 cases are caused by Sigmoid volvulus. There are similar finding to this from different parts of our country as well as other countries like sudan, Ertrea and other developing countries [2, 5, 3] 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 tumor (colorectal cancer) is thought to be the main cause of large bowel obstruction. Small bowel volvulus in contrast to ‘adhesion in black lion hospital and in developing countries’ is the most common cause of Small bowel obstruction in this study. 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 [10]. In this study 11 of 15 patients who have previous history of abdominopelvic operation developed intestinal obstruction.

Post operative adhesion, hernia and intussusceptions are the third, fourth and fifth most common causes of intestinal obstruction with 11, 12 and 8 of cases are caused by this diseases enteties. There are similar findings from recent study is Ugandan with hernia, adhesion, volvulus and intussusceptions comprising 40.2%, 20.5%, 17.4% and 11.4% respectively [9].

Relatively smaller proportion (40.3%) of patients were treated conservatively. From the total study subjects 108(59.7%) are managed by surgery. Majority 64(87.7%) of 73 conservatively treated patients are large bowel obstruction cases from sigmoid volvulus while majority 56(51.9%) of operated cases are small bowel obstruction cases. This implies that patients with small bowel obstruction are more commonly managed by surgery than patients with large bowel obstruction. Rectal tube defilation and Nasogastric tube decompression are the two most commonly used conservative treatement methods. Failure rate of rectal tube defilation is about 11.2% only. This is similar to finding from other studies with 80-90% success rate [15].

From 108 operated cases 15(13.9%) are diagnosed with gangrenous small intestine while 16(14.8%) are gangrenous large intestine. This is higher than finding in other studies which demonstrated 10% strangulation rate for patients with small bowel obstruction (20). This might be due to late presentation of patients with small bowel obstruction to hospitalas 11(73.3%) of 15 patients gangrenous small obstruction presented to hospital after 48 hours of onset of illness. The reason for late

presentation to the institution delivering these surgical treatment needs to be studied further.

Morbidity and mortality of intestinal obstruction is related to the etiology of intestinal obstruction. Post operative complication occurred in 16.7% of operated cases. This is less than as 24.2% complication seen in Ugandan study [9]. 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 14(12.9%) of all operated cases. The other less frequently seen complications include anastomotic leakage in 1(0.9%), wound dehiscence in 2(1.9%), and pneumonia in one (0.9%) of cases. This is similar to findings from Black Lion Hospital [12].

Only 3(1.7%) of patients expired all of them were operated cases. The overall mortality rate of 1.7% from this study is less than most other studies (3-30%), Ugandan study of 12.9% and the 15.3% mortality at Black Lion Hospital [6, 9, 10, 12]. Adequate preoperative resuscitation and proper post operative care might be the reason for this lower mortality rate in the study area.

5. Conclusions

Acute intestinal obstruction remains a major cause of morbidity in our environment. Intestinal obstruction is the most common cause for non traumatic acute abdominal admission accounting 50.7% in the study area. Large bowel obstruction is relatively more common than small bowel obstruction at Debre Birhan Referral Hospital. Post operative adhesion and groin hernias were found to be the commonest causes for intestinal obstruction next to Volvulus, but tumor was the rare cause of small bowel obstruction in the study area.

Patient in the age of 15-39 are more affected by Small bowel obstruction while age greater than 40 is highly affected by large bowel obstruction. Male patients, patients from rural areas, those with previous history of intestinal obstruction and previous history of operation are at increased risk of having intestinal obstruction.

Recommendations

Debre Birhan Referral Hospital

a, Elective repair of hernia should be strengthened before it causes obstruction.

b, Public awareness should be increased on the risk factors of intestinal obstruction through health education to reduce the observed magnitude.

c, Some patient charts were found with incomplete records should be improved.

d, Additionally every effort should be tried to decrease relaparotomy rate which is associated with 0% mortality rate.

North Shoa Zonal Health Department and DBRH

The knowledge gap of mid and lower level health professionals on the diagnosis, resuscitation and importance

of early referral to higher center should be addressed.

Moreover, health facilities and health professionals capable of handling patients with intestinal obstruction should be available within the reach of the community.

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