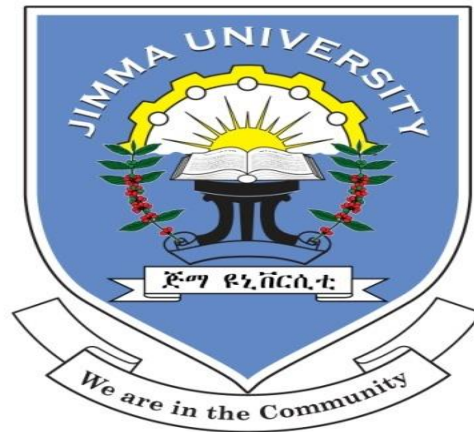ASSOCITED FACTORS AND MANAGEMENT OUTCOME OF SURGICALLY TREATED ADULT INTESTINAL OBSTRUCTION AT NEKEMTE REFERRAL HOSPITAL, OROMIA, WESTERN ETHIOPIA

BY:

NATNAEL GETACHEW (BSc)

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RESEARCH THESIS TO BE SUBMITTED TO THE RESEARCH AND GRADUATE STUDIES COORDINATING OFFICE OF INSTITUTE OF HEALTH, JIMMA UNIVERSITY, FOR PARTIAL FULFILLEMENT OF DEGREE OF MASTER IN INTEGRATED EMERGENCY OBSTETRICS /GYNACOLOGY AND GENERAL SURGERY (IEOS)

OCTOBER 2018
JIMMA, ETHIOPIA

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ASSOCIATED FACTORS AND MANAGEMENT OUTCOME OF SURGICALLY TREATED ADULT INTESTINAL OBSTRUCTION AT NEKEMTE REFERRAL HOSPITAL, OROMIA, WESTERN ETHIOPIA

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Abstract

Background: Intestinal obstruction remains one of the most common surgical diagnoses made in emergency departments worldwide [1]. Its magnitude and causes have kept changing over time within various parts of country, varies from time to time and from area to area even in the same country and affected by different factors.

Objective: -The objective of this study is to assess associated factor and management outcome of adult intestinal obstruction patients managed operatively at Nekemte Referrals Hospital, from January to September 2018.

Method: - Institution based cross-sectional study was conducted in Nekemte Referral Hospital, Oromia region, Western Ethiopia from January to September 2018. Data was collected from surgically managed adult patients who were admitted in Nekemte Referral Hospital surgical ward with the diagnosis of intestinal obstruction. The data was collected directly from the patient and from the patient's card. The collected data checked for any inconsistencies, incorrectness, and incompleteness. Then, data entered to epidata software and exported to SPSS version 22.0 for data analysis. Data was analyzed and presented by frequency distribution and logistic regression. On binary logistic regression analysis, a p-value <0.25 was used as a reference to be a candidate for multivariable logistic regression analysis. P-Value<0.05 at 95% confidence interval (CI) was considered as statistically significant.

Result: Totally, 206 surgically managed adult intestinal obstruction patients get admission from January to October 2018. SBO accounts 126 (61.8%) and LBO 80 (38.2%). Patients' age ranges between 15-80 years with a mean of 42.66(SD±16.15) and M: F ratio of 1.4:1. Independent factors that predict the management outcome were age, intra-operative finding and anastomosis leak (see table 6). Overall mortality was 12.1%, which is mainly due to sepsis 19(76%) %. 44 (21.3%) patients developed postoperative complication.

Conclusion and recommendation: SBO was the leading site of obstruction caused by small bowel volvules, inguinal hernia, and adhesion. Sigmoid volvules and colo-rectal mass were the two most common causes of LBO. The mortality rate and postoperative complication were high and needs careful peri-operative multidisciplinary patient evaluation and monitoring. Elective surgery for inguinal and femoral hernia repair should be widely performed in NRH and its sub region hospitals that have general surgeons.

Key words: Intestinal obstruction, anastomosis, management outcome

ACKNOWLEDGMENTS

Table of Content

List of figures

List of Tables

List abbreviations and acronym

ARH-Adama Referral Hospital

CBC-Complete Blood Count

CI- Confidence Interval

CV-Cecal Volvulus

DBRH-Debre Berhan Referral Hospital

GUH-Gondar University Hospital

IEOS-Integrated Emergency Obstetric and Surgery

IO- Intestinal Obstruction

IV-Intestinal Volvulus

LBO-Large Bowel Obstruction

MRC- Medical Record Card

Mr.-Mister

NGT- Naso-Gastric Tube

NRH-Nekemte Referral Hospital

SBO- Small Bowel Obstruction

SBV-Small Bowel Volvulus

SPSS- Statistical Package for Social Sciences

SV-Sigmoid Volvulus

TAH-Tikur Anbessa Hospital

WHO-World Health Organization

WURH: Welega University Referral Hospital

WSUTRH-Wolayta Sodo University Teaching and eferral Hospital

CHAPTER ONE: INTRODUCTION

1.1 Background

Intestinal obstruction is a partial or complete blockage of the intestinal contents from travelling distally because of either intrinsic or extrinsic compression of the bowel whereas pseudo-obstruction characterized by dilation of the bowel in the absence of a causative anatomic lesion. It is a common and potentially dangerous surgical emergency associated with high morbidity and mortality if managed inappropriately. Clinically, intestinal obstruction classified as small bowel and large bowel obstruction. About 80% of bowel obstructions occur in the small intestine; the other 20% occur in the large intestine [18]. It is one of the most common acute abdominal emergencies and is associated with significant mortality and morbidity, especially if it progresses to bowel ischemia [1, 3, 4].

Global as well as regional variation of intestinal obstruction documented well in the literatures. In developed countries, the most common cause of intestinal obstruction is adhesion, whereas incarcerated hernias and volvulus in developing countries. The leading causes of intestinal obstruction in Africans have mostly been hernia and volvulus. There are, however, some African studies, which are pointing to the change in these established patterns [5, 31, 21, 33, 23].

The diagnosis of IO is not always easy, and indication of surgery needs high index of suspicion. Detailed history and thorough clinical examination are helpful to make a working diagnosis and planning treatment. Classically there are four cardinal features for IO, i.e. Colicky abdominal pain, distension, vomiting and constipation, but the prominence of each of these affected by the site and type of obstruction. Clinically it is possible to distinguish strangulation from simple intestinal obstruction depending upon severity of clinical features. Tenderness, guarding, and rigidity with signs of shock are more prominent in strangulated obstruction. Successful management requires early diagnosis and treatment with meticulous fluid, electrolyte imbalance, and timely surgical intervention [4, 7, 9].

There are wide variations in the prevalence, mortality, and morbidity rate of IO throughout the world. According to the recent available study in Ethiopia, intestinal obstruction is the leading cause of acute abdomen admission (as high as 50.7%) [40]. A study at BLH in 2014 shows mortality and morbidity rate of 23% and 22.9% respectively following surgery for IO . In DBRH at 2016, the overall mortality rate of IO is 1.6% and morbidity rate of 16.7%. Several factors described to be responsible for these differences like cause of obstruction, site of intestinal obstruction, duration of illness, ethnicity, age group, dietary habits, and geographic location and among other factors. However, there were no researches done previously regarding in management outcome of intestinal obstruction and its associated factor in Nekemte Referral Hospital.

1.2 Statement of the problem

Intestinal obstruction is one of the commonest abdominal surgical emergencies. It is a global problem consuming much in terms of surgical services even in Eastern Europe and North America [13] and it is also the leading cause of acute abdomen especially for countries found in the 'volvulus belt' regions including Africa, India, Iran, Russia and Brazil. As part of Sub-Saharan Africa country, intestinal obstruction is a common surgical emergency and a significant health problem in Ethiopia [1, 5, 11].

In developed world, like USA, prevalence of IO is 10.6% of all adults presenting to the emergency department with non-traumatic acute abdomen. According to the recent available study in Ethiopia (in DBRH), from all non-traumatic acute abdomen admissions , prevalence of IO accounts 50.7% of which 60.2% is due to large bowel obstruction whereas in ARH, prevalence of intestinal obstruction from all acute abdomen patient is 21.8% of which the main site of obstruction is at small intestine(64%)[39,40].

Worldwide, the etiology of intestinal obstruction is relatively uniform, in adults most commonly adhesions, followed by incarcerated hernias and either volvulus or tumors in developed and developing countries, respectively, and in children most often hernias, then intussusceptions and adhesions(11,6, 12, 8, 13).In Ethiopia, some literatures show different causes of IO at different institutions. In ARH, the main causes of adult IO are Intussusceptions (30.9%) followed by small bowel volvulus (30.3%) while in DBRH, volvulus is the leading followed by hernia [39, 40].

Many factors described as responsible for surgical morbidity and mortality of patients who underwent emergency abdominal surgery for IO. These include age of the patient, increased time between the onset of symptoms and the hospital admission, the hospital admission and surgery, nature of operation, presence of peritonitis, a delayed diagnosis, management, complication detection time and postoperative stay are mentioned [1]. A study in GUH at 2014 shows an overall morbidity and mortality rates of 30% and 18%, from all acute surgical emergency, respectively. Most of the patients (23%) who died after operation were for bowel obstruction. All of the patients died with large bowel obstruction had gangrenous sigmoid volvulus. Almost all deaths were those patients who came after two -five days of illness and

all were from rural areas [16]. On the other hand a study in DBRH, at 2017 shows an overall 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. None of patient died during conservative treatment.

To decrease the morbidity and the mortality rate associated with IO, now there is better understanding on pathophysiology of IO and improvement in radiological techniques of IO diagnosis. New surgical principles in modern surgery, as in large bowel obstruction, introduction of on table lavage and resection and primary anastomosis, increasing early access of health facility and production of skilled manpower are being performed. Elective hernia repair is also widely performed to decrease IO patients who are presenting with strangulated and incarcerated hernia [9, 26, 30].

Despite the above-mentioned facts, intestinal obstruction is still one of the commonest abdominal surgical emergencies with significant morbidity and mortality still. The pattern of the disease changes from time to time and place to place. Therefore, it needs periodic studies to evaluate the associated factors and behavior of the disease [3]. Except some studies, in some parts of Ethiopia [1, 7,10,40], no report is available in Nekemte Referral Hospital regarding surgical management outcomes of intestinal obstruction and its associated factors despite the condition is common cause of surgical admissions.

The purpose of this study was to assess associated factor and management outcome of adult intestinal obstruction patients managed operatively at Nekemte Referrals Hospital, from January to September 2018. The result will suggest the health service planers to have measures for prevention and treatment of the condition and will compare with other studies in the country, Sub Saharan Africa, and the developed world to give recommendation.

1.3. Significance of the Study

Currently, intestinal obstruction is a major public problem of acute abdomen cases in our country. Since the pattern of the diseases is different at different setup and varies, from time to time, it needs periodic study to determine the factors that affect the management outcome of intestinal obstruction. However, there was no information relating intestinal obstruction in the set up yet. Hence, this study will fill the existing gap. Consequently, the findings of this study will provide the hospital, and Nongovernmental Organization (NGOs) with relevant information about the pattern, magnitude, associated factors for intestinal obstruction for future planning of appropriate strategies and can use by program implementers as an input towards improving quality of management of IO and with their ultimate goal of reducing case mortality.

The result of this study will also add epidemiological and clinical information that will serve as essential references for those who want to undertake researches since there was no adequate study conducted in our country, which deals about it. There will be also an attempt to publish the research result.

CHAPTER TWO:

1. Literature review

Intestinal obstruction continues to remain a challenge to surgeons 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 all over the world. Several factors contribute to poor outcomes in the case of intestinal obstruction. Some of these determinants may include poor health seeking behavior, dalliance in presentation, and poverty. Poor clinical judgment is also one of the negative factors leading to poor prognosis in case of intestinal obstruction [11, 23].

Universally, intestinal obstruction varies from country to country or regions in terms of its prevalence, causes, and management outcomes depending on ethnicity, age group, dietary habits, and geographic location, among other factors as well as living condition of the community.

In the previous report from the United Kingdom between 1925 and 1930, 50% of bowel obstruction was due to strangulated hernia, followed by malignancy (23%) and adhesion (7%). However, in the study between 1942 and 1945, the picture had changed, and adhesion found to be the commonest causes of intestinal obstruction (31%) followed by malignancy (27%) and strangulated hernia (10%) [5,6]. However, in the developing countries where health delivery system is not as good as in the developed world, obstructed inguinal hernia is still the commonest cause of intestinal obstruction at present [32,33,34].

At a large teaching hospital in Boston, Massachusetts (USA), a total of 536 adults presenting to the emergency department with acute, non-trauma-related abdominal pain comprised 308 men (57%) and 228 women (43%), with intestinal obstruction accounting 10.6% [30].

There is a significant regional variation in the etiology of IO among various African studies. Strangulated/incarcerated hernias and adhesive bowel disease accounted for 54-90% of all cases of IO in series from Nigeria, Rwanda, and Sudan [28, 29, 31] while volvulus of the small or large bowel accounted for 55-74% of all cases of IO in series from Ethiopia [34, 35].

A 5-year retrospective study conducted in Nigeria from 1993 to 1997 on seventy-six cases of IO shows that male to female ratio of 2:1 and major complaints were abdominal pain (90%), distension (85%), vomiting (71.2%), and constipation (65%). The commonest causes of obstruction in adult patients were strangulated hernia and adhesion. The commonest postoperative complication was burst abdomen. Other 3-years retrospective study on spectrum of causes of IO in adult Nigerian patients (between 2012 and 2014) put fibrous adhesion as the commonest cause of obstruction followed by volvulus and hernia. Only 16% of patients in the adhesive obstructive group responded to conservative treatment; 84% required surgery. Of these, 32% had bowel resection and anastomosis for strangulation. The overall mortality rate was 14%. The operative mortality of 11% included seven cases of strangulating obstruction, three of advanced colorectal carcinomas and one of simple obstruction. The remaining deaths occurred before surgery from complications in patients presenting late with neglected obstruction [36, 37].

A prospective descriptive study from 1 December 2013 to 31 May 2014, in Makerere University, Uganda showed hernia (20.9%) cut across board as the commonest cause of adult IO and followed by gut volvulus (11.8%) then adhesions and tumor. Clinically at presentation 50% of the participants presented after 72 hrs of symptoms, 24.6% of them manage in a healthcare center before reaching Hospital with only 7.3% of the participants presenting within 24 hours of symptomatology. Symptom duration had a weak statistical association. Colicky abdominal pain (72.7%), abdominal distension (63.6%), and vomiting (59.1%) were the three commonest symptoms while abdominal distension (79.1%), increased bowel sounds (60.9%), plus abdominal tenderness (40.9%) were the commonest signs on examination [26].

A 4-year retrospective study of adult patients managed for IO at Tenwek Hospital, in Bomet, Kenya between November 1, 2009 and October 31, 2013 shows 445 cases were gathered from the study period, comprised of 303 (68.1%) males and 142 (31.9%) females. The most common signs and symptoms were abdominal pain (89.4%), abdominal tenderness (81.6%), vomiting (78%), abdominal distension (65.4%), constipation (50.8%), and peritonitis (30.3%). History of prior laparatomy noted in 152 (34.1%) case. The major causes of IO,

accounting for 78.5% of all cases, were sigmoid volvulus (25.6%), adhesive bowel disease (23.1%), small bowel volvulus (21.3%) and ileo-sigmoid knotting (8.5%). Overall, the mortality rate at discharge was 4.5%. Bowel gangrene noted in 112 (31%) cases. Sigmoid volvulus, small bowel volvulus and ileo-sigmoid knotting accounted for 84% of all cases of bowel gangrene. The main operative procedures performed included resection and anastomosis (170, 47.1%), distortion and decompression (73, 20.2%), and adhesiolysis (51, 14.1%) [37].

A 4-year retrospective study at Gonder University Hospital (GUH) from September 1998 to August 2002 shows that small bowel obstruction (43.4%), acute appendicitis (34.6%) and large bowel obstruction (11.5%) were the commonest three indications for non-traumatic emergency abdominal surgeries respectively. The frequency of occurrence of IO in this study is 70 per year and it is 62 per year in TAH [1, 6].

Two-year retrospective study conducted on non-traumatic surgical acute abdomen cases treated operatively at Wolayta Sodo University Teaching and Referral Hospital (WSUTRH), Southern Ethiopia. There were 270 surgical emergency laparatomy for non-traumatic surgical acute abdomen. Intestinal obstruction 49.3 %(133) was found to be the leading cause of non-traumatic surgical acute abdomen for emergency operation. Small bowel obstruction (SBO) was the leading cause of bowel obstruction, which accounted 72.73% (98) of bowel obstructions, of which (39.8%) was primary small bowel volvulus, followed by intussusceptions (28.6%). Sigmoid volvulus was the leading cause of LBO 24(68.6%) followed by ilieo-sigmoid knotting 4(11.4%) and colo-colic intussusceptions and colorectal Cancer were similar [38].

Across-sectional study conducted from December 8,2015 to January 9,2016 at Debre Birhan Referral Hospital shows that Abdominal pain 341 (95.5%), abdominal distension 220(61.6%) and Nausea and vomiting 306(85.7%) are the three most frequent history findings. 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. 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. From all 181 cases of intestinal obstruction 73(40.3%) and 108(59.7%) are treated conservatively and surgically respectively [39].

A hospital based cross sectional study conducted at Adama Referral Hospital, from January 1, 2011 to December 30, 2013 shows that 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. Most small bowel obstruction was secondary to intussusceptions (in 30.9 %of the cases) and volvulus (in 30.3 % of the cases). Sigmoid volvulus (69.0 %) is the most common cause of LBO [40].

The knowledge of patterns of intestinal obstruction in a country as well as in different parts of the region has significant value in fast diagnosis and on time surgical intervention, which result in good outcome of the patient [22, 23]. The numbers of researches done on intestinal obstruction in general are not large enough in Ethiopia. Especially in southwest part of the country specifically in Nekemte Referral hospital, no research conducted on intestinal obstruction. This study conducted in NRH, Oromia Region, East Welega zone, Ethiopia to review the common associated factors and surgical management outcome in order to provide health service plan and to be base line information about intestinal obstruction in this setup for further study.

2. Conceptual frame work
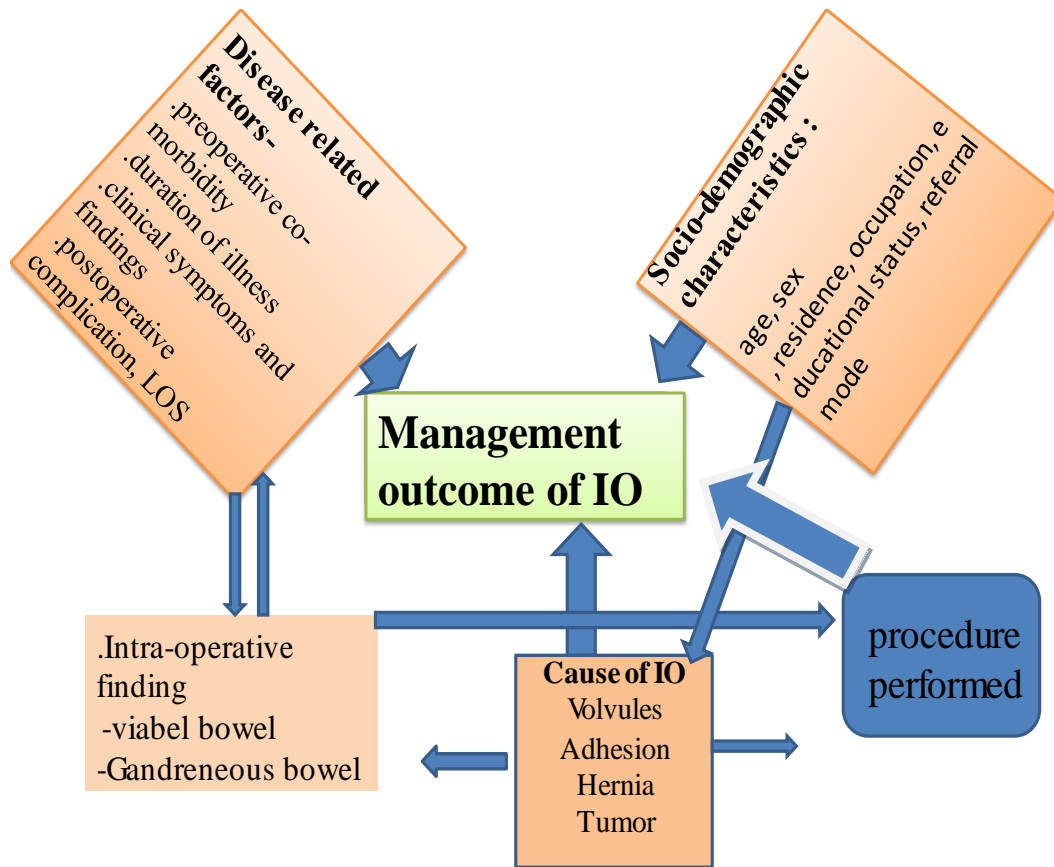
Figure 1.Conceptual framework showing associated factors for management outcome of IO (7, 13)

CHAPTER THREE: OBJECTIVES

3.1 General objective

The objective of this study is to assess associated factor and management outcome of adult intestinal obstruction patients managed operatively at Nekemte Referrals Hospital, from January to September 2018

3.2 Specific objectives

1. To identify associated factors of adult intestinal obstruction

2. To assess patterns of intestinal obstruction

3. To assess the management outcome of surgically managed adult intestinal obstruction patients

CHAPTER FOUR: METHOD AND MATERIALS

4.1 Study area and period

Nekemte is the zonal capital city of East Welega Zone, which is one of the zones in the central oromia region of Ethiopia, which is about 331 Kilometers from Addis Ababa. The zone has a total population of 1, 213, 503, of whom606, 379(49.9%) are men and 607,124(50.03%) female. Of all, 7.72% are urban inhabitants and the majority of the zone population are follower of Protestantism (48.42%) followed by Ethiopian orthodox Christianity (37.04%) (National censes 2007). Predominantly rural Woredas produces 'Teff', cereals, khat, coffee, and vegetables, which are used as a principal cash crop and consumption goods to themselves and the people for Nekemte town.

The Zone has 298 health posts, 61 Health Centers, 2 primary hospitals and 2 referral hospitals including Nekemte referral Hospital. NRH has 207 different types of private clinics in the zone (Nekemte Town Health Administration office, 2017).

Nekemte Referral Hospital is one of the referral hospitals in the town, which established in 1923 e.c. It has 204 beds and the total number of staff in the hospital is 408. Out of these, 120 of them are health professionals including specialists, General practitioners, Health officers, Nurses, Lab technicians, and pharmacists. Surgical ward has 37 beds in adult surgical ward used for the inpatient services (NRH Administration Office, 2017). This study was facility based cross sectional study at Nekemte Referral Hospital from January to October 2018.

4.2 Study design

A Hospital based cross-sectional study conducted.

4.3 Population

4.3.1 Source population

The source populations were all patients who admitted to surgical ward for intestinal obstruction in NRH

4.3.2 Study population

Adult patients who gate operative management for mechanical intestinal obstruction in NRH from January to September 2018 were the study population.

4.4 Inclusion criteria

Adult patients admitted with radiologic and clinical evidence of mechanical intestinal obstruction that were managed operatively at NRH from January to September 2018.

4.5 Exclusion Criteria

➢ Patient age less than fifteen years
➢ Referred patients

4.6 Sample size:

All patients admitted to surgical ward of Nekemte referral Hospital with the diagnosis of adult intestinal obstruction and managed operatively from January to September 2018.

4.7 Sampling method

All patients who were admitted and managed operatively for intestinal obstructions in the study period were included.

4.8 Data collection tools and techniques

The data for this study was collected using pre tested checklist for each individual patient, which has three sections:

Section I: Socio-demographic characteristics.

Section II: Clinical manifestation at presentation.

Section III: Causes and management outcome of intestinal obstruction.

Checklist filled by direct interview and physical examination of patients who get admission with working diagnosis of IO in NRH surgical ward and from the patient medical record card. A checklist was prepared in English. Three IESO 2nd year students and one IESO 3rd year student who assigned in NRH surgical ward recruited for data collector and supervisor

respectively. The principal investigator gave two days training for data collectors and supervisor on how to fill the prepared checklist, the importance of data quality, and the relevance of the study. The supervisor supervised the activity on the consistency and completeness of the checklist regularly. The principal investigator checked the activities of data collectors and supervisor twice weekly. The collected data filled on the prepared structured checklist forms daily from cases of intestinal obstructions from January to August 2018.

4.9 Study variables

4.9.1 Dependent variable:

- Management outcome of patients

4.9.2 Independent variables:

- Socio-demographic characteristics-age, sex , residence, occupation, educational status, referral mode
- Disease related factors (preoperative co-morbidity, duration of illness, clinical presentation and findings, shock, postoperative complication, LOS
- Pattern: causes of IO, , intra-operative finding, intra-Operative procedures performed
- Diagnosis accuracy (Diagnosis at admission, Post-operative diagnosis)

4.10. Data analysis

The collected data was checked for any inconsistencies, incorrectness, and incompleteness. Then, data was entered to epidata software and exported to SPSS version 22.0 for data analysis. Data analyzed and presented using frequency distributions and logistic regression. On binary logistic regression analysis, a p-value < 0.25 used as a reference to be a candidate for multivariable logistic regression analysis and P-value<0.05 at 95% confidence interval (CI) was considered as statistically significant.

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4.11. Data quality management

To assure the quality of the data, data collectors and supervisors were trained and a regular supervision and follow up made by Supervisors. In addition, regular checkup for completeness and consistency of the data was also made on daily basis and entered to epidata software. Pretest done from patients who were admitted for IO at NRH surgical ward for two consecutive weeks before the actual data collection started and based on the result adjustment was made on the instrument. The pretest data was not included in the analysis of the actual study.

4.12. Operational definitions

1. **Anastomosis***:*-The surgical union of two hollow organs, e.g. parts of the intestine, to ensure continuity of the passageway and anastomosis leak refers to leakage through surgical union site.

2. **Facial dehiscence:** is facial disruption due to abdominal wall tension overcoming tissue or suture strength, or knot security.

3. **Hematoma and seroma:** post-operative accumulation of blood and serum in side surgical wounds respectively.

4. **Intra-operative procedure:** The procedure done after laparatomy depending on the causes and intraoperative finding of obstruction

5. **Intra-operative finding:** The finding after abdomen opened which can be gangrenous bowel or viable bowel etc.

6. **Length of hospital stay:** the duration of time from admission to discharge or death of the patient classified as prolonged if it is more than 10 days.

7. **Management outcome**: The condition of the patient after the procedure that means whether he developed complication or not, discharged alive or died in the hospital

A. Good outcome: **F**avorable outcome of patient after management like discharge after improvement with or without any complication

B. Bad outcome: Unfavorable (death) outcome following management in the intra-operative, preoperative, or post-operative time

8. Pattern: causes, intraoperative findings, performed procedures

9. **Postoperative pneumonia: S**uspected in a patient with clinical findings of infection including fever, cough, or purulent sputum in the post-operative period including aspiration pneumonia

10. **Procedure done: T**he main procedure done after laparatomy to relieve the obstruction

11. **Wound infections (SSI):** Infection following surgical incisions and classified as [18]
a. Superficial Incision SSI: Infection occurs within 30 days after the operation and involves only skin or subcutaneous tissue of the incision

b. Deep Incision SSI: Infection occurring after the operation and infection involves
 Facial and muscle layers.

12. Facial dehiscence: is facial disruption due to abdominal wall tension overcoming tissue or suture strength, or knot security. It can occur early or late in the post-operative period, and involve a portion of the incision (i.e., partial dehiscence) or the entire incision (i.e., complete facial dehiscence).

13. Non-operative management: means management of patients with partial bowel obstruction, recurrent adhesive obstruction, or during the early postoperative period with NGT-suction, IV fluids and frequent clinical reassessment to rule out bowel strangulation, which may need operative management

14. Operative management: means surgical exploration of the abdomen, which is determined by the nature of obstruction and whose goals are to diagnose and resolve the source of the obstruction, resection of any nonviable bowel and minimizes the occurrence of an incidental enterotomy.

15. **Pre-operative co-morbidity:** chronic or acute medical problem before the current insult

16. **Adult**: patients age greater than 15 years were considered adult

4.11 Ethical consideration

Ethical clearance obtained from ethical committee of Jimma University. A formal letter obtained from the department of Integrated Emergency Obstetrics/Gynecology and surgery to the hospital administrator office. The Hospital medical director permitted us to conduct the study. Informed consent had taken from each study unit.

4.12. Dissemination the findings

The findings will be presented during Master's thesis defense. The results of this study will be submitted to the department and disseminated to the study site and other concerned body. There is also an attempt to publish the outcome of the research result.

CHAPTER FIVE: RESULTS

5.1 General characteristics of study population

Two hundred seventy four patients were admitted to surgical ward for obstructed bowel from January to October 2018 and of whom 68 (24.8%) managed none operatively and 206 (75.2%) patients managed surgically. Out of 206 patients who were managed surgically, SBO accounts 126(61.62%) and LBO 80(38.8).

5.2. Socio demographic characteristics

Patients' age ranges between 15-80 years with a mean of 42.66 years (SD±16.15). Of which 121(58.7%) were males while 85 (41.3%) were females and the male to female ratio is 1.4-1. About 127(61.7%) and 79(31.3%) of patients were rural and urban residents respectively.

Table1: Socio-demographic characteristics of operatively managed adult intestinal obstruction patients in Nekemte Referral Hospital from January to September 2018.

variables		Frequency	percent
age	15-24	24	11.7
	25-54	122	59.2
	>=55	60	29.1
	Total	206	100
Sex	male	121	58.7
	female	85	41.3
	Total	206	100.0
Educational status	illiterate	34	16.5
	literate	172	83.5
	Total	206	100
Occupation	farmer	127	61.7
	merchant	41	19.9
	Government employee	22	10.7
	Private employee	6	2.9
	others	10	4.9
	Total	206	100
Residence	rural	127	61.7
	urban	79	31.3
	Total	206	100

5.3. General condition of the patient

From patients who were managed in a study period, 119 (57.8%) came after 24 hours of their clinical manifestation, 137(66.5%) came with referral, 36 (17.5%) had previous abdominal operation .The three most clinical symptom during their presentations are abdominal pain, 205(99.5), vomiting 201(97.6) and constipation, 102(49.5) respectively. OF all patients managed surgically, 66(33%) were presented in shock in the preoperative period.

Table **2:** *General condition of patients managed for adult intestinal obstruction in Nekemte Referral Hospital from January to September 2018*.

variables		Frequency	Percent
duration of illness in	<=24 hours	87	42.2
hours before	>24hours	119	57.8
presentation	total	206	100
Pre operative co	yes	15	7.3
morbidity problem	no	191	92.7
	total	206	100
did the patient come	Yes	137	33.5
with referral	No	69	66.5
	total	206	100
Abdominal pain	Yes	205	99.5
	No	1	.5
	total	206	100
constipation	Yes	102	49.5
	No	104	50.5
	total	206	100
abdominal distention	Yes	155	75.2
	No	51	24.8
	total	206	100
abdominal tenderness	Yes	140	68
	No	66	32
	total	206	100
bowel sound	Hypoactive	59	28.6
	Normoactive	64	31.1
	hyperactive	83	40.3
	total	206	100
Was the rectum empty?	Yes	88	42.7
	No	118	57.3
	total		
did the patient had	Yes	36	17.5
previous abdominal	No	170	82.5
operation	total	206	100
shock	yes	68	33
	no	138	67
	Total	206	100

5.4. Site and etiological spectrum of intestinal obstruction

Among the total cases of 206 patients, 126(61.2%) were managed for small intestinal obstruction secondary to small bowel volvulus, inguinal hernia and adhesion accounting of 44 (34.92%), 32(25.39%) and 31 (24.63%) respectively. The rest 80 (38.8%) of cases were managed for large bowel obstruction primarily due to sigmoid volvulus 54 (67.5%) followed by colonic tumors 15 (18.75%).

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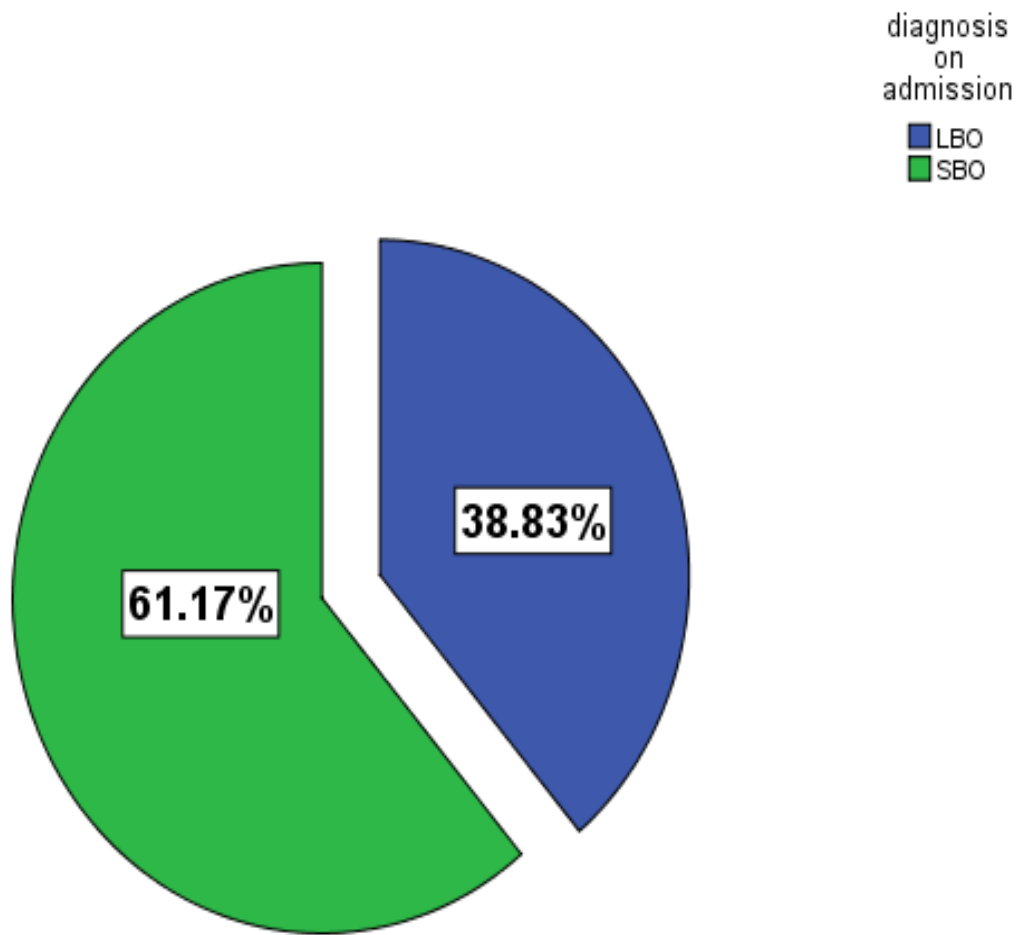
Figure 2: showing the main sites of intestinal obstruction during admission in NRH from January to September 2018.

Table3: Site and etiological spectrum of intestinal obstruction in Nekemte Referral Hospital from January to September 2018

Major cause(site)	frequency	Percent (%)	cause	frequency	Percent (%)
Small bowel obstruction	126	61.8	Small bowel volvules	44	34.9
			Adhesion and band	31	24.6
			Inguinal hernia	32	25.4
			Femoral hernia	12	9.5
			Intussusceptions	7	5.6
			Total	126	100
Large bowel obstruction	80	38.2	Sigmoid volvules	54	67.5
			Cecal volvules	9	11.35
			Colo-rectal mass	17	21.25
			Total	80	100

5.5. Intra-operative findings and procedures

Viable bowel was the dominant intra-operative finding 140(68%). Primary resection & anastomosis, 102(49.5) followed by derotation and milking 37(18) of bowel has frequently been performed intra operative procedure to resolve the obstruction.
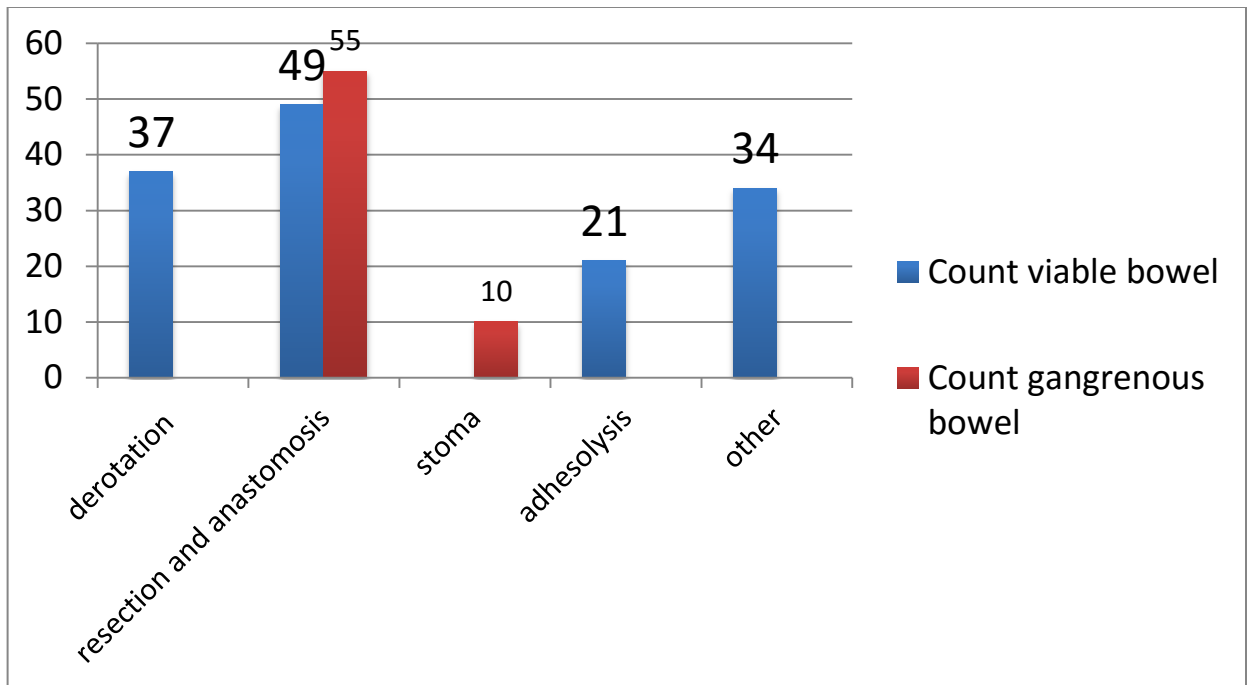
Figure 3: Bar graph showing performed procedures for its respective intra-operative findings of intestinal obstruction in Nekemte Referral Hospital from January to September 2018.

NB: other; includes intussusceptions reduction, hernia reduction.

5.6. Management outcome and complications of intestinal obstruction

Among 206 surgically managed adult intestinal obstruction cases, 181 (87.9%) had good outcome having been discharged alive uncomplicated or improved where as 25 (12.1%) had bad outcome. The mortality rate was 25(12.1%). Out of 44 (21.4%) patients who developed postoperative complications, surgical site (wound) infection and anastomosis leak 30 (68.2%), 22 (50%) respectively were the prevalent complications.

Table 4: Management outcome and complications developed in the postoperative course of patients in Nekemte Referral Hospital from January to September 2018

variables		Frequency	Percent
post op complication	yes	44	21.4
	no	162	78.6
	Total	206	100
Length of hospital stay(LOS)	<=10 days	113	54.9
	>10 days	93	45.1
	Total	206	100
Outcome of the patient	Improved & discharged(good outcome)	181	87.9
	Died(bad outcome)	25	12.1
	Total	206	100

5.7. Factors associated with management outcome of intestinal obstruction

To identify the factors associated with management outcome of adult intestinal obstruction, each variable were analyzed using binary logistic regression. Out of these age, sex, residence, educational status, duration of illness before presentation, shock, intra-operative findings, SSI, anastomosis leak and length of hospital stay are candidates for multivariate analysis.

Table 5: Bi-variable table of factors associated with management outcomes of adult intestinal obstructions in Nekemte referral hospital from January to October 2018

Variables	character	Management outcomes		p-value	COR (95%)
		bad	good		
age of the patient	15-24	1	23	.000*	10.844 (3.805-30.907)
	25-54	5	117	.025*	10.659 (1.339 – 84.86)
	>=55	19	41		1
sex	Female	6	79	.18*	2.453 (.936-6.429)
	Male	19	102		1
occupation	Farmer	22	105	0.557	.530 (.064-4.403)
	Merchant	0	41	0.998	12(0.006-11.123)
	Government employer	1	21	0.564	2.333(.131-41.554)
	Private employer	1	5	0.699	1
residence	Rural	21	106	.020*	.269(.089-.8190
	Urban	4	75		1
educational status of the patient	Illiterate	10	24	.001*	.229(.092-.569)
	Literate	15	157		1
referral mode	Self referral	7	62	0.536	1.340(.531-3.380)
	Come with referral paper	18	119		1
pre-operative co morbidity problem	Yes	1	14	0.509	2.012(.253-15.999)
	No	24	167		1
duration of presentation in hours	<=24	5	82	.022*	3.313(1.191-9.213)
	>24	20	99		1
abdominal pain	yes	25	180	1	0
	No	0	1		1
vomiting	Yes	20	181	0.999	14620061131
	No	5	0		1
constipation	Yes	13	89	0.791	.893(387-2.062)
	No	12	92		1
abdominal distention	Yes	19	136	0.925	.954(.359-2.537)
	No	6	45		1
SHOCK	Yes	13	55	.035*	.403(.173-.939)
	No	12	126		1
abdominal tenderness	Yes	19	121	0.361	.637(.242-1.6780
	No	6	60		1
Guarding	Yes	9	54	0.531	.756(.315-1.816)
	No	16	127		1
bowel sound	Hypoactive	8	51	0.79	.873(.323-2.365)
	Normoactive	7	57	0.835	1.115(.400-3.112)

	Hyperactive	10	73		1
Was the rectum empty?	Yes	12	76	0.57	.784(.339-1.813)
	No	13	105		1
did the patient has previous history of abdominal surgery	Yes	5	31	0.723	.827(.288-2.371)
	No	20	150		1
diagnosis on admission	LBO	9	64	0.475	2.370(.222-25.313)
	SBO	15	114	0.434	2.533(.247-25.942)
	Other	1	3		1
intra-operative finding after laparatomy	Viable bowel	7	133	.000*	7.125(2.802-18.119)
	Gangrenous bowel	18	48		1
intra-operative procedure performed	derotation and milking	4	33	0.967	1.031(.237-4.479)
	primary resection and anastomosis	16	86	0.505	672(.209-2.161)
	stoma	0	10	0.999	201934358.246(.000)
	adhesolysis	1	20	0.427	2.500(.261-23.991)
	Reduction and herniorraphy	4	32		1
post operative diagnosis	LBO	15	108	0.999	.000(0.000
	SBO	10	69		1
cause of obstruction if SBO	small bowel volvules	7	37	0.999	.000(0.000)
	adhesion and band	5	26	0.999	.000(0.000)
	inguinal hernia	3	29	0.999	.000(0.000)
	femoral hernia	0	12	1	.000(0.000)
	intussusceptions	0	7		1
cause of obstruction if LBO	sigmoid volvules	7	47	0.897	.895(.168-4.782)
	cecal volvules	1	8	0.96	1.067(.083-13.650)
	Colo- rectal mass	1	1		1
SSI(wound infection)	yes	10	20	.000*	.186(.074-.470)
	no	15	161		1
anastomosis leak	yes	8	14	.001*	.178(.065-.485)
	no	17	167		1
post-operative pneumonia	yes	0	4	0.999	228174415.864(000
	no	25	177		1
Length of hospital stay in days	<=10	7	106	.006*	3.634(1.446-9.136)
	>10	18	75		1

* has significant association.

5.8. Factors associated with management outcome of intestinal obstruction

Numerous associations were found to be significant in the bi-variate analysis. Therefore, a multivariate approach was applied to determine which factors best explained and predict management outcome of patients.

Table 6: Multi-variable table of factors associated with management outcomes of adult intestinal obstructions in Nekemte Referral Hospital from January to September 2018

Variables		Management outcomes		P-value	AOR(95%CI)
		good	bad		
Age in year	15-24	23	1	0.551	2(0.192-22.131)
	25-54	117	5	.006**	6(1.736-25.657)
	>=55	41	19		1
sex	male	102	19	.28	.233(.063-.857)
	female	79	6		1
residence	rural	106	21	0.494	.612(.150-2.500)
	urban	75	4		1
educational status of the patient	illiterate	24	10	0.565	.680(.183-2,530)
	literate	157	15		1
Duration of presentation of illness in hours	<=24	82	5		1
	>24	99	20	0.136	.320(.071-1.433)
Shock	yes	55	13	0.814	.863(.253-2.941)
	no	126	12		1
intra-operative finding of bowel	Viable	133	7		1
	Gangrenous	48	18	.043**	.271(.077-.957)
SSI(wound infection)	yes	20	10	0.273	.473(.124-1.801)
	N0	161	15		1
Anastomosis leak	yes	14	8	.047**	.254(.065-.982)
	no	167	17		1
LOS in days	<= 10	106	7		1
	> 10	75	18	0.843	1.150(.289-4.573)

 **statistically significant

From this multivariate analysis, age, intra-operative findings, and anastomosis leak have statistically significant association with management outcome.

In this analysis age group 25-54 years were 6 times more likely to have good outcome compared from age greater than 55 years (AOR=2, 95%CI: 1.736-25.657, p-value=0.006) . Intra-operative finding had significant statistical association with management outcome of patients (AOR=0.271, 95%CI: 0.077-0.957, p-value=0.043). Patients with gangrenous bowel intra-operative finding were 27.1% less likely to have good management out come as compared to those who had viable bowel patients and postoperative complication with anastomosis leak had significant statistical association with management outcome. Patients who had anastomosis leak complication were 25% less likely to have good management out come as compared to those who had no anastomosis leak complication.

CHAPTER SIX: DISCUSSION

Acute bowel obstruction presents as a frequently encountered emergency in hospitals throughout the world, accounting for a great proportion of emergency room visits. This poses a challenge to the surgical trainee. Its treatment requires careful pre-operative preparation, good surgical judgment, technique, and post-operative care, which are often very demanding (3, 4). This hospital-based study has tried to address associated factors and management outcome of intestinal obstruction in Nekemte referral hospital. Accordingly, some of the common causes, its complication, and management outcome were identified.

In this study, small intestinal obstruction was common in the age group 25-54 years 122(59.2%), the age ranges from 15 to 80 years with mean age of 42.6 years (standard deviation ± 16.15). This is consistent with study conducted in GU and Uganda (3, 26). Out of 60(29.1%) patients whose age is above 55 years old; 19(32%) were died, 15(25%) had pre-operative co morbidity problem. Age group 25-54 years were 6 times more likely to have good outcome compared from age greater than 55 years (AOR=6.6, 95%CI: 1.736-25.657, p-value=0.006) . This is because that patient above 55 years old has decreased functional reserve of critical organ systems resulting in surgical stress and development of co morbid condition.

Intestinal obstruction is more common in males; with male to female ratio of 1.4:1. This is inconsistent with other studies like by Russell RCG; London, William A; George Zuidema hospital (27) and some Africa countries (17, 18, 28). SBO secondary to adhesion in male is 27 (33.8%) and in female 4(8.7%). 76 (62.1%) of males and 43 (50.2%) of females presented late after 24 hours of their clinical symptom respectively. From those who develop postoperative complication, male accounts (68.8%) and females 13 (29.7%).

More than two-thirds 157(76.21%) of patients with intestinal obstructions were literate, 49(23.7%) were illiterate. The most common signs and symptoms were abdominal pain205 (99.5%), abdominal distension 155 (75.2%), abdominal tenderness 140 (68%), constipation102 (49.5%).

Two third of the patients, 137(66.55) came after they referred from the sub regions of Nekemte Referral Hospital and the remaining 69 (33.5%) patients came by themselves. Patients who presented within 24 hours of onset of symptoms in our study was 87(42.2%) and 119 (57.8%) came later after 24 hours. Patients who presented within 24 hours is lesser compared from similar studies done in ARH (52%), Ethiopia, by Eleweke in Nigeria (56.8%), in Bomet, Kenya (48.5%). Median duration of illness was 34 hours ranging from 4 to 100 hours. However, the effect of this on mortality was not statistically significant in this study. This dalliance was possibly due to, infrastructural problems, poor health-seeking behavior, delayed referral in our sub region, unavailability of blood and inadequate power supply in the setup (14, 21, and 26).

According to our study, cause of small bowel obstruction has no statically significant association with management outcome. However, the primary cause of intestinal obstruction was small bowel obstruction 127(59.7%) mainly due to small bowel volvulus 44(34.9%), inguinal hernia 32 (25.4%), adhesion and bands 31 (24.6%). The second site of IO is LBO accounting 80 (38.8%) with sigmoid volvulus 54(67.5%) and colonic tumors 17 (21.3%) being the leading causes which is in contrary with a study done in Black Lion Hospital reporting, small bowel and large bowel obstruction accounts 52.3% and 46.7% respectively(5). In addition, another study conducted in Saudi Arabia shows LBO were mainly due to fecal impaction (7.1%), colonic cancer (3.6%), and sigmoid volvulus in 5.3 % (18). Socioeconomic factors and dietary habit be responsible for the observed difference.

As of this study, $2/3^{rd}$ of the intra-operative findings was viable bowel 140(68%) and 66(32%) was gangrenous bowel which is higher compared from the study done in DBRH,ARH whose results shows 25% and 18 % respectively for gangrenous bowel finding. Out of 66 gangrenous bowel intra operative finding, 51 (77.2%) were presented late after 24 hours, 15 (22.7%) presented within 24 hours, 42 (63.7%) presented in shock, 38 (57.5%) of gangrenous bowel was caused by volvules, 22(3.5%) of gangrenous bowel was caused by strangulated hernia and adhesion. Gangrenous bowel was found to be statistically significant with management outcomes (AOR=0.271, 95% CI: 0.077, 0.957, P-value=0.043) suggesting that patients with gangrenous bowel have 27.1% less likely to have good outcome

as compared with patients having viable bowel. This is due to that bacteria will get access of translocation and multiplication to cause sepsis when the bowel becomes gangrenous.

Primary bowel resection and anastomosis 102 (49.5%) was the most common intra-operative procedure performed followed by derotation (untwisting volvulus) 37 (18%) while herniorraphy 36 (17.5%) and adhesionolysis 21 (10.2%) respectively were the third and fourth common intra-operative procedures. The type of the procedure-performed intra operatively had no statically significant association with the management outcome.

This study shows Post operative complication developed in 44 (21.4%) of totally operated patients. The most commonly encountered postoperative complications were wound infection 30(66.7%) followed by anastomosis leak 22 (21.5 %%). This contradicts with a study conducted in Tanzania, Pakistan, GUH with prevalence of 15.83%,15%,& 16.3% respectively(1,5,7,13). Of all the complication in our setup, anastomosis leak was statistically significant with management outcomes (AOR=0.254, 95% CI: 0.065, 0.982, P-value=0.047) suggesting that patients with anastomosis leak have 25.4% less likely to have good outcome as compared with patients have no post operative anastomosis leak. This is because patients complicated with anastomosis leak are prone to develop sepsis, severe malnutrition (since they kept NPO long period), at risk for hospital acquired infection and pulmonary embolism (since they will be bed ridden for some period).

According to this study, more than half of the patients 153 (54.9%) were discharged within 10 days of operation. The length of hospital stay varies from minimum of 3 days to the maximum 36 days with the average duration 10.56 days (SD ±6.76). Patients who stayed for more than 10 days and who developed post operative complication were 38 (40.8%) where as patients who discharged within 10 days of operation and who developed post operative complication were 6(5.4%). This high percentage may be probably that patients are at risk for hospital-acquired infection when they stayed for long period and poor postoperative pain management will hinder fast recovery.

The mortality rate in our study was 12.1% which is comparable with studies done in Nigeria 12.1%(11),Gondar 11.8%(13),Sudan 13.7%(16), and Tanzania 14.3%(20) but a Study done in Larkana, Pakistan and Iraq show overall mortality rate of 6.6%,3.49% & 4.3%

respectively (1,5,19). 21(84%) of the death were from rural area and 4(16%) from urban area. From total death, 20(80.5%) were initially presented after 24 hour of their clinical symptoms, 16(15.5%) death were after primary resection and anastomosis was done to relive their obstruction.

This mortality rate of 12% in our study is unacceptably high especially when compared to mortality rate of 4% in developed countries [2]. The most common cause of death in this study was related to sepsis, which accounted for 19(76) % of the mortality, which is similar with Lagos and Nigeria, unlike the findings of the studies in BLH which is 52%, WSTRH 48%. Multivariate analysis revealed that age, sex, intra-operative finding, and anastomosis leak were the independent predictors of mortality.

Strength and Limitation of the Study

Strength of the study

Since data was collected prospectivelly, it avoided incomplete documentation of charts like un-recording and miss-recordings.

Limitation of the Study

Since it is institutional based cross-sectional study, it may not be representative of the whole population.

CHAPTER 7: CONCLUSION AND RECOMMENDATION

7.1 Conclusion

Intestinal obstruction is a commonly encountered surgical emergency. SBO is the leading site of obstruction caused by small bowel volvules, inguinal hernia, and adhesion. Sigmoid volvules and colo-rectal mass are the two most common causes of LBO.

Age of the patient, sex, intra-operative findings and postoperative complications by anastomosis leak were found to be the most associated factors that matters the management outcome of intestinal obstruction.

The mortality rate recorded in this study is, however, unacceptably high, despite there is no universally set common standard mortality rate. The most commonly encountered postoperative complications were wound infection.

7.2 Recommendation

Mortality risk increased with age for most surgical procedures. Careful assessment of potential problems in the peri-operative period is mandatory especially for aged patient since they have decreased functional reserve of critical organ systems and masked co morbidity problems.

Strangulated hernia and adhesion is now coming the second and third leading cause of bowel obstruction. Therefore, to decrease complications associated with gangrenous bowel, elective surgery for inguinal and femoral hernia repair should be widely performed in NRH and its sub region hospitals that have general surgeons.

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ANNEX .I Checklist

CHECKLIST FOR DATA COLLECTION ON PROSPECTIVE ANALYSIS ON ASSOCIATED FACTORS AND MANAGEMENT OUTCOME OF SURGICALLY TREATED ADULT INTESTINAL OBSTRUCTION AT NEKEMTE REFERRAL HOSPITAL, OROMIA, WESTERN ETHIOPIA *FRPOM JANUARY* 2017-SEPTEBER 30/ 2018

Card No.-- *Code……………………………………*

Part1. Socio-demographic characteristics

1. Age _____

2. Sex

   a. Male   b. Female

3. Occupation   a. Farmer   b. merchant   c. government employer

d. private employer   e. others(specify)_____ f. Not mentioned

4. Address a. Rural   b. Urban   c. Not mentioned

5. Pre operative co morbidity problem   1.yes   2.no

Part2. Clinical manifestation at presentation

6. Duration of presentation in hours_____

7. Symptoms at presentation

a. Abdominal pain, 1.Yes   2.No   3.Not mentioned

b. Vomiting, 1.yes   2.No   3.Not mentioned

c. Constipation, 1.yes   2.No   3.Not mentioned

d. Abdominal distension   1. Yes   2. No   3.Not mentioned

8. Clinical finding:

a. shock   1.yes   2.no

b. Abdominal tenderness   1.Yes   2.No   3. Not mentioned

c. Guarding   1.Yes   2.No   3.Not mentioned

d. Distended abdomen   1.Yes   2.No   3.Not mentioned

e. Bowel sound 1.Hypoactive 2.Normoactive 3.Hyperactive 4.Not mentioned

F. Was the rectum empty? 1. Yes   2. No   3. Not mentioned

Part 3 Causes and Management Outcome of Obstruction

9. Did the patent has previous abdominal surgery   1.Yes   2. No   3.Not mentioned

10. If question no.9 is yes, specify indication of operation _____

11. Diagnosis on admission_____

12. Conservative management succeeds.   ------------1.yes   2.no

13. If yes for Q(12)mention what was done

14. Intra operative findings

   1. Small bowel volvulus (viable)

   2. Small bowel volvulus (gangrenous)

   3. Sigmoid volvulus (viable)

   4. Sigmoid volvulus (gangrenous)

   5. Adhesions and Bands

   6. Intussusceptions

   7. Others

14. Procedure done

      1. Untwisting the volvulus

      2. Anastomosis: type, specify-----------

      3. Stoma (Colostomy) specify-----------

      4. Laparatomy

      5. Adhesionolysis

      6. Others (specify) _____

15. Postoperative diagnosis

      A. Small bowel obstruction

      B. Large bowel obstruction

16. Is there any preoperative and postoperative diagnosis discrepancy?

      A. Yes

      B. No

16. If yes, Kind of intestinal obstruction   1. SBO   2. LBO

17. Causes of obstruction if SBO _____

18. Causes of obstruction if LBO_____

19. Post op complication developed 1.Yes   2. No

20. If question no.18 is yes what type is it?

   A. Hematoma/seroma   1) yes 2) no

   B. Incision SSI: (1) superficial (2) deep

   C. Facial dehiscence (Anastomosis leak) 1) yes 2) no

D. Pneumonia/Atelectasis   1) yes 2) no

E. Others, specify_____

21. Length of hospital stays in days_____

22. Outcome of the patient   1. Improved and discharged   2.Died

23 If died probable cause of death_____

DECLARATION

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been fully acknowledged.

Name: Natnael Getachew (BSc)

Signature: _____Date--------------------------

Name of the institution:_ Jimma University College of Health Science

Date of submission: --

This thesis has been declared for final submission with my internal examiner and advisers

Approval as university,

Name of internal examiner_____

  Signature_____

  Date_____

Confirmed by, advisers

1. Name of first advisor: Dr. Seifu Alemu (MD, consultant general surgeon and pediatric surgeon)

 Date_____   Signature_____

2. Name of second advisor: Mr.Teshome Kebeta (BSc, MSc)

  Date _____   Signature_____