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Proportion and factors Associated with Re-Laparotomy Among Laparotomy Patients in Debre Tabor Comprehensive Specialized Hospital, Amhara Region, Northcentral Ethiopia; Institutional Based Cross Sectional Study

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A THESIS REPORT TO BE SUBMITTED TO COLLEGE OF MEDICINE AND HEALTH SCIENCES SCHOOL OF MEDICINE DEPARTEMENT OF INTEGRATED EMERGENCY SURGERY AND OBSTETRICS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN INTEGRATED EMERGENCY SURGERY AND OBSTETRICS.

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Tittle of the research	**PROPORTION AND FACTORS ASSOCIATED WITH RE-LAPAROTOMY AMONG LAPAROTOMY PATIENTS IN DEBRE TABOR COMPREHENSIVE SPECIALIZED HOSPITAL, AMHARA REGION, NORTHCENTRAL ETHIOPIA**
Duration of research	(January 1 – August 30)/2021
Study Area	Debre Tabor Comprehensive specialized Hospital

Candidate's Declaration form

Declaration

This is to certify that the thesis entitled "proportion and factors associated with re-laparotomy among laparotomy patients in Debre Tabor Comprehensive Specialized Hospital", submitted in partial fulfillment of the requirements for the degree of Master of science in Department IESO; school of medicine; College of Medicine and Health Science Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

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Advisor's approval form

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Approval of Dissertation for defense

We hereby certify that we have supervised, read, and evaluated this thesis/dissertation titled "proportion and factors associated with re-laparotomy among laparotomy patients in Debre Tabor Comprehensive Specialized Hospital"

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List of Acronyms and Abbreviations

AAA - abdominal aorta aneurysm

AL - anastomotic leak

ANC - anti natal care

BPM - beats per minute

CAD - Coronary artery disease

COPD - Chronic obstructive pulmonary disease

DM - diabetes mellitus

DTCSH – Debre Tabor comprehensive specialized hospital

HIV - Human immune virus

HTN - hypertension

IAI - intra abdominal infection

IESO - integrated emergency surgery and obstetrics

LBO - Large bowel obstruction

NICU - neonatal intensive care unit

PE - principal investigator

PF - pancreatic fistula

PUD - Peptic ulcer disease

RL - Re-laparotomy

SBO - Small bowel obstruction

SPSS – Statistical Package for the Social Sciences

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Abstract

Background. Re-laparotomy refers to operations performed within 60 days of an initial laparotomy, for complications like anastomotic leak and intra-abdominal abscess collection. Incidence is highly variable. Morbidity and mortality following relaparotomy is high.

Either globally or nationally the studies conducted about this problem are minimal. In Debre Tabor comprehensive specialized hospital study was not conducted on this problem. On patients who undergone re-laparotomy the risks of morbidity and mortality is high. The costs, length of hospital stay and the psychological impact on patients and their families are high. Additionally, the decisions by the physicians to do or not to do relaparotomy is difficult.

Objectives: The aim of the study is to assess the proportion and factors associated with re-laparotomy among laparotomy patients in Debre tabor comprehensive specialized hospital.

Methods: Institutional based cross-sectional study has been conducted in Debre Tabor comprehensive specialized hospital from January 1/2019 to January 30/2021 on 617 patients who undergone laparotomy surgery. SPSS version 25 were used for data analysis. The results were described by using descriptive statistics like summary value, tables of frequency, graphs and diagrams. The associated factors for re-laparotomy were identified by using multiple binary logistic regression analysis. P value < 0.05 were considered statistically significant.

Result: The proportion of relaparotomy was 9.1 %. The median age was 34 year. Among relaparotomy patients 73.2 % were males and 26.8% were females. In this study age above 60 years (AOR = 11.5, 95% CI = [2.5-52]), duration illness more than 120 hours (AOR = 5.6, 95% CI= [1.6-20]), pre-operative pulse rate more than 120 beats per minute (AOR = 4.7, 95% CI= [1.3-16.7]), Patients having peritonitis (AOR = 14, 95% CI= [5.9-33.2]) and Comorbidity (AOR = 6.1, 95% CI = [1.4-26.2]) were associated with re-laparotomy.

Conclusion and recommendation; In DTCSH the proportion of relaparotomy was high. Factors associated with relaparotomy were; age above 60 years, duration of illness more than 72 hours, pre-operative pulse rate greater than 120 beats per minute, comorbidities, presence of peritonitis. Creating awareness on the community about the importance of early visit of health facilities when they feel illness will decrease the risk of relaparotomy.

Key words: re-laparotomy, anastomotic leak, peritonitis, wound dehiscence, evisceration.

1. Introduction

1.1. Background Information

Laparotomy is a surgical incision into the abdominal cavity for diagnosis or in preparation for major Surgery [1]. The term Re-laparotomy (RL) refers to operations performed within 60 days of an initial laparotomy, for complications arising following the primary surgery. RL rates have been reported to range from 1 to 4.4%; RL may be early or late; planned or unplanned; emergency or elective; and radical or palliative. The objectives of RL are to manage complications of the primary surgery, restore intestinal continuity, prevent fecal contamination of the peritoneal cavity, obtain homeostasis, control hemorrhage, prevent intra-abdominal infection or sepsis, and plan delayed curative surgery. Since most RLs are performed for life-threatening complications, morbidity and mortality rates are high. This urgent re-laparotomy is also called as final choice operation [2-6].

Redo laparotomy are called On demand if laparotomy has to be redone because of patient condition and called planned if the second laparotomy is decided upon during the course of first surgery itself [5]. Early re-laparotomy was defined as an urgent or planned surgical procedure within 30 days after laparotomy [6].

A large number of patients undergo various operative procedures every day, out of which laparotomy forms a major proportion [5]. RL was done in cases where the treating surgeon decided for RL based on the parameters.(Refractory post-operative hemorrhage, Persistent progressive peritonitis, Persistent intra-abdominal abscess refractory to medical treatment and percutaneous drainage, Evidence of anastomotic failure, Wound dehiscence, Refractory post-operative ileus, deterioration of patients' clinical condition despite appropriate therapy [2-4].

Despite advances in minimally invasive surgery, laparotomy remains a mainstay strategy for abdominal access. Re-laparotomy is thus frequently necessary, both for malignant and benign recurrent diseases [7]. The most common indications for re-laparotomy are peritonitis, infection, bleeding, abscess, anastomotic leakage, wound dehiscence, necrotizing pancreatitis, bowel necrosis, bowel obstruction, and evisceration [8].

1.2. Statement of the problem

A large number of patients undergo various operative procedures every day, out of which laparotomy forms a major proportion. Abdominal surgery that has to be redone in association with initial surgery is referred to as re laparotomy. Re-laparotomy is associated with increased morbidity and mortality. Therefore, it is the final choice of surgery. Whenever re laparotomy is necessary, mortality increases to as high as 22% to 51% [3, 5, 9].

About 10% of laparotomies are re-laparotomies [7]. Today, 40 to 66 % of elective procedures in abdominal surgery are reoperations. Reoperations show increased operative time and risk for intraoperative and postoperative complications, mainly due to the need to perform adhesiolysis. It is important to understand which patients will require repeat surgery for optimal utilization and implementation of anti-adhesive strategies [10]. But Accurate and timely identification of patients in need of a re-laparotomy is challenging since there are no readily available strongholds. The decision to perform re-laparotomy is often difficult [11, 12]. The decision which patient requires reoperation and re-laparotomy itself should be undertaken by experienced surgical staff to minimize the risk of possible high rate of consecutive complications and mortality [3].

Early re-laparotomies due to post-operative peritonitis are surgical emergencies associated with a poor prognosis [13]. Complex intra-abdominal sepsis secondary to acute appendicitis is common, and management frequently involves re-laparotomy. Incidence of re-laparotomy differs according to hospital setup as well as patient characteristics and initial surgery. It also depends on post-operative care given to patient following first surgery and incidence of post-operative sepsis. However, about the incidence developing world data are scarce [1, 8, 12, 14].

Complications from abdominal surgery may necessitate a second or more surgeries [14]. Laparotomy has to be re done due to complications like biliary peritonitis, fecal fistula, anastomotic leak, burst abdomen, obstruction, wound dehiscence, evisceration, hemorrhage, vascular complications, post operation peritonitis, perforation, suture line insufficiency, biliary peritonitis etc. of these post-operative peritonitis and intra-abdominal sepsis are the most common cause. The surgical treatment is primarily aimed at eliminating the source. Patient characteristics like demographics, co morbidities, pre-operative, intra operative and post op characteristics has to be analyzed to identify the factors leading to re laparotomy [1, 3, 5, 6, 8].

Intra-abdominal infections are common surgical emergencies and have been reported as major contributors to non-trauma deaths in the emergency departments worldwide. In hospitals worldwide, non-acceptance of, or lack of access to, accessible evidence-based practices and guidelines result in overall poorer outcome of patients suffering IAIs [15]. Secondary peritonitis or abdominal sepsis and intra-abdominal hemorrhages are associated with high mortality rates and are still challenging among surgeons. Planned re-laparotomy is one of the underestimated treatment options of these intractable clinical entities. In one study conducted on turkey, secondary peritonitis, and intra-abdominal hemorrhage groups mortality rates were 52.4%, 59.3%, and 28.5% respectively. Factors observed relating mortality were presence of malignancy, mesenteric ischemia, development of organ failure and presence of anastomosis [1, 16].

The reasons for re laparotomy are first laparotomy; incision technique, competence of surgeon, patient co-morbidities, delay in assessment of time interval between the development of complication and re-laparotomy and unjustifiable time delay in reaching correct diagnosis. Apparently, these factors increase the morbidity and mortality of the patient which makes re-laparotomy the final choice [5].

Maintaining perioperative normothermia has been shown to decrease the rate of surgical site infection after segmental colectomy and is part of the World Health Organization's Guidelines for Safe Surgery. However, strong evidence supporting this association is lacking, and an exact definition of normothermia has not been described [17, 18].

Access to safe and timely surgical care has increasingly been included in the global health agenda. Five billion people worldwide lack access to safe and affordable surgical and anesthesia care, and it is estimated that conditions that are treated by surgery account for 18% of the global burden of disease. In addition, 1.5 million deaths could be averted each year with access to essential surgical procedures such as trauma care, obstetric care, and care of common abdominal emergencies. The significance of emergency and essential surgical care was recognized by global health agencies at the 68th World Health Assembly in 2015, which passed a resolution to prioritize emergency and essential surgical and anesthetic care as a component of universal health coverage [19].

Current evidence suggests that re-laparotomy poses a twofold risk of incisional hernia, resulting in higher costs and a reduced quality of life [17].

The literature on reoperation following pancreaticoduodenectomy is sparse and does not address all concerns [20].

Currently, it is unknown which patients are at risk for undergoing repeat abdominal surgery. The risk of repeat abdominal surgery has only been investigated in a number of disease-specific cohorts which assessed risk factors for undergoing repeat surgery for disease recurrence [10].

Either globally or nationally the studies conducted about this problem are minimal. In this region, even if one study was conducted in Debre Markos Referral hospital significant variables like pre-operative vital sign was missed. In Debre Tabor comprehensive specialized hospital study was not conducted on this problem. On patients who undergone re-laparotomy the risk of morbidity and mortality is high. The costs, length of hospital stay and the psychological impact on the patients and their families are high. Additionally, the decisions by the physicians to do or not to do relaparotomy is difficult. The awareness of the community about acute abdomen and about the importance of early visit of health facility is low. Therefore, this study aims to assess the magnitude and factors associated with re-laparotomy in Debre Tabor comprehensive specialized hospital.

1.3. Significant of the Study

Although re-laparotomy is expected in abdominal surgeries, lack of research on the problem puts the patient at high risk for morbidity and mortality. So, Information on the magnitude and associated factors of re-laparotomy is necessary to focus on minimizing the problem by analyzing the magnitude and risk factors of the problem, to improve the care and to establish preventive strategies.

This study will give relevant information about the magnitude and associated factors of re-laparotomy and measures to tackle them. Subsequently will also help to reduce the incidence of re laparotomy not only but also it may be used by researchers to do further study and as well for policy makers to develop strategies to tackle the problem.

For DTCSH this study will show the level of surgical care in the hospital; and will formulate preventive strategies to decrease the problem in the hospital.

2. Literature Review

2.1. Proportion of Re-Laparotomy

A retrospective study was conducted on Repeat laparotomy in the developing world tertiary level surgical service. Re-laparotomy rate was 24% and Appendicitis and trauma were the most common diagnoses. Planned re-laparotomy rate was high (41%); however, negative re-laparotomy rate was 9%. and morbidity rate (64%), mortality rate was 14%. Patients requiring multiple re-laparotomies had further worsened outcomes [14].

A retrospective study done on Kyushu University Hospital, Japan, analysis of 284 cases on living-donor liver transplantation was performed. The incidence of early re laparotomy of the recipient was 9.2%. Patients with postoperative bleeding experienced a significantly higher mortality rate (54.6%) than those with other reasons for early re laparotomy 13.3% [21].

A retrospective observational study conducted on 2015 in North Korea, from the total of 292 patients who underwent elective open AAA repair at Asan Medical Center. The incidence of early re-laparotomy stay was 4.1%, and the most common causes were bowel ischemia (41.7%) and postoperative bleeding (25%).Furthermore, early re laparotomy was associated with perioperative and overall in-hospital mortality [22].

Retrospective study conducted in India in 2015, about Patterns and Outcomes of Urgent Redo-Laparotomies by Indian Journal of Surgery. From a total of 6530 patients redo laparotomy performed were (2.5 %) [23]. In the country another study Dehradun, Urgent Re-Laparotomy was (4.2%) [24]. Additional Observational study in the country the Incidence of re-laparotomy was 2.84% [18].

In India, Coimbatore, a retrospective study conducted to assess the risk factors of re-laparotomy among patients undergoing laparotomy. The incidence of re-laparotomy in the study was 7% and the incidence of second re-laparotomy was 1%, [5]. In the country, a prospective nonrandomized observational study was conducted at a tertiary care Medical College Hospital. Among A total of 622 laparotomies performed during the study period the incidence of RL was 4.8% [2].

A study conducted in South Africa, Pietermaritzburg. 72 patients required more than one repeat laparotomy and a total of 182 repeat laparotomy operations were performed on the patient's cohort. The majority of patients required only two repeat laparotomy (65 %), while two patients

required a total of 6 repeat laparotomy each, both with an initial diagnosis of appendicitis and both those patients were survived. Total mortality for the study was 21% [25]. In Democratic Republic Congo, from 304 patients underwent laparotomies, (18.4%) underwent re-laparotomies [13].

In Ethiopia, Addis Ababa, a retrospective study conducted on pediatric surgical patients. Who underwent re laparotomy at Tikur Anbessa Teaching Hospital, between September 1, 2011 and August 31, 2016. The re laparotomy rate was 17.2% [26]. Another study in Addis, at St. Paul's Hospital Millennium Medical College. From 2146 laparotomies, 6.9% needed re-laparotomy [1]. In the country Amhara region, Debre Markos referral Hospital; From 390 patients undergone laparotomy, (12.3%) were identified with re-laparotomy [8].

2.2. Socio Demographic Factors

A study conducted on Repeat laparotomy in a developing world the average age was 38 years with a male predominance (70%) [14, 23]. A study conducted in North Korea, on patients who underwent elective open AAA repair, age was significantly associated with re-laparotomy [22]. In other study conducted, in Coimbatore Medical College who underwent re laparotomy, the average patient age was 52.2 years and the male: female ratio was 25:5 [4].

In India, Dehradun, from 40 urgent re-laparotomy patients males were 25 and females were 15 [24]. Another study conducted in Western India for a total of 75 re-laparotomy cases. It was most common in age group of 31 to 40 years; with mean age of 39.25 years [18]. In the country additional study on patients underwent RL, the average patient's age was 52.2 years and the male to female ratio was 5:1 (44%) patients were above 50 years of age [2].

Two studies conducted in South Africa, on patients who underwent re-laparotomy, both studies showed male predominance respectively. The median age was 21 and 39 years respectively [12, 25]. In Democratic Republic Congo, from a total of 56 patients underwent re-laparotomies, 38 were men and 18 were women. The average age of patients was 34.6 ± 19 years [13]. Similarly, in Ethiopia, two studies on re-laparotomy in Addis and Debre Markos, found male predominance. The mean age was 37.5 year [8, 26].

2.3. Surgical Related Factors

A retrospective study done on Kyushu University Hospital, Japan, on living-donor liver transplantation was performed. The indications for re-laparotomy were postoperative bleeding (42.3%), insufficient portal venous flow (19.2%), and other (38.5%) [21].

A retrospective study in Trakia University, Bulgaria, was conducted in 2014 on medical records of group of 58 patients with oncological disease was performed. Studied parameters included body temperature, general or local peritoneal reaction, leukocyte count, paresis of gastrointestinal organs and presence of intestinal content in peritoneal drain fluid. There was no statistically significant association between patients with one surgical intervention and those with re-laparotomy due to anastomosis leakage [27].

Two studies identified that the indications for Re laparotomy were; anastomotic leak, persistent intra-abdominal infection, burst abdomen, enterocutaneous fistula, persistent intraabdominal abscess, stomal complications, post-operative hemorrhage, persistent intestinal gangrene, persistent or progressive peritonitis, wound dehiscence, and post-operative resistant ileus, evisceration. Surgical intervention for hollow viscus perforation was the most common index surgery needing RL followed by surgery for Intestinal obstruction. Other index surgeries were bowel gangrene and abdominal sepsis [2, 4].

A retrospective study conducted in India in 2015, about Patterns and Outcomes of Urgent Redo-Laparotomies. (42 %) of the index surgeries were elective and (58 %) performed in the emergency situation. Pancreas was the commonest organ for the index operation (25.9 %), followed by the colon and rectum (23.3 %) and the small bowel (18.7 %). The most common cause for re-exploration were postoperative hemorrhage (34.2 %), an abscess or fluid collection (29.6 %) and peritonitis. The mortality rate after redo laparotomies was 33.2 % with sepsis and multi-organ failure being the commonest cause of death [23].

In India, Dehradun Himalayan University, observational Prospective Study was conducted to assess the Etiological Factors and Outcomes of Urgent Re-Laparotomy. The most common indication for re-exploration was anastomotic leak, followed by pyoperitoneum and persistent peritonitis. Comparing the index surgery, lower gastro-intestinal procedures were most usually

involved (47.7%), followed by hepato-pancreato-biliary surgeries (18.2%). There were 6 cases of upper gastro-intestinal surgeries that re explored (13.6%) [24].

Observational study conducted on Re-laparotomy in general surgery department of tertiary care hospital of Western India for a total of 75 re-laparotomy cases. The most common indication of re-laparotomy was leak (34 patients); from an anastomotic site (29 patients) or from perforation (5 patients). The mortality was 34.72% [18]. In Coimbatore India another study was conducted to assess the risk factors of re-laparotomy. The indications for re laparotomy were anastomotic leak (20 %), burst abdomen (20%), pancreatic injury (10%), bladder injury (10%), negative laparotomy (10%), anastomotic leak. The variables with significant p value were, intra op and post op inotropic support, wound infection, wound dehiscence and intra-abdominal abscess. Classification of wounds were taken as variable but did not show any significant [5]. Contrary to this a study in the same country showed that wound class 3 and 4 has increased risk for re-laparotomy [28].

In central India, a retrospective cohort Clinical study of re laparotomy among all patients who have undergone emergency re-exploration from January 2018 to December 2019. 32 cases of re laparotomy were identified. Majority of patients required re laparotomy were anastomotic site leak in (50%) cases followed by intestinal obstruction in (31%)cases, hemorrhage in (16%)cases while the least cause being intra-abdominal sepsis in (6.2%) cases. Re laparotomy was associated with increased mortality and morbidity. Out of 32 patients, (12.5%) patients died [28].

The study conducted in Edendale Hospital, Pietermaritzburg South Africa. Of the total 1000 re-laparotomy patients from acute appendicitis as index case, 406 re-laparotomies, (55.9%) were planned and (44.1%) on demand. Logistic regression analysis showed four factors accurately predicted the need for subsequent re-laparotomy: patients referred from any rural center, duration of illness >5 days, heart rate >120 bpm, and perforation associated with generalized intra-abdominal sepsis [12]. Another study in the country found that Among the total re-laparotomy done, general surgical patients accounted for 60% and trauma patients for 40% [25].

In Katanga, Democratic Republic Congo, a cross-sectional, descriptive study in two Hospitals was conducted. Emergency laparotomy was performed in (91.07%) patients. Laparotomy-related infections were the primary indication for reoperation in 55.36% of cases. Initial laparotomy was

performed by a non-qualified surgeon in 60.71% of cases. Twelve patients who underwent reoperation died, reflecting a rate of 17.65%. Delayed diagnosis aggravates prognosis [13].

In Ethiopia Addis Ababa, Tikur Anbessa teaching Hospital retrospective study conducted on re laparotomy within the first 30 days of the initial surgery. The two most common indications for re-laparotomy were postoperative intra-abdominal collection and anastomotic leak. Mortality rate following re laparotomy was 26.4%. The most common cause of mortality was sepsis with multi-system organ failure (90.6%) [26].

Another similar study in Ethiopia, on patients who underwent Re-laparotomy at St. Paul's Hospital, Addis Ababa. From 129 patients analyzed (95.3%) had on-demand re-laparotomy. Patients operated on emergency made 70.5% of the cases making the ratio of emergency to elective surgery 2.4:1. The three most common surgeries that needed re-laparotomy were perforated appendicitis (27.1%), bowel obstructions (21.7%), and trauma (13.4%). The most common indications for re-laparotomy were intra-abdominal abscess (44.23%), wound dehiscence (13.2%) and anastomotic leak (11.6%). The overall mortality rate was 12.8 % [1].

A retrospective study in Debre Markos Ethiopia found that patients whose latency before surgery took > 60 hours were significantly associated with re-laparotomy. Patients with emergency surgery were about 83% times less likely to undergo re-laparotomy compared with patients who had emergency abdominal surgery [8].

2.4. Co Morbidities and Behavioral Factors

Historically a retrospective study conducted in United States in 2011 on Predictors of re-laparotomy after non trauma emergency general surgery. Multivariate analysis identified the predictors of re-laparotomy: peripheral vascular disease, alcohol abuse, body mass index of 29 kg/m2 or greater, the finding of any ischemic bowel, and operating room latency of 60 hours or longer. Patients with 2 or more of these predictors had a 55% risk of re-laparotomy whereas patients with fewer than 2 of these predictors had a 9% risk [29].

In Netherlands, Radboud University, a prospective cohort study conducted on Risk factors for future repeat abdominal surgery. Female sex and hepatic malignancy as indication for surgery significantly increased the risk of requiring repeat abdominal surgery. But contrary to this they

found that esophageal malignancy significantly reduced the risk of undergoing repeat abdominal surgery [10].

A retrospective observational study conducted on 2015 in North Korea, on patients who underwent elective open AAA repair. On multivariate analysis presence of Chronic obstructive pulmonary disease and number of red blood cell units transfused during the AAA repair were statistically significantly associated with re laparotomy [22].

In Japan, a study on 1311 institutions conducted on Risk factors of serious postoperative complications after pancreaticoduodenectomy. A pancreatic fistula with an International Study Group of Pancreatic Fistula Grade C was significantly associated with serious morbidity. Twenty-one variables were considered statistically significant predictors of serious complications; included age, sex, obesity, functional status, smoking status, the presence of co morbidity, non-pancreatic cancer, combined vascular resection, and several abnormal laboratory results [9].

In Italy, nationwide retrospective study on patients who undergone primary liver transplantation at six Italian Transplant Units. Among HIV patients, the number of early re-laparotomies became significantly increased. Preoperative refractory ascites and a difficult biliary tract Reconstruction requiring a Roux-en-Y choledochojejunostomy are associated with increased risk of early re-laparotomy [6].

In one study on patients with lower rectal cancer underwent curative Intersphincteric resection. Univariate analysis demonstrated preoperative chemotherapy usage was significantly associated with anastomotic leak. Re-laparotomy developed on (9.6 %) patients [30].

In Coimbatore, a retrospective study conducted to assess the risk factors of re-laparotomy among patients undergoing laparotomy in *PSG* Institute of Medical Sciences, the significant factors were systemic hypertension, COPD, CAD [5]. In India, a prospective nonrandomized observational study was conducted on patients underwent RL for various indications. From the total of six mortality patients had undergone emergency primary surgery; Three of the six mortality cases had uncontrolled diabetes mellitus [2].

In Katanga, Democratic Republic Congo, a cross-sectional descriptive study. Re-laparotomy-related co morbidities were arterial hypertension, cancer and poor physical status [13]. In Ethiopia Amhara region, Debre Markos referral hospital. A study on the prevalence and associated factors of re-laparotomy; diabetes mellitus was associated with re-laparotomy as a co-morbidity [8].

3. Conceptual Framework

Different factors like age, site of pathology and diabetes mellitus had associations with relaparotomy based on the literatures see (figure 1).

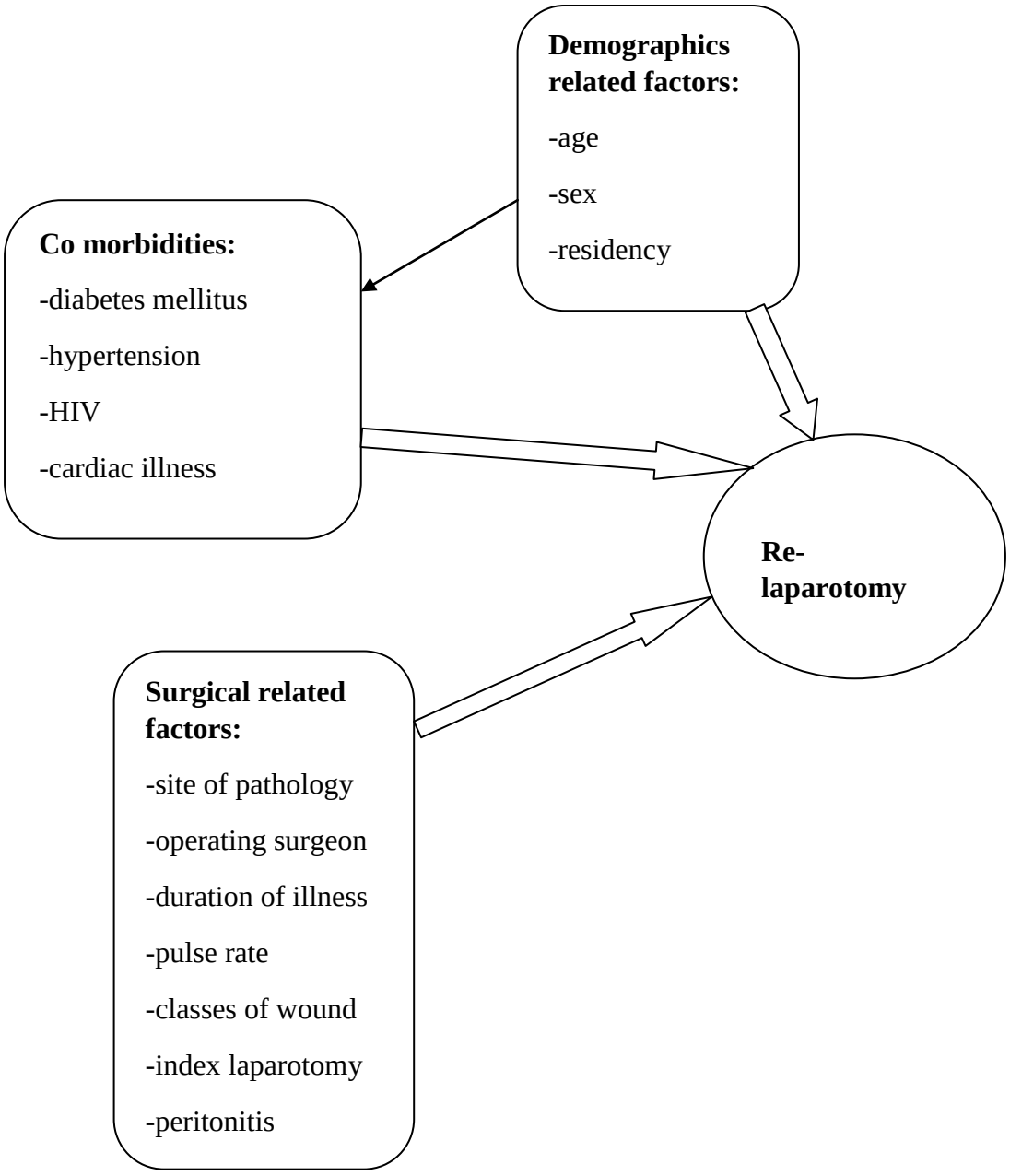

Figure 1: Conceptual framework adopted from different literatures

4. Objectives

4.1 General Objectives

To assess the proportion and factors associated with re-laparotomy among laparotomy patients in Debre Tabor Comprehensive Specialized Hospital, North-central Ethiopia, 2021.

4.2 Specific Objective

1. To determine the proportion of re-laparotomy among laparotomy patients in Debre Tabor Comprehensive Specialized Hospital, North-central Ethiopia, 2021.

2. To identify factors associated with re-laparotomy among laparotomy patients in Debre Tabor Comprehensive Specialized Hospital, North-central Ethiopia, 2021.

5. Methods

5.1. Study area

The study was conducted in DTCSH; which was founded in1923. Its located in Debre Tabor town, Keble 01, South Gondar Zone, Amhara region, it is 661 km to north from Addis Ababa. It has five major clinical departments (Internal medicine, surgery, pediatrics, NICU and Gynecology and Obstetrics) and three minor departments (psychiatry, Ophthalmology, and Dentistry) along with other follow up and special clinics for specific diseases. Currently has total of 402 staffs (137 nurses,2 Health officers,5 IEOS,23 midwives,46 general practioner,28 pharmacists, 6 psychiatrists, 2 Radiologist,15 Laboratory technician,6 medical laboratories,5 Anesthetist,1 ophthalmologist,1 Dentist,20 specialists, and 105 administrative staffs (DTCSH Administrative office). The hospital provides services for about 3 million people for catchment area. including labor and delivery, ANC, emergency and elective surgery, inpatient and outpatient for adults and pediatrics.

5.2. Study Period

The study was conducted from January 1/2019 to January 30/2021.

5.3. Study Design

Institutional based cross-sectional study was conducted in DTCSH.

5.4. Source Population

All patients treated with laparotomy surgery at DTCSH surgical ward.

5.5. Study Population

Patients treated with laparotomy surgery at DTCSH surgical ward within the last two years.

5.6. Eligibility Criteria

5.6.1. Inclusion Criteria

Patients who undergone both elective and emergency laparotomy surgery in DTCSH surgical ward.

5.6.2. Exclusion Criteria

Patients who referred from other institution after index laparotomy performed.

Patients who referred to other institutions after initial laparotomy done in DTCSH.

Patients who undergone laparotomy in DTCSH with obstetrics and gynecologic indication.

5.7 Sample Size and Sampling Technique

5.7.1 Sample Size Determination

5.7.1.1 Sample Size Determination for Objective I:

Sample size for the study was determined by using Single population proportion formula, by considering the following assumptions: proportion re-laparotomy [p] 6.9% taken from a study conducted in St. Paul's Hospital Millennium Medical College [1]; and allowing an error of 2% of in detecting the estimated Proportion and risk factors of re-laparotomy by chance alone [d] with 95% confidence interval, the sample size is calculated:

$$n = \frac{[Z\ \alpha/2]^2\ p\ [1-p]}{d^2}$$

$$n = \frac{[1.96]^2\ [(0.069]\ [1-0.069]}{[0.02]^2}$$

n= 617

where; n=the number of samples required at confidence interval (95%) (1.96)

P=proportion of re laparotomy (6.9%)

d= margin of error (2%)

5.7.1.2 Sample Size Determination for Objective II:

Sample size determination based on significantly associated factors from different studies by using Epi info version 7 which are shown in (table 1).

Table 1: sample size determination based on objective two

Variables	Assumptions							Reference
	Confidence interval	Power	Design effect	Ratio of exposed: unexposed	Percent of outcome in unexposed group	Odds ratio	Sample size	
Latency of initial surgery	95%	80%	1	1:1	4.07%	4.96	196	[8]
Urgency	95%	80%	1	1:1	4.7	31.58	30	[8]
Comorbidities	95%	80%	1	1:1	9.5	3.45	180	[4]

Therefore, the largest sample size is (n)= 617

5.7.2. Sampling Technique

Simple random sampling technique with computer program was used. The sample was selected from the previous two-year laparotomy in DTCSH surgical ward; which was 1012 taken from the hospital operation theater log book. When the selected study unit or card becomes non eligible or incomplete for the study it was replaced by another card.

5.8. Variables

5.8.1. Dependent Variable

Re laparotomy

5.8.2. Independent Variables

Demographics related factors: age, sex, residency.

Surgical related factors: site of pathology, classes of wound, operating surgeon, duration of illness, pulse rate >120 b/min, peritonitis, type of index surgery.

Co morbidities: diabetes mellitus, hypertension, HIV.

5.9. Operational Definition

Index surgery: is the first or initial abdominal surgery.

Duration of illness: the time from onset of the disease to surgery.

Site of pathology: stomach, small bowel, colon, gall bladder.

Type of index surgery; either emergency or elective.

Classes of wound: cleans mean no infection present or no hollow viscus that contains microbes are entered.

Clean/contaminated means hollow viscus opened or entered without significant spillage of contents.

Contaminated means early accidental wounds with extensive bacterial introduction. Hollow viscus opened with significant spillage.

Dirty means delayed traumatic wounds or with necrotic tissue, overt infection and perforated viscus with high degree of contamination.

Operating surgeon: IESO, surgeon or both.

5.10. Data Collection Procedure and Instrument

5.10.1. Data Collection Procedure

Four non employed BSC nurses for data collection and one BSC nurse for supervision was selected. The data collection was conducted by using a standard structured checklist which was prepared in English. The checklist was developed by reviewing different literatures. Data were collected by utilizing the prepared checklist format and was collected from patients card from patients who undergone laparotomy surgery from January 1/2019 to January 30/2021. Patients medical record numbers was identified from operation theater log book.

5.10.2. Data Collection Instrument

Structured checklist, pen, pencil, patient card, patient's registration log book.

5.11. Data Quality Control

One-day training for the data collectors and the supervisor prior to data collection was given. The method of training includes lectures, explanation supplemented with practical role play exercises that focus on purposes of the survey, meaning of each question and how to collect the data, confidentiality of information, and role & responsibility of data collectors and supervisor. During the data collection period the collected data was reviewed and checked for completeness and signed by the data collector and supervisor. Principal Investigator supervised the data collectors and supervisor and samples of checklist was re-checked at random bases.

5.12. Data Processing and Analysis

All the checklists were coded, cleaned and entered into EPI Info 7 and exported to SPSS version 25 software for analysis. The descriptive statistics that used in this study were; summary values like median, maximum, minimum, interquartile range, tables of frequency and percentage. Graphs like histogram, and diagrams like pie chart and bar chart were used to display the visual impression of data.

Simple binary logistic regression analysis was used to identify the associations between the dependent and independent variables. Those variables with p-value of < 0.25 on simple binary logistic regression analysis were entered into multiple binary logistic regression. The degree of association between independent and dependent variables was assessed by using odds ratio with 95% confidence interval and variables with p value < 0.05 was taken as statically significant. Hosmer-Lemeshow goodness-of-fit statistic was used to check the necessary assumptions for multiple logistic regressions.

6. Ethical Consideration

Ethical clearance was obtained from Bahir Dar University College of medicine & health science ethical review board. Official letter was written by department of IESO to the respective officials of the study area. To keep the confidentiality of clients' data, the patient's name or registration number was not documented; rather a code was given for each card. Information concerning the individual was not passed to a third party.

7. Result

7.1 Socio-Demographic Characteristics

In this study 617 laparotomies were considered as study participants. The age range was between 5 months to 78 years and the median age was 34 year with interquartile range age of 29 year. Most laparotomies done in the age group of 16-30 years 200(32.4%) were as the least was in the age group of >61 year which was 65(10.5%). Among the total laparotomies 440(71.3%) were male and 177(28.7%) were female. Based on patient's residency 154(25%) were from Debre Tabor and 463(75%) were from outside of Debre Tabor.

A total of 56 patients had relaparotomies for various complications; which makes the proportion of relaparotomy 9,1% 95%(CI= 8.9-9.3). From 56 relaparotomies, 3 patients had additional second relaparotomy. Among the 56 relaparotomies 41(73.2%) were male and 15 (26.8%) were females. Eleven (19.6%) relaparotomy were performed in the age group of >60 year. In the age group of below 15 years the incidence of relaparotomy were 4(7.1%). Eleven (19.7%) patients were from Debre Tabor and the rest 45 (80.3%) patients were out of Debre Tabor see (table 2).

Table 2: Socio-demographic characteristics in DTCSH,2021

Variables		Frequency	Percent (N=617)
Age	<15	79	12.8
	16-30	200	32.4
	31-45	149	24.1
	46-60	124	20.1
	>60	65	10.5
Sex	Male	440	71.3
	female	177	28.7
Residency	Debretabor	154	25
	Out of Debretabor	463	75

7.2. Surgical Related Factors

From the index laparotomy indications acute appendicitis was 212(34.4%), small bowel obstruction 111 (%) see (table 3).

The proportion of re-laparotomy based on the indication of index laparotomy were; large bowel obstruction 18(32.1%), acute appendicitis 17 (30.3%) and trauma 8 (14.2%), perforated PUD 7(12.5%), small bowel obstruction 4 (7.1), redundant sigmoid 2 (3.6%) see (table 3).

Table 3:Indications of laparotomy in DTCSH

		Index laparotomy (n=617)	Relaparotomy (n=56)	proportion of relaparotomy %
Indication for laparotomy	Appendicitis	212	17	8.05
	SBO	111	4	3.6
	LBO	54	18	33.3
	Colostomy closure	20	0	0
	Ileostomy closure	15	0	0
	Trauma	91	8	8.8
	Perforated PUD	34	7	20.5
	Redundant sigmoid	45	2	4.4
	Other	36	0	0

From the index laparotomy 211 (34.4%) were performed in the appendix and 142 (23%) were in the small bowel. Relaparotomy performed in pathologies for multiple sites were 6 (21.4%) see (table 4).

Table 4: Site of patology in DTCSH,2021

		Index laparotomy (n= 617)	Relaparotomy (56)	Incidence of relaparotomy %
Site of pathology	Appendix	212	17	8
	Small bowel	142	5	3.52
	Large bowel	130	21	16.1
	Stomach	36	7	19.4
	Multiple site	28	6	21.4
	Other	69	0	0

Based on the type of wound the incidence of relaparotomy in dirty wounds were 27.2 %. mentioned in table 5

Table 5: Classification of operative wounds based on degree of microbial contamination.

Type of wound in index laparotomy	No of index laparotomy(n=617)	No, of relaparotomy (n=56)	prevalence of relaparotomy %
Clean	78	2	2.6
Clean contaminated	231	2	0.9
Contaminated	146	8	5.5
Dirty	162	44	27.2

In this study 154(25%) participants had peritonitis and 463(75%) had no peritonitis. Twenty-nine percent of relaparotomy patients had peritonitis on initial laparotomy but in non relaparotomy patients the prevalence of peritonitis were 2.6%.

Based on operating surgeon 286(46.4%) primary laparotomies were done by general surgeons, 175(28.4%) by IESO the remaining 156(25.3%) were done by both.

From 617 index or initial laparotomy 503 (81.5%) were emergency and 114(18.5%) were elective. From the total of 56 relaparotomies, 54 index laparotomy were emergency and the remaining 2 were elective see (table 6).

Table 6:Surgical related factors in DTCSH,2021

Variables		Frequency	Percent (N=617)
Peritonitis	Yes	154	25
	No	463	75

Duration of illness in hours	<12	127	20.6
	12-72	279	45.2
	72-120	75	12.2
	>120	22	3.6
Pulse rate in bpm	<100	264	42.8
	100-120	281	45.5
	>120	72	11.7
Type of wound	Clean	78	12.6
	Clean contaminated	231	37.4
	Contaminated	146	23.7
	Dirty	162	26.3
Operating surgeon	Surgeon	286	46.4
	IESO	175	28.4
	Both	156	25.3
Index laparotomy	Emergency	503	81.5
	Elective	114	18.5
Comorbidity	Yes	21	3.4
	No	596	96.6
Outcome	Improved	600	97.2

Died	17	2.8

The indications for relaparotomy in this study were intra-abdominal abscess collection 24(42.9%), anastomotic leak 17(30.4%), wound dehiscence 5(8.9%), bowel evisceration 2(3.6%), and others 8(14.3%) like (stomal complication (1), foreign body(pack) removal (1), planned (damage control surgery) (2), negative relaparotomy (3) and repair leak (1)) see (figure 2).

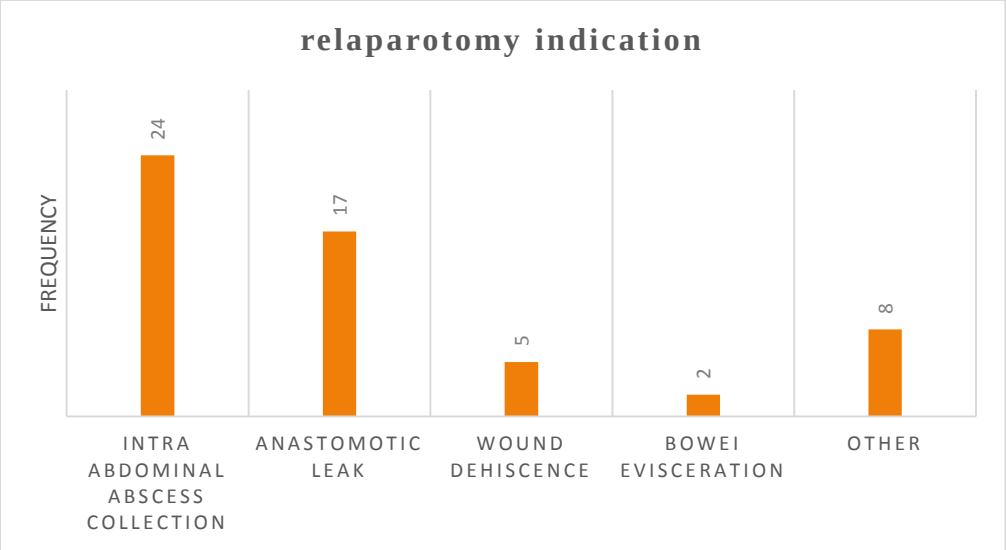

Figure 2: Indications of Relaparotomy in DTCSH,2021

7.3 Comorbidity Related Factors

The total prevalence of known chronic illness in the study participants were 3.4 %(21). Diabetes mellitus (4), HTN (4), cardiac disease (2), multiple disease (3) and others (8) like (HIV, bronchial asthma, alcoholism). In relaparotomy patients the prevalence of comorbidity was 7.1 %(4).

7.4 Factors Associated with Re-Laparotomy

In the simple binary logistic regression analysis; age, peritonitis, type of index laparotomy, comorbidity, duration of illness, pre-operative pulse rate and classes of wound were the independent variables with p value of less than 0.25.

In multiple binary logistic regression analysis; age, peritonitis, duration of illness, pre-operative pulse rate and comorbidity were significant variables with p value of less than 0.05.

Patients age above 60 years were 11.5 times more likely to have re-laparotomy; compared with patients whose age below 60 years, (AOR = 11.5, 95% CI = [2.5-52]).

Patients duration of illness more than 120 hours were 5.6 times more likely to have relaparotomy; compared with patient's duration of illness less 72 hours, (AOR = 5.6, 95% CI= [1.6-20]).

Patients pre-operative pulse rate more than 120 beats per minute were 4.7 times more likely to have relaparotomy; compared with patient's preoperative pulse rate below 120 beats per minute, (AOR = 4.7, 95% CI= [1.3-16.7]).

Patients having peritonitis were 14 times more likely to have relaparotomy; compared with patients haven't peritonitis, (AOR = 14, 95% CI= [5.9-33.2]).

And patients with comorbidity was 6.1 times more likely to have relaparotomy; compared with patents haven't comorbidities, (AOR = 6.1, 95% CI = [1.4-26.2]) see (table 7).

Table 7:Associated factors of relaparotomy in DTCSH,2021

Variables		Relaparotomy		COR(95% CI)	AOR(95%CI)	p-value
		Yes	No			
Age	<15	4	75	1	1	
	16-30	14	186	1	1	
	31-45	10	139	1	1	
	46-60	17	107	2.9(0.9-9.2)	1	0.058
	>60	11	54	3.8(1.1-12.6)	11.5(2.5-52)	0.001
Peritonitis	Yes	44	110	15(7.6-29.4)	14(5.9-33.2)	0.000
	No	12	451	1	1	
Duration of	<12	11	116	1	1	

illness in	12-72	23	256	1	1	
hours	72-120	13	62	2.2(1-5.2)	1	0.071
	>120	7	15	4.9(1.6-14.6)	5.6(1.6-20)	0.007
Pulse rate	<100	6	258	1	1	
(bpm)	100-120	31	250	5.3(2.1-13)	1	0.000
	>120	19	53	15.4(5.8-40)	4.7(1.3-16.7)	0.017
Comorbidity	Yes	4	17	2.4(0.8-7.6)	6.1(1.4-26.2)	0.014
	No	52	544	1	1	
Index	Emergency	54	449	6.7(1.6-28)	1	0.009
laparotomy	Elective	2	112	1	1	
Classes of	clean	2	76	1	1	
wound	Clean contaminated	2	229	1	1	
	Contaminated	8	138	1	1	
	Dirty	44	118	14(3.3-60)	1	0.000

8. Discussion

Laparotomy is a surgical incision into the abdominal cavity for diagnosis or in preparation for major Surgery [1]. The term Re-laparotomy (RL) refers to operations performed within 60 days of an initial laparotomy, for complications arising following the primary surgery. RL may be early or late; planned or unplanned; emergency or elective; and radical or palliative. The objectives of RL are to manage complications of the primary surgery, restore intestinal continuity, prevent fecal contamination of the peritoneal cavity, obtain homeostasis, control hemorrhage, prevent intra-abdominal infection or sepsis, and plan delayed curative surgery [2-6].

The incidence of relaparotomy in DTCSH in this study was 9.1 %. Various studies which was conducted in various parts of the world have found different incidence rates which was as low as 2.5 % to as high as 24% (14) [2, 5, 18, 21]. The finding of this study was lower than

those studies conducted in Addis Ababa (17.2%) which was done on pediatric population [26] and Debre Markos referral Hospital (12.3%) [8]. But higher than a study conducted Addis Ababa St. Paul's Hospital Millennium Medical College (6.9%) [1]. The discrepancy of the incidence from study to study may be due to different inclusion and exclusion criteria on the variables and different study designs. On studies conducted in India and South Africa the incidence of relaparotomy was higher than this result and the variation may be due to they included only emergency index laparotomies [12, 28]. Also the variation may be due to difference in indications or site of pathology [1, 23].

Gender wise distribution of relaparotomy was higher in males than females; the male: female ratio in this study was 4.1:1.5. The male participants were more in both index laparotomies 71.3 % and revision laparotomies. Which is comparable to other similar studies [1, 4, 14, 23, 24, 26]. In this study relaparotomy were more prevalent in the age group of above 60 year which was 16.9 % (11). Which is supported by a study conducted in India, South Africa and Congo [2, 12, 13] but higher than another study conducted in India [18]. The disease pattern and different study design (observational study) may contribute to this discrepancy.
In this study except two patients having relaparotomy the index laparotomy was done as emergency basis similarly this finding supports the finding of a research conducted in Debre Markos and Addis Ababa [1, 2, 8]. Patients who undergone emergency laparotomy mostly are not hemodynamically stable and also they will not be stabilized adequately; Since urgent intervention is needed.

In this study the indications for relaparotomy were intra-abdominal abscess collection (42.9%), anastomotic leak (30.4%), wound dehiscence (8.9%), bowel evisceration (3.6%), and others ((14.3%) like stomal complication (1), foreign body(pack) removal (1), planned (damage control surgery) (2), negative relaparotomy (3) and repair leak (1)). The finding was in line with studies in United States[29], India[2, 4] and in Debre Markos Ethiopia[8]; anastomotic leak, persistent intra-abdominal infection, burst abdomen, enterocutaneous fistula, persistent intra-abdominal abscess, stomal complications, post-operative hemorrhage, persistent intestinal gangrene, persistent or progressive peritonitis, wound dehiscence, and post-operative resistant ileus, evisceration.. The decrement of in the number of indications in this study may be due difference in the sample size and study design.

In this study the commonest indication for index laparotomy which ends with relaparotomy were large bowel obstruction 18(32.1%) followed by acute appendicitis 17 (30.3%) which supports study conducted in India [24] but other similar study in India found pathologies in the pancreas was the leading indication [23]. Another study conducted in Addis Ababa Ethiopia and India found that perforated appendicitis as an index laparotomy were the leading indication which ends with relaparotomy [1, 14]. The discrepancy in the finding may be different disease pattern and may be they used relaparotomy as the study population (Addis Ababa) but in this study total laparotomy was used.

In this study the rate of relaparotomy for preventable complications like negative relaparotomy and foreign body pack was 4 (7.1%). Which is coincides with a study conducted in India Coimbatore 10% [5].

In this study with bi-variable logistic regression model variables like; age, residency, peritonitis, type of index laparotomy, comorbidity, duration of illness, pre-operative pulse rate and classes of wound were factors associated with re-laparotomy with p value less than 0.25.

In multiple logistic regression the following five variables were significant with p value of less than 0.05; age above 60 years, duration of illness more than 72 hours, pre-operative pulse rate greater than 120 beats per minute, comorbidities and presence of peritonitis.

Patients age above 60 years were 11.5 times more likely to have re-laparotomy; compared with patients whose age below 60 years, (AOR = 11.5, 95% CI = [2.5-52], P value = 0.001). This is consistent with other studies from Ethiopia Debre Markos and Addis Ababa [1, 8] and from abroad [2, 4, 22]. The reason for the increment was; in older ages due to their physiologic change they will have low immunity, low protein, their wound healing will be delayed, also with associated comorbidity and chemotherapy utilization increases the risk of RL.

Patients duration of illness more than 120 hours were 5.6 times more likely to have relaparotomy; compared with patient's duration of illness less 72 hours (AOR = 5.6, 95% CI = [1.6-20], P value = 0.007).

Patients pre-operative pulse rate more than 120 beats per minute were 4.7 times more likely to have relaparotomy; compared with patient's preoperative pulse rate below 120 beats per minute, (AOR = 4.7, 95% CI= [1.3-16.7], P value = 0.017).

Patients having peritonitis were 14 times more likely to have relaparotomy; compared with patients haven't peritonitis, (AOR = 14, 95% CI= [5.9-33.2], P value = 0.000).

Patients who presented with long duration of illness will have complicated pathology. Complicated acute abdomens will be manifested by the presence of elevation of heart beat, the presence of peritonitis, elevation of body temperature and the like. And the post-operative coarse of the patient will be event full. These findings indicate that as the duration of illness increases the risk of having re-laparotomy increases. This findings are consistent with different studies conducted in Ethiopia [1, 8], and south Africa [12].

And patients with comorbidity was 6.1 times more likely to have relaparotomy; compared with patents haven't comorbidities (AOR = 6.1, 95% CI = [1.4-26.2], P value = 0.014). In this study cardiac disease, DM, HTN and others like HIV were associated with relaparotomy. Similarly, in the previous studies from Ethiopia [8] also from abroad in India[2, 9, 25] comorbidities like DM. HTN, CAD, vascular disease, malignancy, chemotherapy usage, alcoholism and the like were associated with relaparotomy. The reason for association is accompanied low immunity, poor wound healing, vascular disease, low threshold for surgical as well as anesthetic stress and subsequent event full post-operative period increases the risk for post-operative complications.

9. Limitation

Since this study was retrospective and the data was taken from patient card relevant information's regarding personal details like alcohol usage, smoking and surgical details like duration of surgery were not available or incomplete. Which were significant factors in the previous studies; but, not included in this study.

There was difficulty in finding some relevant information's regarding pre-operative as well as post-operative cares like the timing of preoperative prophylaxis.

10. Conclusion

In DTCSH the proportion of relaparotomy was high. The two most common indications of relaparotomy in this study were intra-abdominal abscess collection and anastomotic leak. Factors associated with relaparotomy were; age above 60 years, duration of illness more than 72 hours, pre-operative pulse rate greater than 120 beats per minute, comorbidities, presence of peritonitis.

11. Recommendation

To Amhara regional health bureau and DTCSH;

In this study, patients who present early had low risk for relaparotomy and better outcome while those present late has high risk for relaparotomy and bad outcome. Therefore, Risk of relaparotomy will be decreased by; Creating awareness on the community about the importance of early visit of health facilities when they feel illness, training health providers at primary health care unites to early referral of patients to nearby higher health facility.

To Debre Tabor comprehensive specialized hospital:

Enhance mentoring and providing regular feedback for those referring health facilities to avoid late referral for those deserved.

Creating better awareness on the community about the importance of elective surgery during they develop mild disease rather than waiting for it worsened and emergency laparotomy becomes obligatory.

To researchers;

Since this study is retrospective and done in a single institution, further studies better with case control study design with large sample size may be needed for better generalization.

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13.Annex

Annex 1: general information sheet

Principal investigator name Shegaw Yitie MSC student of IESO department in Bahir Dar university CMHS. Conducting a study on proportion and factors associated with re-laparotomy among laparotomy patients in Debre Tabor comprehensive specialized hospital.

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Name of the data collector _____ Signature_____

Date of the data collected_____

Name of the supervisor _____Sign. _____ Date_____

Annex 2: Checklist

001. checklist Code_____

1. Sex A, Male B. Female

2. Age in year?

A. <15 C. 31-45

B. 16-30 D. 46-60 E. ≥60

3. Residency of the patient? A. Debre Tabor B. Outside of Debre Tabor

4. Indication for index laparotomy?

A. acute appendicitis C. LBO E. ileostomy closure

B. SBO D. Colostomy closure F. trauma G. perforated PUD

H. Redundant sigmoid I. other specify

5. Site of pathology?

A. Appendix B. small bowel C. large bowel

D. stomach E. multiple F. other

6. Was there peritonitis? A. Yes B. No

7. Wound classification?

A. clean B. clean contaminate C. contaminated D. dirty

8. Duration of the illness in hours?

A. <12 B. 12-72

C. 72-120 D. ≥120

9. Preoperative pulse rate (beats/minute)?

A. <100 B. 100-119 C. ≥120

10. Operating surgeon for index laparotomy?

A. IESO B. surgeon C. together

11. Type of index laparotomy?

A. emergency B. elective

12. Does the patient had comorbidity? (If the answer is no go to question 14)

A. Yes B. No

13. Any diagnosed co morbid condition?

A. diabetes mellitus B. Hypertension D. multiple

C. Cardiac disease E. other specify

14. Was re-laparotomy done?

A. yes B. No

15. If the answer is yes for question no 12 what was the indication?

A. intra-abdominal collection D. bowel evisceration

B. anastomotic leak E. Specify other

C. Wound dehiscence

16. Was there further relaparotomy?

A. Yes B. No

17. Final outcome of the patient

A. improved B. deteriorated/referred C. died