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DEPARTMENT OF SURGERY

Pattern And Treatment Outcome Of Patients With Secondary Generalized Peritonitis At Tibebe Ghion Specialized Hospital Northwest Ethiopia, 2025

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A THESIS REPORT SUBMITTED TO THE DEPARTMENT OF SURGERY, SCHOOL OF MEDICINE, COLLEGE OF MEDICINE AND HEALTH SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE SPECIALIZATION OF GENERAL SURGERY.

MARCH, 2025

BAHIR DAR, ETHIOPIA

BAHIR DAR UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCE
SCHOOL OF MEDICINE
DEPARTMENT OF SURGERY

PATTERN AND TREATMENT OUTCOME OF PATIENTS WITH SECONDARY GENERALIZED PERITONITIS AT TIBEBE GHION SPECIALIZED HOSPITAL NORTHWEST ETHIOPIA, 2025

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Abstract

Background: Peritonitis is defined as irritation and inflammation of the peritoneum covering the abdominal wall. This usually occurs due to microbial contamination of the peritoneum. Etiologically it is further classified as primary, secondary, and potentially tertiary, it can also be classified as generalized or localized. The diagnosis of generalized peritonitis is mainly clinical. Patients can also present late with signs and symptoms of organ failure. Surgery is the sole and effective measure to manage patients with secondary generalized peritonitis. Even though in Ethiopia secondary peritonitis is among the leading surgical causes of morbidity and mortality, few published studies have been conducted so far on the pattern and treatment outcome of secondary peritonitis.

Objective: To assess the Pattern and treatment outcome of patients operated for secondary generalized peritonitis at Tibebe Ghion Hospital in Bahir Dar city, Northwest Ethiopia.

Method: A retrospective cross-sectional monocentric study conducted by reviewing medical record of patients operated at Tibebe Ghion Specialized Hospital from January, 2022 to January, 2025GC. Data collected by reviewing operation theater logbook and patient card registry through kobo toolbox, processed and analyzed using Statistical Package for the Social Sciences software version 25. Simple and multiple variable regression analysis used to analyze the association between variables. The results presented using textual description, tables, pie charts and bar graphs.

Results: a total of 384 patients between the ages of 18 to 97 years were included. The mean age was 38.14 (SD ±17.3). And 189 (49.2%) of them were found to be in the age group of 18-30 and the male to female ratio was 3:1. Traumatic bowel perforation was the predominant intraoperative finding 160(41.7%) followed by gangrenous bowel obstruction 98(25.5%), perforated PUD 51(13.3%), perforated appendicitis 47(12.2%), mesenteric ischemia with gangrenous bowel 14(3.6%), tumor perforation 12(3.1%), and gall bladder perforation 2(0.5%). Stoma was the common procedure done 116(30.2%) followed by resection and anastomosis 102(26.6%), pedicle omental patch 51(13.3%), anastomosis with stoma 48(12.5%), appendectomy 47(12.2%), bowel repair 18(4.7%) and cholecystectomy 2(0.5%) Favorable outcome was found in 270(70.3%), 114(29.7%) had unfavorable outcome. Superficial Surgical site infection is the most common complication found in 77(23.5%) patients. Mortality found in 38(9.9%). Factors significantly associated with favorable outcome are: age>60(AOR = 0.054, 95% CI = [0.018-0.156]), duration of illness >24hours (AOR = 0.087, 95% CI= [0.033-0.227]), Systolic BP<90(AOR = 0.059, 95% CI = [0.019-0.187]), WBC level <4500(AOR = 29.185, 95% CI = [8.497-100]) and duration of surgery >2hours (AOR = 0.501, 95% CI = [0.101-0.95]).

Conclusion and recommendation; In TGSH, the commonest cause of secondary peritonitis is traumatic bowel perforation, with high probability of unfavorable outcome. Creating awareness on the community about the importance of early visit of health facilities when they feel illness, aggressive fluid resuscitation and enhancing intraoperative care will improve the outcome

Key words: secondary generalized peritonitis, traumatic bowel perforation, surgery

Abbreviations and acronym

ASA	American Society of Anesthesiologists
CLD	Chronic Liver Disease
CNS	Central Nervous System
DM	Diabetes Mellitus
ESRD	End Stage Renal Disease
GC	Gregorian Calendar
GI	GastroIntestinal
HIV	Human Immune Acquired Virus
ICU	Intensive Care Unit
IOF	Intra Operative Finding
LBO	Large Bowel Obstruction
NICU	Neonatal Intensive Care Unit
OP	Operation
PID	Pelvic Inflammatory Disease
PUD	Peptic Ulcer Disease
SBP	Systolic Blood Pressure
SBO	Small Bowel Obstruction
SPSS	Statistical Package for the Social Sciences
SSI	Surgical Site Infection
TB	Tuberculosis
TGSH	Tibebe Ghion Specialized Hospital

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1. Introduction

1.1 Background

Peritonitis is defined as irritation and inflammation of the peritoneum covering the abdominal wall.[1] This usually occurs due to microbial contamination of the peritoneum, generalized peritonitis occurs when inflammation of the infection is not localized and becomes diffuse.[1] It is one of the most commonly encountered cases in the practice of general surgery in emergency setting. It is diagnosed clinically patients having diffuse tenderness and rebound tenderness with guarding and rigidity. This is lethal illness with extremely high mortality and morbidity in untreated cases.[2]

Peritonitis can be classified as generalized or localized.[3] Etiologically it is further classified as primary, secondary, and potentially tertiary.[1, 4] Primary peritonitis (also referred to as spontaneous bacterial peritonitis) is infection of the peritoneum usually with hematologic spread of microorganism from other areas of the body.[5] The other unique feature of primary peritonitis is that usually a single bacteria is isolated.[6]

Whereas secondary peritonitis is due to direct contamination through disruption or severe inflammation of intra-abdominal organs and is typically polymicrobial.[1, 4] It could be perforation peritonitis (due to necrosis and perforation of the gastrointestinal wall), postoperative peritonitis (leak of anastomosis or suture line, stump insufficiency or other iatrogenic leak), and post traumatic peritonitis (blunt or penetrating abdominal trauma).[1, 4] Due to the loss of epithelial integrity, bacterial pathogens can traverse into the peritoneal cavity leading to a cascade of inflammatory response, sepsis, multisystem organ failure and death if not treated in a timely manner.[7] Aggressive resuscitation and early surgical intervention is therefore required in order to deliver optimal care for the patients and improve their treatment outcome.

Tertiary peritonitis is poorly understood phenomenon occurs after the host fails to clear secondary peritonitis despite adequate treatment.[1] The international sepsis forum defines it as peritonitis persisting or recurring ≥48hrs after appropriate treatment of secondary or primary bacterial peritonitis.[5]

Up on clinical presentation patients will complain of severe abdominal pain (it is usually constant and of a sharp, pricking character it may be referred to the ipsilateral shoulder tip), fever, Anorexia, malaise, nausea and vomiting are common associated features, constipation is usually present, unless a pelvic abscess develops (which can cause diarrhea).[8] On abdominal examination patients will have diffuse direct and rebound tenderness in all four abdominal quadrants.[8] The abdominal muscles became rigid in response to the irritation of the peritoneum, this phenomenon is called peritonism and is mediated by nociceptive stimuli located in the visceral peritoneum. This sign is an important clue though the sensitivity and specificity is lower.[2]

Patients can also present late with signs and symptoms of organ failure. Patients can be hypotensive despite fluid resuscitation. Respiratory failure can also be there with altered and depressed mentation indicating CNS failure. Patients urine output can also be affected indicating of acute kidney injury.[9]

As of its treatment primary peritonitis is primarily treated by antibiotics targeting the offending organism. Whereas the treatment of secondary peritonitis is mainly surgical which is done in emergency basis. To this day Surgery is the sole and effective means of treatment of secondary peritonitis. It's not necessary and unethical to delay surgery for such patients investigating them. Emergent laparotomy should be done without delay. Organ support and antibiotics also play pivotal role in curing these patients.[10]

1.2 Statement of the Problem

Generalized peritonitis accounts for most cases of surgical emergency visits. Despite improved understanding of pathophysiology, advanced surgical techniques and antibiotic availability it increases the risk of perioperative morbidity and mortality, and it causes a high economic burden on affected patients, families and the health system as a whole.[10]

A study done in one state of United States found that generalized peritonitis accounts for 9.3 of 1000 admissions and it requires adequate preoperative resuscitation to avert high perioperative morbidity and mortality.[2, 10] Acute Generalized peritonitis is associated with significant post operative complications and mortality of patients. A study done in the geographically diverse India population which enrolled 100 patients found to have a significant mortality of ~32% in comparison to current lethality rate of 6% worldwide.[11]

In the Democratic Republic of Congo, a study carried out in Butembo showed that acute generalized peritonitis is the second most common cause of abdominal emergencies after appendicitis, in south-Kivu province 60.7% of patients were acute generalized peritonitis out of 458 cases of gastrointestinal surgical emergencies.[12]

The mortality gravely increased if it evolves to severe sepsis and organ failure. A cross sectional African study done in Tanzania in 2015 G.C involving 97 patients with acute generalized peritonitis found mortality to be 15% and 36 % had complications.[13] Most of our patients present to the emergency lately making the outcome worse and different than the western counterparts.

Whereas figures are higher in Sub-Saharan Africa. Evidences showing the exact statistical incidence and the proportion accounted by acute generalized peritonitis is lacking in sub-Saharan Africa. But from observation during surgical practice many patients with generalized peritonitis are treated on a daily basis. Though there are some researches done on acute abdomen in Ethiopia, they didn't well study on the broad etiology, specific age distribution, clinical features and treatment outcome of secondary generalized peritonitis. In addition, they show low morbidity and mortality which shouldn't be concluded specifically for patients with generalized peritonitis which have significantly high morbidity and mortality worldwide. From the research done on patients with generalized peritonitis in Harar Ethiopia, favorable outcome was found in

70.2% of the cases, 29.8% of patients had a complicated course. Mortality rate of this study was 7.7%.[14]

Moreover, the microbiology of secondary peritonitis is evolving, recently microbial ecological shift is being recognized and multi-drug resistant organisms have become commonplace worldwide, these all factors increases the severity of the disease and become factors for treatment failure.[15]

The disease is also associated with higher cost of treatment since most patients require preparation, surgery and intensive specialized care after they are operated. The economic burden on the health care system of developing countries is huge by itself.

Secondary Generalized peritonitis has variable etiologies, prognosis and outcome in different areas of the world. In addition, there is considerable facility gap in developing countries. Keeping in mind peculiarities of the illness, there is paucity of researches done in these areas especially in our country. The research will also help to determine modifiable factors determining the patient outcome and will help to reduce treatment cost in a setup with limited resources.

1.3 Significance of the study

By studying the general pattern and the factors that predict outcome of patients with secondary generalized peritonitis the final outcome can be significantly improved and the morbidity and mortality reduced.

Preventable factors can be improved through: Infrastructure improvements (e.g emergency surgical units), Preventive measures (e.g., vaccination for typhoid, sanitation campaigns) and Training programs for early diagnosis & referral. Predictors of poor outcomes, such as delayed hospital admission, comorbidities, or sepsis, can be targeted through community education, triage systems, or preoperative optimization.

In a long term it may represent a channel for Ministry of health to establish standards for preventing and acting on factors which lead to poor outcome with the ambition of putting Ethiopia on track to build a foundation of national guidelines to assure better outcome among patients with secondary generalized peritonitis. This understanding leads to ameliorate disease severity and reduce health expenditures.

This study also allows researchers to do further study and as well for policy makers to develop strategies to tackle the problem. It will be helpful for developing countries especially for Sub-Saharan countries because there is handful of researches done and have limited resources that should be properly allocated.

2. Literature Review

2.1 Sociodemographic factors

Secondary generalized peritonitis is one of the most frequent surgical emergencies worldwide, it accounts for 1% of urgent or emergent hospital admissions and is the second leading cause of sepsis in patients in intensive care units globally. Its etiologic spectrum is different from developed countries from the rest of countries especially the Sub-Saharan Africa region both in terms of prevalence and mortality rates.[2, 10]

The male to female ratio is almost similar in two studies done in Nigeria 2:1 in Ibadan similar to the study in Azare, Bauchi state, North eastern Nigeria, where males constituted 73.2% of 153 patients with peritonitis over a five year period.[23, 24] The Ibadan study shows the mean age of the patients was 48 ± 12 years. 6.6% patients had other co-morbidities, with hypertension being the most frequent.[23, 24]

The mean age in 153 patients in North eastern Nigeria study was 21.88 years (range 4–70). The mean time lapse between onset of symptoms and presentation to hospital was 5.4 ± 3.7 days (range 0.75–21).[23] Another retrospective, descriptive, observational study was conducted on 2019 in Democratic republic of Congo shows the mean age was 28.9 ± 16.1 with a sex ratio M: F of 0.8 and the admission time in 65.5% was more than 72 hours.[12]

A descriptive cross-sectional study involving 97 patients with secondary peritonitis admitted at Bugando Medical Centre, Mwanza, Tanzania from May 2014 to April 2015 found female to male ratio of 1:1.8 and approximately 41.2 % (40/97) were in their third and fourth decades of life.[13]

2.2 Pattern of generalized peritonitis

Common etiologies of abdominal sepsis in the developed world include perforated appendicitis, cholecystitis, perforated gastrointestinal cancers, and diverticular disease. With efficient access to elective surgical services, screening programs, and preventive medication (i.e. proton pump inhibitors), the outcomes of patients with abdominal sepsis has steadily improved in the developed world.[16]

As of the pattern of generalized it varies greatly among different geographical areas. Most western researches show the common causes of Secondary generalized peritonitis in decreasing order to be perforated appendicitis, perforated colon, Gastroduodenal perforations and Jejunoileal perforation which is relatively uncommon as a source of peritonitis in the Western world in contrast to Eastern countries.[3]

In a study of 480 cases of peritonitis, cases in New Mexico US, 58.5% were secondary to perforation of appendix and 27% of patients had perforated colonic lesions from either diverticular disease or other colonic pathology.[17] A French Prospective Observational Multicenter Study founds peritonitis originated in the colon (32% of patients), appendix (31%), stomach/duodenum (18%), small bowel (13%), or biliary tract (6%). Most patients (78%) presented with generalized peritonitis.[18]

A retrospective study done on 204 patients in Serbia found that perforated PUD was the most common cause of perforation peritonitis 60 (29.41%), following by the perforated appendicitis 45 (22.06%). The fecal peritonitis and colon perforation were found in 42 patients (20.59%).[19]

A comparative analytical study on the Indian patients found that sites of perforations were prevalent in the upper gastrointestinal tract with the majority being gastro-duodenal for the Indian population as opposed to distal parts in the western population. Maximum incidents of peritonitis occurred at the sites of gastroduodenal (34-80%), ileal (6-53%) and appendicular (4-47%) region while lesser incident occur at jejunal (4-7%), colonic (2-10%) and other non-alimentary sites (1-10%).[11]

The other descriptive observational study in India was conducted in Dr. Rajendra Prasad Government Medical College Kangra at Tanda, shows the most common etiologies of generalized secondary peritonitis in these patients was perforated PUD 77.13% (72.55% patients of duodenal ulcer perforation and 4.58% patients of gastric ulcer perforation with duodenal: gastric ulcer ratio of 15.8:1). Other etiologies were perforated appendicitis 9.8%, enteric perforation 7.84%, 3.92% traumatic bowel perforation and colonic malignancy 1.31%.[20]

Cross-sectional study conducted in Jinnah Postgraduate Medical Centre, Pakistan indicates the cause of peritonitis included typhoid ileal perforation (41%), duodenal perforation (33%), ruptured appendix (28%), intestinal tuberculous (14%), gangrenous gut (7%), tumor perforation (6%), liver abscess (3%), and gastric perforation and rectal tear (1%).[21]

Retrospective study (January 2009–August 2010) of 137 patients with secondary peritonitis at Al-Jala Hospital and Faculty of Medicine, University of Benghazi, Libya founds Appendicitis and gastroduodenal perforations were the commonest causes of secondary peritonitis, occurring in 61% and 20% of the patients respectively. Other conditions (small bowel perforations, colonic perforations, biliary peritonitis, ruptured hydatid cyst and pancreatitis) accounted for less than 20% of cases.[22]

Different causes of generalized peritonitis that contribute to the death toll in Sub- Saharan African countries have been described as follows; typhoid perforation of the terminal ileum (34.7 %), postoperative peritonitis (19.5%) and peptic ulcer perforation (15.2%), perforated appendicitis (8.7 %), and perforation of the sigmoid colon (8.7 %).[10]

From studies done in Nigeria, Ibadan perforated appendicitis was the most common cause of peritonitis (27.5%) followed by penetrating abdominal injury (16.2%) and perforated PUD (9.6%).[23, 24]

A North eastern Nigeria study shows forty-eight (31.4%) of the patients were operated within 24 hours of presentation and 105 (68.3%) after 24 h. The main symptoms were abdominal pain in 150 (98.9%), fever in 108 (70.6%), and abdominal distention in 108 (70.6%). The main causes of perforation peritonitis were typhoid ileal perforation in 98 (64.0%), perforated peptic ulcer in 25 (16.3%) and perforated appendix in 22 (14.4%) patients.[23]

In a prospective study from Ghana, appendicitis and typhoid ileal perforation were the commonest causes occurring in 43.1% and 35.1% of patients, respectively. Other conditions such

as gastroduodenal perforations, ruptured abscesses, traumatic bowel perforations and amoebic colonic perforations together accounted for fewer than quarter of the cases.[25]

A retrospective analysis of 305 cases from two regional Hospitals in South-West Region of Cameroon shows the most common clinical findings were diffuse abdominal pain (100 %), abnormal temperature (83 %) and signs of peritoneal irritation (tenderness, rebound tenderness, guarding, rigidity: 91 %). The most common causes of diffuse peritonitis included peptic ulcer perforation 22.6%, complications of acute appendicitis 17.4%, post-operative peritonitis 14.4%, typhoid related perforation of the terminal ileum 14.1% and abdominal injuries 12.5%.[26]

Another retrospective, descriptive, observational study was conducted on 2019 in Democratic republic of Congo shows acute abdominal pain was the reason for consultation in most patients (93.2%). Abdominal distension, tenderness or rigidity was the most common physical symptom found in 88.8%, followed by fever (64%). Disturbed consciousness was found in 6.8% cases. Most patients (63.7%), were classified as American Society of Anesthesiologists (ASA) 2. This research depicted that typhoid ileal perforation is the commonest cause (47.4%) followed by complicated acute appendicitis (12.6%).[12]

From the descriptive cross-sectional study done in Tanzania, only 3 (3.09 %) patients arrived to the hospital within 24 hours of onset of illness, 26 (26.80 %) patients presented with shock and HIV seropositivity among all patients was 13.40 % (13/97). Abdominal pain, fever and vomiting were the most common presentations. The common etiologies of secondary peritonitis were perforated appendicitis 23.71%, peptic ulcer disease 18.56%, ischemia 18.56% and typhoidal perforation 15.46 %.[13]

In a developing country like Ethiopia, this area is not well studied and there are limited number of researches done on the topic making it difficult know the mortality in Ethiopian context. A retrospective study done at Harar a city in the Eastern province of Ethiopia, 650 patients were enrolled in the research and Perforated PUD accounted for 34.6% of the total, Perforated appendix 31.1%, gangrenous SBO 25.8 %, and Lower GI perforation 8.5%. [14]

From prospective cross-sectional study done on Non-Traumatic Acute Abdomen at Attat Hospital, Gurage Zone, Ethiopia, Peritonitis was the 3rd common cause of non-traumatic surgical acute abdomen which accounts 24%. Perforated appendicitis was the leading cause of peritonitis 46% followed by gangrenous SBO 22% followed by gangrenous large bowel 17% and perforated PUD 15%. Male to female ratio was 1.2:1.[27]

A retrospective cross-sectional study was conducted on 172 cases of patients who were operated from Sept, 2018 to April, 2020 at Yekatit 12 referral hospital and Minilik II referral Hospital Addis Ababa Ethiopia. The most common cause of secondary generalized and localized peritonitis was complicated appendicitis (52.9%), followed by perforated PUD (33.1%), small bowel pathology (4.7 %) and colonic pathology (4.7%). During exploration, pus was found in 68.8 % of the time, while GI content mixed with pus was found in 28.5% of the time. 70.9% of the patients were males and 29.1% were females. The Median age group of patients was 25 yrs. The commonest comorbid disease that was found was hypertension (4.1%), followed by HIV

(2.3%) and DM (1.7%). The median length of time from the onset of symptoms to seeking medical care was 3 days.[28]

In Tibebe Ghion hospital based on the research done on non-traumatic acute abdomen total peritonitis takes about 18.5% of acute abdomen whereas gangrenous LBO, gangrenous SBO and perforated PUD takes 32.1%, 12.5%, 23.2% of all acute abdomen respectively.[29]

2.3 Treatment outcome

The management outcome of secondary generalized peritonitis affected by patient, disease and intervention related factors like age of the patient, duration of illness, causes of generalized peritonitis, presence of comorbidities and socioeconomic status. Secondary peritonitis that is caused by complicated appendicitis is associated with a lower mortality, shorter duration of hospital stay, and lower morbidity than other etiologies. Overall mortality is 6%, but mortality rises to 35% in patients who develop severe sepsis.[2, 7, 30]

A significant correlation between mortality with age and gender are reported worldwide. Significantly higher incidence of peritonitis in age groups lower than 50, increased death rate (11-33%) and increased duration of hospital stay in patients group with age >50 years was also seen.[11] Hypertension, DM, abdominal mass and inflammatory bowel disease are the most common comorbidities associated with secondary peritonitis.[7]

Secondary generalized peritonitis can cause the problems of hypovolemic shock and postoperative complications like surgical site infections, pneumonia, postoperative ileus, thromboembolic diseases, incisional hernia, wound dehiscence, enterocutanous fistulas, reoperation and prolonged hospital stay.[10]

It was Kirchner who first described basic surgical principles that greatly improved the outcome of patients who presented with generalized peritonitis in 1926 G.C. These are early intervention with eliminating the source of infection, peritoneal toilet and proper antibiotics. Eleminating the source of infection or source control emphasizes on surgical closure or rsection. For instance a person presenting with generalized peritonitis scondary to perforated acute appendicitis, which is a common etiology of peritonitis in our setup, emergency laparotomy with surgical removal of the appndix should be done. The peritoneal abscess should be drained and adequate lavage is mandatory for optimal outcome. Subsequently post operative antibiotics are instilled. After Kirchner the treatment of peritonitis has been standardized for many etiologies and many authors tried to determine factors affecting the morbidity and mortality of these patients.[9, 31]

Before the era of operative therapy, about 90% of all patients with intraabdominal infection died from sepsis. When principles of surgical management were established and applied, the mortality dropped below 50%. The improved survival of 40-50% is due to operative management alone. Currently mortality is reported to be between 13-43%.[4, 30]

A French Prospective Observational Multicenter Study done on 841 patients results overall mortality rate of 15%. It was significantly lower for the appendix (1.5%) than the biliary tract

(14%), stomach/duodenum (17%), colon (23%), or small bowel (27%). Repeat surgery and percutaneous drainage were required in 9% and 2% of patients, respectively, with no significant difference according to site. A superficial incisional surgical site infection was observed in 4% (small bowel) to 11% (colon) of patients. Non-surgical infections were observed in 7% (appendix) to 35% (small bowel) of patients. The median length of hospital stay was 11 days (range, 1–191 days). In the subgroup of patients with at least one identified pathogen, those receiving inappropriate initial therapy experienced a significant increase in morbidity compared with those receiving appropriate therapy.[18]

A Serbian study shows morbidity rate was 50%; 40.2% patients had more than one complication; the morbidity rate was significantly the highest in patients with colon perforation (90%). Overall mortality rate was 8.82%, the mortality rate was significantly high among the patients with mesenteric ischemia (66.67%), followed by colon perforation in (23.81%), and (6.6%) deaths due to gastro-duodenal perforation.[19]

A study at the regional institute of the northeastern part of India as a cross sectional study for two years (2018-2020 G.C) done on One hundred and ten patients who underwent exploratory laparotomy within the study period found that the mortality to be around 32%. The study also found out an increased death rate (11-33%) in patients group with age >50 years and there was a significant association between increased duration of hospital stay for patients greater than 50 years of age. Increased death rate is found for patients with intraoperative finding of fecal contamination of the peritoneum. And also delayed admission of patients results in sepsis and eventual organ failures in cases of peritonitis with worse outcome. Thus the mortality is increased for those kind of patients.[11]

A study done at Jinnah Postgraduate Medical Centre from September 2019 until March 2021 for 18 months shows the common complications were paralytic ileus (8%) and burst abdomen (8%). Cause-related mortality shows that 2.4% of patients with typhoid peritonitis, 3.0% with duodenal perforation 3.5% with ruptured appendix, 14.2% with tuberculous intestine, 33.3% with tumor perforation and 100% with liver abscess perforation passed. Mortality related to the duration of inflammation showed that no patients died within 24 hours, 1.47% patients died within 24–48 hours, and 4.4% patients died after 48 hours.[21]

From the retrospective study in the Libya it was found that overall mortality rate was 4.37%, morbidity developed in 23.4% of patients with secondary peritonitis, among the complications wound infection, chest infection and residual collection are the commonest.[22]

A Research done on the 302 patients in Ibadan Nigeria shows 2.4% mortality rate with significance difference on the other study done on 153 patients in north eastern Nigeria which had 26.1% overall mortality rate. The deaths were mainly due to overwhelming sepsis and severe electrolyte derangement. On the former study twenty-eight (9.2%) patients had complications, 19 patients (6.5%) required intensive care unit admission and 25 patients (8.4%) required a second exploratory laparotomy.[23, 24] In north eastern Nigeria study the mortality 75% of mortality is

due to typhoid perforation, 15.0% due to perforated gastric ulcer, 7.5% from perforated duodenal ulcer and 2.5% from ruptured appendix.[23]

The study done at South-West Region of Cameroon over a 7-year period shows the overall mortality rate was 15.1 % with the most common cause of death was septic shock. The most common complications included wound dehiscence, sepsis, prolonged paralytic ileus, and multi-organ failure. Patients with typhoid perforation of the terminal ileum carried a significantly higher risk of developing a complication.[26]

Another retrospective study was conducted in Democratic republic of Congo shows 32.4% of the patients had a surgical reoperation and 15.8% of the digestive fistulas were reported. The average duration of the hospitalization was 23.4 ± 20.3 days. Morbidity rate was 14.7%.[12]

15% mortality and 35% complications were found in the study done in Bugando Medical Centre, Mwanza, Tanzania. Surgical site infection, wound dehiscence and Septicemia were the most common complications. Presence of comorbid illness and post-operative complications were found to be significantly associated with mortality.[13]

Where as in Ethiopia research done in Harar, favorable outcome was found in 70.2% of the cases. 29.8% of patients had a complicated course. Pneumonia accounted for 8.6% of the total complications making it is the most common, post op collection 4.2%, SSI 4%, septic shock 2.9 %, wound dehiscence 2.2%, Ileus 0.6 %, Anastomosis leak 0.5%. Mortality rate of this study is (7.7%).[14]

3. Conceptual framework

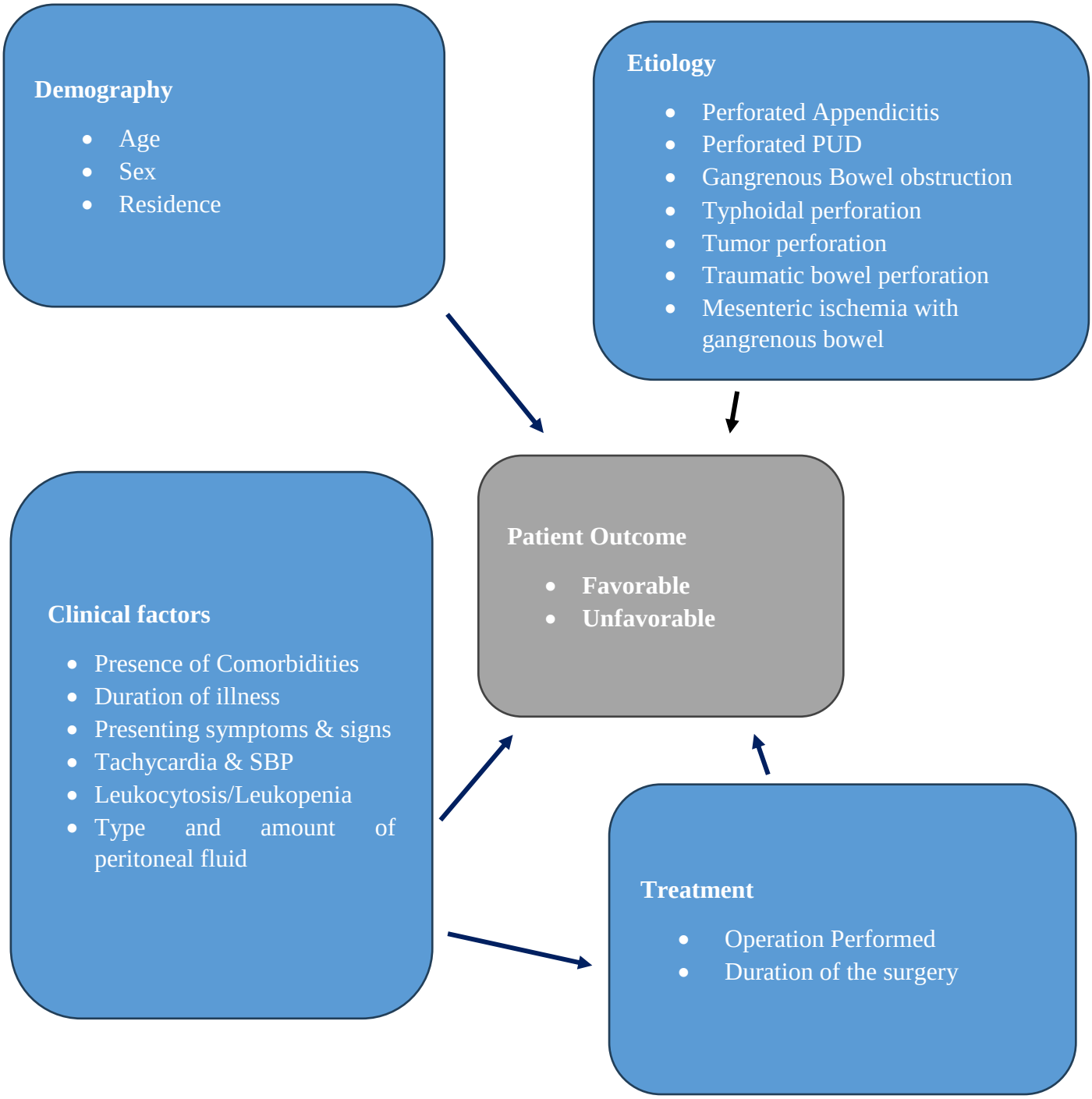


Figure 1: Shows Conceptual framework on the pattern and treatment outcome of secondary generalized peritonitis adopted from different literatures

4. Objective of the study

4.1 General Objective

- To assess the pattern and treatment outcome in patients with secondary generalized peritonitis in Tibebe Ghion Specialized Hospital, Northwest Ethiopia, 2025.

4.2 Specific Objective

- To assess demographic profile, common etiologies and clinical presentation of secondary generalized peritonitis.
- To determine postoperative complications and mortality rates.
- To identify specific interactions among determinant factors with patient outcome.

5. Methods and Materials

5.1 Study area

This study will be conducted in the Department of General surgery in TGSH. TGSH is one of the biggest specialized university hospitals in Amhara regional states. It was established in 2011 E.C /2018 G.C which landed in an area of 10000sq.M to primarily give service with fair cost or even free of charge for those who are unable to afford care elsewhere and at the time it was constructed to serve 2000 people per day. It's located in Bahir-dar town, Sebatamit kebele, Amhara region which is 565 km to northwest from Addis Ababa. It has eight major clinical departments (Internal medicine, surgery, pediatrics, NICU and Gynecology and Obstetrics radiology, Dermatology, Psychiatry, Ophthalmology, Maxillofacial and Dentistry) along with other follow up and special clinics for specific diseases. The hospital provides services for about 10 million people for catchment area.

The TGSH is selected because it is the largest tertiary referral hospital and it is possible to obtain a sufficient number of secondary peritonitis patients coming from different parts of Amhara region. It is also a teaching hospital of Bahir- Dar University with adequate beds, and serves as a training center for undergraduate and postgraduate medical student and other health professionals who shoulder the health problems of the community and the country at large.

5.2 Study design and period

Institution based cross-sectional study from January17 to March 25 2025 GC.

5.3 Population

4.3.1 Source population

All adult patients admitted to TGSH surgical ward with diagnosis of generalized secondary peritonitis.

5.3.2 Study Population

Patients who are treated for secondary generalized peritonitis presenting in the time period from January 1, 2022 to January 1, 2025GC.

5.4 Eligibility Criteria

5.4.1 Inclusion criteria

All patients of age > 18yrs old and treated for secondary generalized peritonitis in the study period.

5.4.2 Exclusion criteria

- TB peritonitis
- Acute Pancreatitis
- Complicated PID
- Patients who refuse surgery or go against medical advice

5.5 Study variables

5.5.1 Independent variables

Sociodemographic factors

- Age
- Sex
- Residence: Urban or Rural area

Clinical factors

- Duration of illness
- Presenting symptoms
- Pulse rate and Systolic Blood pressure at presentation
- Total white blood cell count
- Presence of comorbid illness
- Nature of the peritoneal fluid: pus, GI content, hemorrhagic and GI mixed pus
- Cause of peritonitis
- Type of procedure done

5.5.2 Dependent Variable

- Favorable Treatment outcome
- Unfavorable Treatment outcome

5.6 Operational Definition

- Favorable Treatment outcome: the condition of the patient after the procedure has been done which does not develop postoperative complications until discharged from Hospital and documented as improved on the discharge summary sheet. [26, 27]
- Unfavorable Treatment outcome: the condition of the patient after the procedure has been done that develops any postoperative complications, referral due to worsening or death. [26, 27]
- Generalized peritonitis (Acute diffuse peritonitis): inflammation of the peritoneum due to contamination of the peritoneal cavity caused by perforation or severe inflammation and infection of an intra-abdominal organ.[1, 7]
- Traumatic peritonitis: peritonitis caused by contamination from GI tract secondary to traumatic injury.[1]
- Localized peritonitis: peritoneal inflammation and contamination localized to specific area and not generalized
- Morbidity: complications that are associated and arises with a particular illness.
- Mortality: death of a patient

5.7 Sample Size determination and Sampling Technique

5.7.1 Sample Size Determination

Sample size for the pattern of peritonitis determined by using Single population proportion formula, since there is no published data in our country on both the pattern and outcome of this specific research topic. Considering the following assumptions: proportion of (p) 50 % allowing an error (d) of 5% of in detecting the estimated by chance alone with 95% confidence interval, Z-score (standard normal deviate corresponding to 100%, α/2%) of 95% which is 1.96. Finally, the sample size (n)=the number of samples required at confidence interval 95% (1.96) is calculated as:

$$\boldsymbol{n} = (Z\alpha/2)^2 P(1\text{-}P)/d^2$$

$$n = [1.96]^2 [0.5] [1 - 0.5] / [0.05]^2$$

$$n = 384$$

5.7.2 Sampling Technique

The sample selected from the past three year in TGSH, taken from the hospital operation theatre log book of 412 patients operated for generalized peritonitis, 28 cards were replaced when the selected study card becomes non eligible or incomplete for the study.

5.8 Data collection Procedure and Instruments

The data collection conducted by using kobo tool box which was prepared in English. The checklist developed by reviewing different literatures. Log book of patients operated for Secondary Generalized peritonitis from January 2022 to January 2025GC is obtained from operating room and their medical record number is recorded. The patients chart obtained from medical record department. The completeness and the genuineness of the data checked and incomplete patient medical records are taken out. After data collection carried out patients medical records immediately returned to the medical record department.

The instruments that are used; smart mobile phones and tablets, pen, pencil, patient card, and patient's registration log book.

5.9 Data Quality Control

One-day prior to data collection training for the data collectors and the supervisor 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 reviewed and checked for completeness and signed by the data collector and supervisor. Principal Investigator supervise the data collectors and supervisor and samples of checklist re-checked at random bases.

5.10 Data processing and analysis

Data collected through Kobo toolbox and exported to SPSS version 25 software for analysis. Graphs; bar charts and pie chart used to display the visual impression of data.

Bivariate logistic regression analysis used to identify potential confounders that are associated with the dependent variables and those variables with p-value of < 0.25 on bivariate logistic regression analysis entered into multivariate logistic regression. The degree of association between independent and dependent variables assessed by using odds ratio with 95% confidence interval and variables with p value < 0.05 taken as statistically significant.

5.11 Ethical clearance

Ethical approval was obtained from the institutional review board of college of medicine and health sciences, Bahir Dar University. The assigned IRB number is 003. Accordingly, Permission letter to access charts of patients for retrieving data and to conduct the study was obtained from TGSH hospital office of medical director and head of department of surgery. Moreover, confidentiality was maintained when handling each case; all the information retrieved was kept in the way that did not affect personal privacy and confidentiality.

5.12 Dissemination

The finding of this study will be presented as one of the partial fulfillments of specialty certificate in the department of General surgery, Bahir Dar University and published upon approval in accessible journals.

6. Results

6.1 Socio-Demographic Characteristics

In this study, 384 study participants were considered, comprising 296 (77.1%) males and 88 (22.9%) females with male to female ratio of 3.3:1. The mean age of study participants was 38.14 (SD ±17.3) with range of 18-97 years. And 189 (49.2%) of them were found to be in the age group of 18-30 years and those who came from rural areas were 292 (76%).

Table 1: Socio demographic characteristics of adult patients with secondary generalized peritonitis at Tibebe Ghion Specialized Hospital North West Ethiopia, 2025 (n=384)

Variable	categories	Frequency	Percentage (%)
Age	18-30	189	49.2
	31-60	145	37.8
	>60	50	13
Sex	Male	296	77.1
	Female	88	22.9
Residency	Rural	292	76
	Urban	92	24

6.2 Pre operative clinical feature

In this study, from patients presented to Hospital with the diagnosis of secondary generalized peritonitis all 384(100%) had abdominal pain, 140(36.5%) had abdominal distension, 159(41.4) had failure to pass flatus or feces, 300(78.1%) had vomiting and 214(55.7%) had fever, with mean duration of illness 66.7 hours and 173 (45.1%) presents after 48hours of illness. During presentation 332(86.5%) had tachycardia, 343(89.3%) had systolic BP ≥90, 384(100%) had diffuse abdominal tenderness and 244(63.5%) had abdominal guarding. 19(4.9%) had comorbidities, and hypertension is the commonest 14(66.7%). Among study participants 169(44%) had leukocytosis value >11000.

Table 2: Preoperative clinical characteristics of adult patients with secondary generalized peritonitis at Tibebe Ghion Specialized Hospital North West Ethiopia, 2025 (n=384)

Variables	Category	Frequency	Percentage
Duration of illness	<24	159	41.4
	24-48	52	13.5
	>48	173	45.1
Abdominal pain	Yes	384	100
	No	0	0
Abdominal distension	Yes	140	36.5
	No	244	63.5
Failure to pass flatus or feces	Yes	159	41.4
	No	225	58.6
Vomiting	Yes	300	78.1
	No	84	21.9
Fever	Yes	214	55.7
	No	170	44.3
Tachycardia	Yes	332	86.5
	No	52	13.5

Systolic BP	≥90	343	89.3
	<90	41	10.7
Diffuse abdominal tenderness	Yes	384	100
	No	0	0
Abdominal guarding	Yes	244	63.5
	No	140	36.5
Comorbidity	No	365	95.1
	Yes	19	4.9
Types of comorbidities	Hypertension	14	66.7
	DM	4	19
	Cardiac disease	3	14.3
WBC level	<4500	51	13.3
	4500-11000	164	42.7
	>11000	169	44

6.3 Intraoperative finding & Procedure done

Among the study participant (384) who had laparotomy, the most common intra operative finding were traumatic bowel perforation 160(41.7%) followed by gangrenous bowel obstruction 98(25.5%), perforated PUD 51(13.3%), perforated appendicitis 47(12.2%), mesenteric ischemia with gangrenous bowel 14(3.6%), tumor perforation 12(3.1%), gall bladder perforation 2(0.5%). From gross intraperitoneal fluid content pus is the most common 143(37.2%) followed by hemorrhagic 122(31.8%), GI content mixed pus 66(17.2%) and GI content only 53(13.8%). With mean amount of estimated intraperitoneal fluid 0.74 liters (SD ±0.59). 133(34.6%) had duration of surgery ≤2 hours and 251(65.4%) had >2hours. Among procedures done on descending order; stoma 116(30.2%), resection and anastomosis 102(26.6%), pedicle omental patch 51(13.3%), anastomosis with stoma 48(12.5%), appendectomy 47(12.2%), bowel repair 18(4.7%) and cholecystectomy 2(0.5%).

Figure 2: Shows intraoperative findings of secondary generalized peritonitis at Tibebe Ghion Specialized Hospital North West Ethiopia, 2025 (n=384)

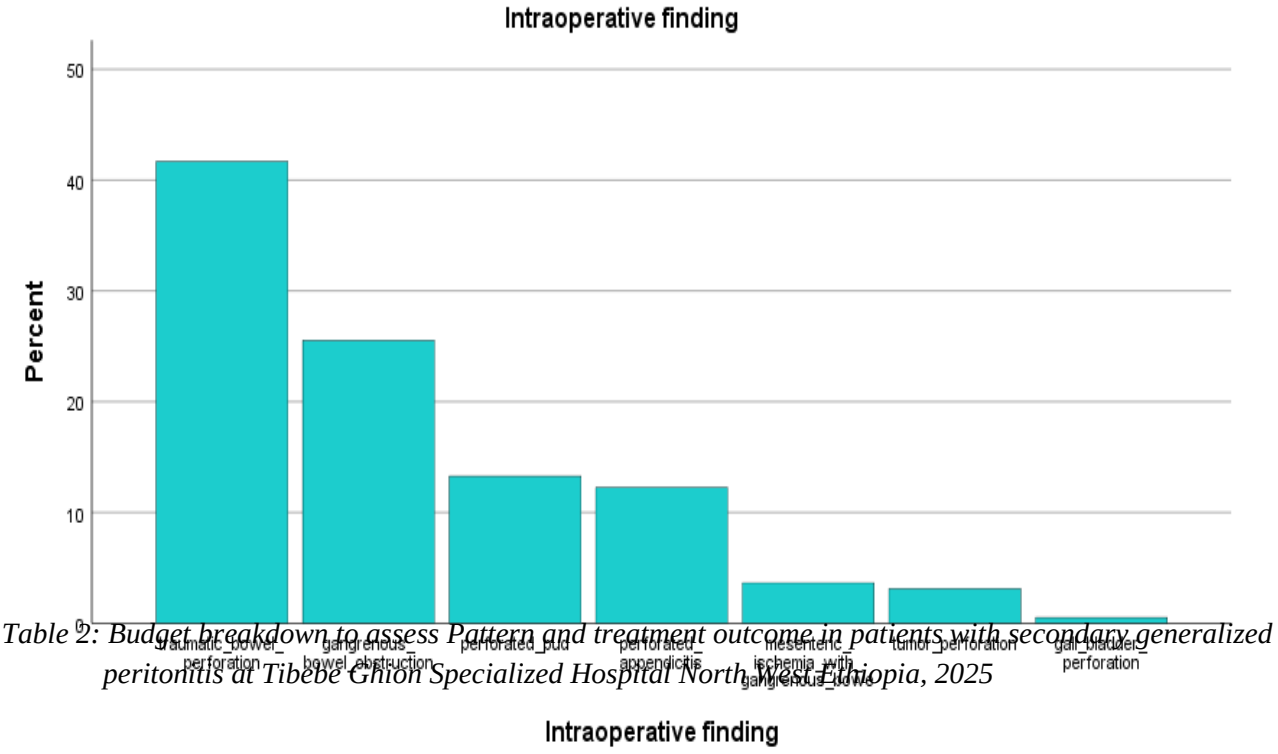
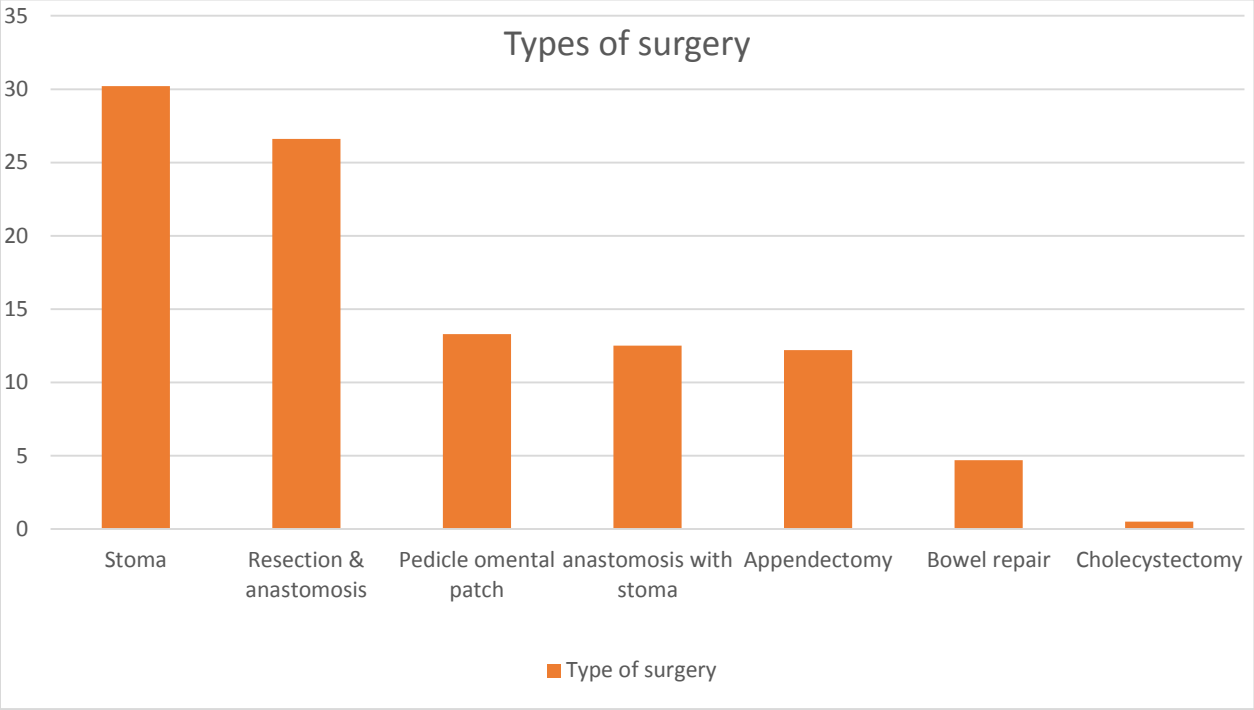


Table 2: Budget breakdown to assess Pattern and treatment outcome in patients with secondary generalized peritonitis at Tibebe Ghion Specialized Hospital North West Ethiopia, 2025

Figure 3: Shows types of surgery for secondary generalized peritonitis at Tibebe Ghion Specialized Hospital North West Ethiopia, 2025 (n=384)



6.4 Post operative course

Among 384 study participants 270(70.3%) had favorable outcome and 114(29.7%) had unfavorable outcome. From those complication superficial SSI is the most common complication found in 77(23.5%) study participants followed by intrabdominal collection 69(21.1%), pneumonia 46(14.1%), sepsis or septic shock 46(14.1%), new onset organ failure 34(10.4%), wound dehiscence 25(7.6%), stoma retraction 10(3.1%), anastomotic leak 11(3.4%), and DVT or PE 9(2.8%). The mean duration of hospital stay was 10.9 days (range from 1 to 48 days); 132(34.4%) stays ≤7 days while 252(65.6%) stays >7 days. 54(14.1%) undergone relaparotomy. The overall mortality rate in this study was 9.9%(n=38).

Figure 4: postoperative complications for secondary generalized peritonitis at Tibebe Ghion Specialized Hospital North West Ethiopia, 2025 (n=384)

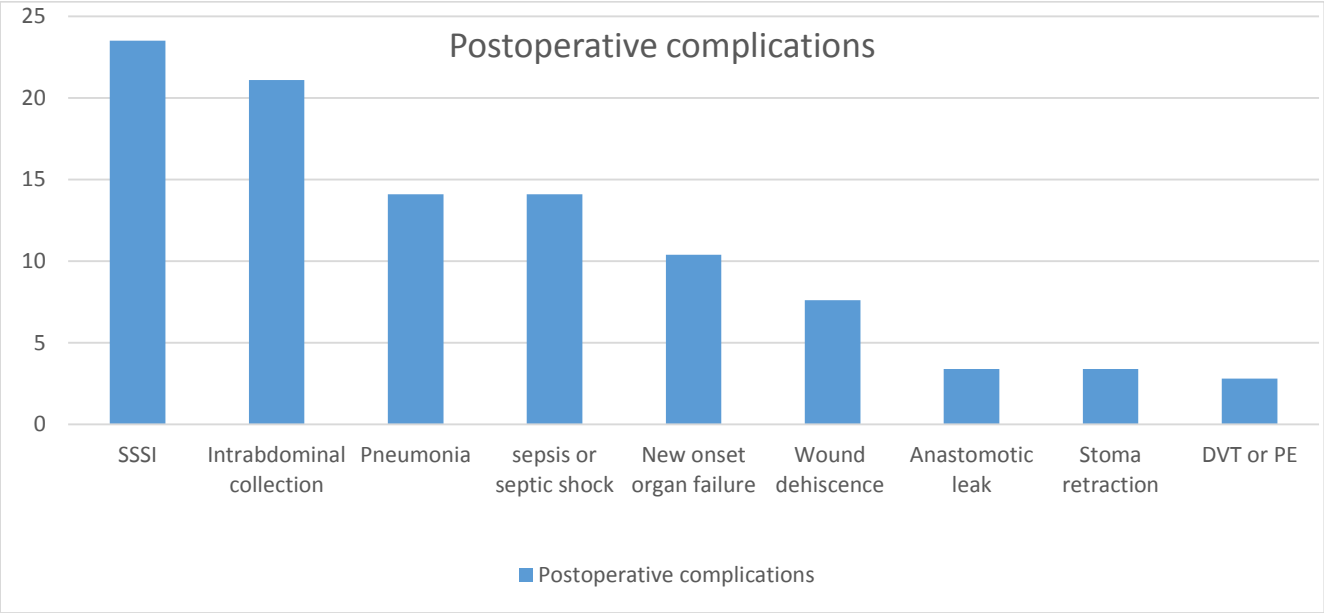
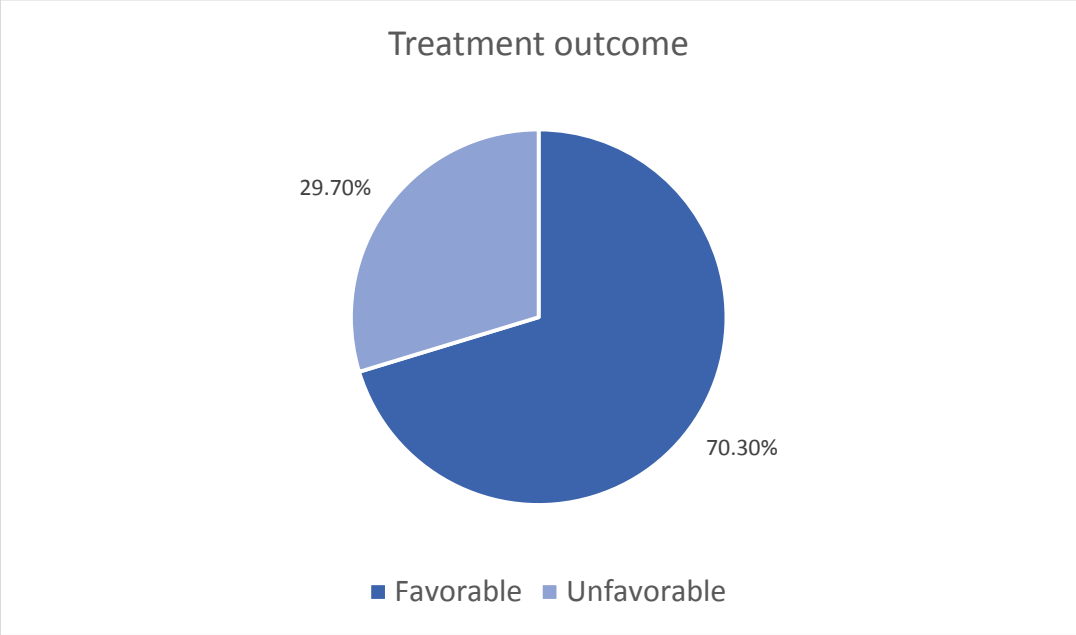


Figure 5: treatment outcome for secondary generalized peritonitis at Tibebe Ghion Specialized Hospital North West Ethiopia, 2025 (n=384)



6.5 Factors Associated with outcome

In the bivariate logistic regression analysis; Age, sex, duration of illness, failure to pass faeces and flatus, comorbidities, SBP, WBC level, type of procedure, duration of surgery and duration of hospital stay were the independent variables with p value of less than 0.25.

In multiple binary logistic regression analysis; age, duration of illness(24-48hours), Systolic BP, WBC level and duration of surgery were significant variables with p value of less than 0.05.

Patients age between 31 and 60 years were 0.113 times or 88.7% less likely to have favourable outcome as compared with patients whose age was between 18 and 30 years, (AOR = 0.113, 95% CI = [0.041-0.308]). Also, those above 60 years were 0.054 times or 94.6% less likely to

have favourable outcome as compared with patients whose age was between 18 and 30 years, (AOR = 0.054, 95% CI = [0.018-0.156]).

Patients with duration of illness 24-48 hours were 0.087 times or 91.3% less likely to have favourable outcome as compared with patient's duration of illness less 24 hours, (AOR = 0.087, 95% CI= [0.033-0.227]).

Patients with SBP<90mmhg at admission had 0.059 times or 94.1% less likely to have favourable outcome as compared with patients whose SBP was ≥90 mmhg, (AOR = 0.059, 95% CI = [0.019-0.187]).

Patients with WBC level 4500-11000 at admission had 29 times more likely to have favourable outcome as compared with patients whose WBC level was<4500, (AOR = 29.185, 95% CI = [8.497-100]). Also, those Patients with WBC level >11000 at admission had 2.5 times more likely to have favourable outcome as compared with patients whose WBC level was<4500, (AOR = 2.5, 95% CI = [1.157-5.492]).

Patients with duration of surgery >2 hours were 0.501 times or 49.9% less likely to have favourable outcome as compared with patients with duration of surgery ≤2hours, (AOR = 0.501, 95% CI = [0.101-0.95]).

Table 3: outcome associated of adult patients with secondary generalized peritonitis at Tibebe Ghion Specialized Hospital North West Ethiopia, 2025 (n=384)

Variables		Final outcome		COR (95% CI)	AOR (95% CI)	P-value
		Favorable	Unfavorable			
Age	18-30	140	49	1	1	**<0.001***
	31-60	106	39	0.323(0.170-0.615)	0.113(0.041-0.308)	
	>60	24	26	0.340(0.175-0.661)	0.054(0.018-0.156)	

Sex	Female	55	33	1	1	
	Male	215	81	1.593(0.964-2.630)	1.175(0.421-3.279)	0.758
Duration of illness	<24	126	33	1	1	
	24-48	37	15	0.64(0.260-0.694)	0.087(0.033-0.227)	**0.013***
	>48	107	66	0.425(0.335-1.289)	0.659(0.238-1.825)	0.422
Failure to pass feces & flatus	Yes	105	54	1	1	
	No	165	60	1.414(0.909-2.2)	1.131(0.386-3.311)	0.823
Comorbidities	Yes	7	12	1	1	
	No	263	102	4.420(1.693-11.542)	2.682(0.65-11.07)	0.173
SBP	≥90	257	86	1	1	
	<90	13	28	0.155(0.077-0.313)	0.059(0.019-0.187)	**<0.001***
WBC level	<4500	18	33	1	1	
	4500-11000	114	50	8.161(4.077-16.336)	29.185(8.497-100)	**<0.001***
	>11000	138	31	1.952(1.170-3.258)	2.521(1.157-5.492)	**0.02***
Duration of surgery	≤2 hours	108	25	1	1	
	>2 hours	162	89	0.421(0.254-0.699)	0.501(0.101-0.95)	**0.014***
Duration of hospital stay	≤7days	105	27	1	1	
	>7days	165	87	0.488(0.297-0.801)	0.625(0.213-1.830)	0.391

6.6 Discussion

Traumatic bowel perforation 160(41.7%), is the most common cause of secondary generalized peritonitis in adults in this study followed by gangrenous bowel obstruction 98(25.5%) and perforated PUD 51(13.3%). This is affected by the ongoing war in the area which leads to higher cases of traumatic bowel perforation. Unfavorable outcome found in 114(29.7%) patients with commonest complication of superficial SSI 77(23.5%).

Despite they exclude traumatic causes of generalized peritonitis, perforated PUD (34.6%) is the commonest cause of generalized peritonitis in the research done at Hiwot fana specialized hospital, Haramaya and perforated appendicitis 23.71% and perforated PUD 18% were the commonest causes in other African country studies done in Tanzania.[13,14] Where as in the study done in Ibadan Nigeria Perforated appendicitis was the most common cause of peritonitis (27.5%) followed by penetrating abdominal injury (16.2%) and perforated PUD (9.6%).[24]

In contrast to this findings, a study done in Tanda, India shows traumatic bowel perforation (3.92%) was the fourth commonest cause of secondary generalized peritonitis, preceded by enteric perforation (7.84%), perforated appendicitis (9.8%) and perforated PUD 77.13%, where as from studies in Pakistan, north eastern Nigeria, Ghana and Democratic Republic of Congo typhoid ileal perforation was the commonest cause which didn't found in this study.[12,21,23,25]

Another peculiar feature in this study is gangrenous bowel obstruction becoming the second commonest cause which isn't common in other studies. The discrepancy in the commonest cause of secondary generalized peritonitis may be due to different inclusion and exclusion criteria on the variables, different study designs and length of study period.

Gender wise distribution of secondary generalized peritonitis was higher in males than female. This observation is consistent with results of most available literatures with male: female ratio of 3.3:1 in this study compared to 4.8:1 in Harar and 1.8:1 in Mwanza, Tanzania. Most of the series from India have reported male preponderance over females in secondary peritonitis; the ratio of male to female was 6.29:1 in a study by Kumar et al while Malik et al in their study reported a male to female of 5.25:1.[8,13,14] This can be explained by high prevalence of trauma in males compared to female which is the commonest cause in this study.

In this study secondary generalized peritonitis were more prevalent in the age group of below 60 years with mean age of 38.14 years which is comparable to the study in Harar(33.7) and study done by Kumar in India (42.75) but higher from north eastern Nigeria(21.88) and Democratic Republic of Congo(28.9).[8,12,14,23]

Among age groups those who are greater than 60 years have more unfavorable outcome (94.6%) than those between age group of 18-30 years, (AOR = 0.054, 95% CI = [0.018-0.156]). Which is supported by a study conducted in Harar (Older patients have 4.6 times less likely to get favourable outcome as compare to younger patients). This is also in line with the study done at Ottawa that 3.1 times to be complicated for older patients. A study done in India found the average age in the survivors was 36.57 and that of the non-survivors was 56.24, signifying poor outcome in elderly patients.[14,30] The effect of age on the outcome is probably due to the high probablity of co-morbidity with increased age and potential decrement of physiological reserves.

The mean duration of illness in this study is 66.7 hours and 13.5% of patients present in the time period between 24-48 hours and 91.3% less likely to have favourable outcome as compared with patient's with duration of illness less than 24 hours, though 65.36% patients presented after 24 hours on India studies done by Kumar and Shanker they had significant post operative morbidity and mortality consistent with this study.[8]

Patients with SBP<60mmhg at admission had more likely unfavourable outcome, this in line with to the study done in Hong Kong by Boey who demonstrated that outcome was significantly related to preoperative shock (66.7% of those who died have shock and 29.6% of those who had morbidity had shock).[32] This is due to a combination of systemic,organ-specific and treatment releated factors with secondary complications.

Patients with leukopenia of <4500 have poorer outcome than those with normal WBC count, this is also supported by Thomas which shows Leukopenia (white blood cells, < 6 x 10(9)/L) mildly significant for higher mortality but higher WBC count was also a significant predictor of mortality.[33] Potentially this is due to leukopenia masks the typical signs of infection leading to atypical presentation and late recognition of disease, associated comorbid conditions and atypical opportunistic and resistant pathogens.

Comparing the duration of surgery, Patients with duration of surgery >2 hours were 49.9% less likely to have favourable outcome as compared with patients with duration of surgery ≤2hours, consistent with study done by Khan (of those duration of surgery >2 hour ,62% had morbidity and 41% had mortality).[30] This is mainly due to the cause of peritonitis with complex trauma, complicated obstruction and large segment gangrenous bowel tends to be more time consumig than other procedures like appendectomy and omental patch so this variable have potential to be confounded by the etiologies of peritonitis.

The overall outcome of in this study indicates 29.7% of unfavorable outcome which is comparable to the study done in Haramaya which is 27.5%.

The mortality of this study is 9.9% which is Higher than the overall mortality of 7.7% of Haramaya study, 4% from Libian study (4.3%) and study done in Ibadan Nigeria(2.4%) but lower than studies from north eastern Nigeria (26.1%), Cameroon , Tanzania (15.1%) and India (32%).[14,22,23,26]

7. Limitation

Since this study was retrospective and the data was taken from patient card, relevant information's regarding personal details like alcohol usage, smoking were not documented and surgical details like ASA class, type of operating surgeon , type of anesthesia profession, pre operate nutritional status not included in this study.

8. Conclusion

In this research, the three most common cause of secondary generalized peritonitis in adults are Traumatic bowel perforation, gangrenous bowel obstruction and perforated PUD. Morbidity and mortality was also high and factors associated with unfavorable outcome are: age, duration of illness>24hours, Systolic BP<90, WBC level <4500 and duration of surgery >2hours.

9. Recommendation

To Ministry of health

In this study patients with old age, prolonged duration of illness, Hypotension at presentation, Leukopenia and long duration of surgery have poor patient outcome

- To implement strategies for prevention of traumatic injuries to the abdomen, gangrenous bowel obstruction and perforated PUD.
- To give Community awareness about generalized peritonitis to avoid late presentation.
- To collaborate with other stakeholders for building of infrastructures like health centres and roads and to make health care transportation available.
- Expanding surgical service centres and assigning of well-trained professionals.

To Tibebe Ghion specialized hospital

- To improve mentoring and providing regular feedback for those referring health facilities to avoid late referral for those deserved.
- To give special attention and proper follow up to patients with secondary generalized peritonitis specifically for those with old age or leukopenia and to start aggressive resuscitation for those who present with hypotension (SBP<90).
- To create ways of teaching on enhancing duration of surgery.

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 and in non-war period.
- It is better to include factors like alcohol usage, smoking, ASA class, nutritional status, vasopressor usage with prospective study.

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Annex: English Version Checklist

Principal investigator name; Dr. Smegnew Mulatu Kassie, final year surgery resident. Department of surgery in Bahir Dar University College of medicine and health Science. Conducting a study on Pattern and treatment outcome in patients with secondary generalized peritonitis at Tibebe Ghion Specialized Hospital.

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Name of the data collector _____ Signature_____Date_____

Date of the data collected_____

Name of the supervisor _____ Signature. _____Date_____

Checklist 001. Checklist Code_____

Part 1. Data on socio-demographic characteristics			
101	Residence	i. Urban ii. Rural	
102.	Sex	i. Male ii. Female	
103.	Age (in years)	……. years	
Part 2. Data on clinical factors			
104.	Duration of illness	……hours	
105.	Abdominal pain	i. Yes ii. No	
106	Abdominal distension	i. Yes ii. No	
107	Failure to pass flatus or feces	i. Yes ii. No	
108	Vomiting	i. Yes ii. No	
109.	Fever	i. Yes ii. No	
110.	Comorbidities	i. Yes ii. No	If yes specify
111.	Tachycardia	i. Yes ii. No	
112.	SBP	i. ≥90 ii. <90	

113.	Abdominal Guarding	i. Yes ii. No	
114.	Presence of abdominal tenderness	i. Yes ii. No	
115.	WBC level	i. $<4500/mm^3$ ii. $4500\text{-}11000/mm^3$ iii. $\geq 11000/mm^3$	
Part 3. Data on intraoperative finding & Procedure done			
116.	Intraoperative finding	i. Perforated Appendicitis ii. Perforated PUD iii. Gangrenous bowel obstruction iv. Typhoidal perforation v. Tumor perforation vi. Mesenteric Ischemia vii. Traumatic bowel perforation viii. Other(Specify)_____	
117.	Intraperitoneal fluid content	i. Pus ii. GI content iii. GI mixed pus iv. Hemorrhagic	
118.	Duration of the surgery	……. hour	
119.	Types of procedure	i. Appendectomy ii. Pedicle omental patch iii. Stoma Only iv. Stoma with anastomosis v. Resection and anastomosis only vi. Other(Specify)_____	
Part 4. Data on post-operative course			
120.	Duration of hospital stay	…… in days	
121.	Post OP complications	i. Yes ii. No	

122.	Types of post OP complications	i. Pneumonia ii. Sepsis/septic shock iii. Organ failure iv. Superficial Surgical Site infection (SSSI) v. Intraabdominal collection vi. Wound Dehiscence vii. Anastomotic leak viii. Stoma retraction ix. Other (Specify)_____	
123.	Patient undergone Relaparotomy	i. Yes ii. No	
124.	Final Outcome	i. Favorable ii. Unfavorable	

Declaration

This is to certify that the thesis entitled "Pattern and treatment outcome of patients with secondary generalized peritonitis at Tibebe Ghion Specialized Hospital north west Ethiopia from January, 2022 to January, 2025GC", submitted in partial fulfillment of the requirements for the specialization of general surgery, Bahir Dar University, is a record of original work carried out by me and has never been submitted to this institution, and that all the resources and materials used for the research proposal, have been fully acknowledged.

Principal investigator

Name DR. SMEGNEW MULATU

Signature ----------

Date 21/07/17 E.C

Advisors

1. Name DR. YITAYAL ALEMU

Signature ----------

Date 25/07/17 E.C

2. Name MRS. GENET ENDALK

Signature ----------

Date

department of surgery