

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF SURGERY

SURGICAL TREATMENT OUTCOME OF PERFORATED PEPTIC ULCER DISEASE AND ASSOCIATED FACTORS AMONG SURGICALLY TREATED PATIENTS AT WOLKITE UNIVERSITY COMPREHNSIVE SPECIALIZED HOSPITAL RETROSPECTIVE STUDY (SEPTEMBER2019-AUGEST2025)

BY

DR. MELKAMU MERDASSA

A THESIS TO BE SUBMITTED TO THE DEPARTMENT OF SURGERY, COLLEGE OF MEDICINE AND HEATLH SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE SPECIALIZATION IN GENERAL SURGERY

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WOLKITE UNIVERSITY

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Full title of the project	**Surgical Treatment Outcome of Perforated PUD And Associated Factors Among Surgically Treated Patients at Wolkite University comprehensive Specialized Hospital 6 Year A Retrospective Cohort Study (SEP 2019-AUG 2025)**
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Total Cost of the project	**26300**
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APPROVAL SHEET

We hereby certify that we have read and evaluated this Thesis titled "**Surgical Treatment Outcome of Perforated PUD And Associated Factors Among Surgically Treated Patients at Wolkite University comprehensive Specialized Hospital 6 Year A Retrospective Cohort Study (SEP 2019-AUG 2025**" prepared under our guidance prepared by Dr Dr Melkamu Merdassa We recommend that the Thesis shall be submitted as fulfilling the requirements for the award of Certificate of Specialty in General surgery

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As members of the Board of Examiners of the Certificate of Specialty in General surgery Thesis open defense examination, we have read and evaluated this thesis prepared by Dr Melkamu Merdassa, and examined the candidate. We hereby certify that; the thesis is accepted for fulfilling the requirements for the award of the Certificate of Specialty in General surgery.

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Declaration

I, the undersigned student declares that "**Surgical Treatment Outcome of Perforated PUD And Associated Factors Among Surgically Treated Patients at Wolkite University Specialized Hospital 6 Year A Retrospective Cohort Study** "is my original work in partial fulfillment of the requirement for specialization in general surgery. is my original work in partial fulfillment for the requirement in **certificate of specialty in General surgery program** and not submitted for any other educational program fulfillments or publications. All sources used here for review of the proposal and the thesis are duly acknowledged.

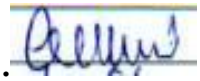
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ABREVIATIONS AND ACRONYMS

AIDS: -Acquired immunodeficiency syndrome

ARDS: -Acute Respiratory Distress Syndrome

PPI: -proton pump inhibitor

CHF: -Congestive Heart Failure

CI: -Confidence Interval

CLD: -Chronic Liver Disease

DM: -diabetes mellitus

E.C: - Ethiopian calendar

GI: - Gastrointestinal

GP: - General practitioner

HAP: -Hospital Acquired Pneumonia

H Pylori: - Helicobacter Pylori

WUSH: -: Wolkite university specialized hospital

HSV: -Highly selective vagotomy

KM: - Kilometer

MOF: -Multi organ failure

NSAIDs: -Non-steroidal anti-inflammatory Drugs

OR: -Operating room

PPUD: Perforated Peptic Ulcer Disease

RVI: -Retro viral infection

SPSS: -Statistical package of social science

V+D: -Vagotomy + Drainage

WHO: -World Health Organization

LMIC: -low and middle-income countries

PUP: -peptic ulcer perforation

Abstract

Background

Peptic ulcer perforation is a surgical emergency and life-threatening complication affecting 2–10% of peptic ulcer disease patients. Delayed diagnosis and surgical management are associated with significant morbidity and mortality. This study assessed the outcome of Perforated peptic ulcer disease among patients operated at Wolkite university comprehensive specialized hospital, Ethiopia.

Objective

To study surgical treatment Outcome of Perforated Peptic ulcer disease Patients who underwent emergency Surgical Operations in Wolkite university comprehensive specialized hospital between September 12/2019 to august 2025.

Method

A six-year hospital based retrospective study, in Wolkite university comprehensive specialized hospital, Wolkite, Ethiopia from September 12/2019 to august 2025 was conducted on 113 patients. Data was entered into EPI data then transferred and analyzed using SPSS windows program version 27. Odds ratio and 95% CI was calculated using the chi-square test and $P < 0.05$ was considered statistically significant

Results

Out of 134 cases operated for Perforated peptic ulcer in the study period, charts of 113 cases were analyzed making the retrieval rate 84%. 85%% were males & 51% are above 40 years of age. Previous history of Peptic ulcer disease & cigarette smoking was documented in 54.9% & 8.5% respectively. The post-operative complication rate was 21.1% & overall mortality of the study is 8.9%. Factors found to be significantly associated with increased complications were age above 40 ($p=0.002$) & treatment delay > 24 hours ($p=0.01$). Whereas mortality was increased by treatment delay ($p=0.04$) & shock at presentation ($p=0.039$).

Conclusion and recommendations

Perforated peptic ulcers as we have noted from our study is a disease of the young & males like the figures from the developing nations. Perforated peptic ulcer has high rates of overall morbidity & mortality. Early presentation of patients to surgical care facilities may reduce the overall morbidity and mortality.

1, INTRODUCTION

1.1 Background

Perforated peptic ulcer (PPU) is a surgical emergency and is associated with short-term mortality and morbidity in up to 30% and 50% of patients, respectively. Worldwide variation in demography, socioeconomic status, Helicobacter pylori prevalence and usage of prescription drugs make investigation into risk factors for PPU difficult. PPU presents as an acute abdominal condition, with localized or generalized peritonitis and has high risk of developing sepsis and death (1)

Globally, the incidence of peptic ulcer disease has fallen in recent years. Despite this and recent advances in both diagnosis and management of peptic ulcer disease, namely the improvement in endoscopic facilities, eradication of H. pylori and the introduction of the PPIs, complications such as peptic ulcer perforation remain a substantial healthcare problem. This may be due to an increase in the risk factors for peptic ulcer complications. Approximately one-third of the surgical procedures done today for PUD are because of perforation (3)

Peptic ulcer perforation is a serious complication which affects almost 2-10% of peptic ulcer patients on the average. Being a life-threatening complication of peptic ulcer disease, it needs special attention with prompt resuscitation and appropriate surgical management if morbidity and mortality are to be avoided (2).

The pattern of perforated PUD has been reported to vary from one geographical area to another depending on the prevailing socio-demographic and environmental factors. In the developing world, the patient population is young with male predominance, patients present late, and there is a strong association with smoking. In the west the patients tend to be elderly and there is a high incidence of ulcerogenic drug ingestion (2)

The diagnosis of perforated PUD poses a diagnostic challenge in most of cases. The spillage of duodenal or gastric contents into peritoneal cavity causing abdominal pain, shock, peritonitis, marked tenderness and decreased liver dullness offers little difficulty in

diagnosis of perforations. The presence of gas under the diaphragm on plain abdominal erect X-ray is diagnostic in up to 80% of the cases (1)

Since the first description of surgery for acute perforated peptic ulcer disease, many techniques have been recommended. The recent advances in antiulcer therapy have shown that simple closure of perforation with omental patch followed by eradication of H. Pylori is a simple and safe option in many centers and have changed the old trend of truncal vagotomy and drainage procedures. The definitive operation for perforated PUD is performed by few surgeons (1).

Delay in diagnosis and initiation of surgical treatment of perforated PUD has been reported to be associated with high morbidity and mortality after surgery for perforated PUD. Early recognition and prompt surgical treatment of perforated PUD is of paramount importance if morbidity and mortality associated with perforated PUD are to be avoided. A successful outcome is obtained by prompt recognition of the diagnosis, aggressive resuscitation and early institution of surgical management (1).

Little research work has been done on the surgical management of perforated peptic ulcer disease in our local environment despite increase in the number of admissions of this condition from time to time. The aim of this study is to describe our experience on the surgical management of perforated peptic ulcer disease outlining the clinical presentation pattern, management and outcome of patients with peptic ulcer perforation in our setting and to identify predictors of outcome of these patients.

1.2 Statement of The Problem

Perforation occurs in approximately 2–14% of patients with peptic ulcer disease and is responsible for a large proportion of ulcer-related deaths. Despite improvements in diagnostic modalities, resuscitation, anesthesia, and surgical techniques, the mortality rate of perforated peptic ulcer remains high, ranging from 6% to 30%, particularly among elderly patients and those with delayed presentation (1,6,17).

Globally, the incidence and outcomes of perforated peptic ulcer vary across regions due to differences in socioeconomic status, access to healthcare, prevalence of risk factors, and health system capacity. Studies from Europe and other developed regions have shown declining incidence due to better medical treatment and eradication therapy; however,

perforation still represents a major cause of emergency abdominal surgery (1,14,16). In contrast, many low- and middle-income countries continue to experience a significant burden of the disease due to limited access to early diagnosis, delayed presentation, and barriers to timely surgical care (7,8,15).

In Africa, several studies have demonstrated that perforated peptic ulcer is a common surgical emergency with substantial postoperative complications and mortality. Reports from Liberia, Tanzania, Côte d'Ivoire, Kenya, and Nigeria indicate that delayed hospital presentation, shock at admission, advanced age, comorbid conditions, and large perforation size are important predictors of poor outcomes (7,8,9,10,19). Similar findings have been reported in other developing settings, where inadequate health infrastructure and limited emergency surgical services contribute to adverse outcomes (15).

In Ethiopia, perforated peptic ulcer remains a significant surgical problem and continues to be frequently encountered in tertiary hospitals. Studies conducted at major hospitals in Addis Ababa have reported considerable morbidity and mortality among patients undergoing surgery for perforated peptic ulcer (11,12,21). Additional studies have also shown that the disease disproportionately affects young adult males and demonstrates seasonal variations in occurrence (23). However, outcomes are influenced by several clinical and management-related factors such as delay in presentation, presence of peritonitis, comorbid illnesses, and perioperative complications (22).

Although several studies have described the clinical profile and outcomes of perforated peptic ulcer in Ethiopia and other African countries, there remains limited local evidence regarding the magnitude of postoperative outcomes and the specific factors associated with poor surgical outcomes in many hospitals. Understanding these outcome patterns and associated factors is essential for improving early diagnosis, optimizing perioperative management, and reducing mortality related to perforated peptic ulcer. Therefore, this study aims to assess the surgical outcomes and associated factors among patients operated for perforated peptic ulcer at the study setting. The findings of this study will help identify modifiable risk factors, guide clinical decision-making, and contribute to improving emergency surgical care for patients with perforated peptic ulcer.

1.3. Significance of the study

After adequately assessing post treatment outcome of perforated PUD patients in our hospital and properly studying factors attributing to poor treatment outcome the research will give good information for responsible stakeholders at national, regional and our hospital levels. The stake holders are management staffs of our hospital starting from surgical department to CEO of our hospital, surgeons and surgical Residents, medical interns, nurses, anesthetists & Regional health bureau and minster of health .It will help them ,to understand the deficits in different facility's and their impact on patient outcome and identifying the possible reasons (factors) affecting it .It will help also to improve pre op preparations ,intra op management including type & dose of anesthesia depending on patient condition and post op care & patient follow up to improve post treatment outcome .Finally it also help to adjust policy's regarding surgical care in general by understanding the gap and its impact on patient treatment outcome

2. LITERATURE REVIEW

2.1 Global Context

Peptic Ulcer Disease (PUD) is a common gastrointestinal disorder characterized by mucosal ulceration in the stomach or duodenum resulting from an imbalance between aggressive factors such as gastric acid, pepsin, non-steroidal anti-inflammatory drugs (NSAIDs), and protective mucosal mechanisms. The most common etiological factors include infection with Helicobacter pylori and the widespread use of NSAIDs. Despite advances in medical therapy, peptic ulcer disease remains an important cause of morbidity and mortality worldwide due to its complications, including bleeding, obstruction, and perforation. (1,2 ,4)

Among the complications of peptic ulcer disease, Perforated Peptic Ulcer (PPU) is one of the most severe surgical emergencies. Perforation occurs when the ulcer erodes through the full thickness of the stomach or duodenal wall, allowing gastric or duodenal contents to spill into the peritoneal cavity and causing generalized peritonitis. Patients typically present with sudden onset of severe epigastric pain, abdominal rigidity, and signs of peritonitis requiring urgent surgical intervention. Mortality following emergency surgery for ulcer perforation is closely associated with delayed presentation, presence of preoperative shock, coexisting medical illnesses, and duration of perforation greater than 48 hours. (1, 3 ,4)

Globally, perforation occurs in approximately 2–10% of patients with peptic ulcer disease and accounts for more than 70% of deaths associated with the disease. The most frequent anatomical location of perforation is the anterior wall of the duodenum, accounting for about 60% of cases, followed by gastric antral ulcers (20%) and ulcers on the lesser curvature of the stomach (20%). Epidemiological patterns vary geographically; duodenal ulcers predominate in Western populations, while gastric ulcers are relatively more common in some Asian countries. (1 ,18)

Despite the introduction of acid-suppressive medications such as H2 receptor antagonists and proton pump inhibitors, the incidence of complications such as perforation has not declined substantially in many regions. In Europe, peptic ulcer disease still accounts for approximately 20,000–30,000 deaths annually. Increased use of aspirin and NSAIDs,

particularly among elderly populations, has been identified as a major contributing factor to the persistence of ulcer complications. (1 ,3 ,14)

Risk stratification is important in predicting outcomes in patients with perforated peptic ulcers. The well-known Boey score incorporates three major risk factors: preoperative shock, severe medical illness, and duration of perforation greater than 24 hours. Patients with all three risk factors have significantly higher mortality compared with those without risk factors. (13)

A prospective multicenter study conducted in Germany involving 37 patients from 11 centers reported a median age of 49 years among patients with perforated peptic ulcers. Males accounted for 65% of the patients, and gastric perforations were slightly more frequent than duodenal perforations. Delayed presentation beyond 12 hours and age greater than 60 years were identified as major predictors of postoperative complications. (5)

Similarly, a retrospective cohort study conducted at Nakornping Hospital in Chiang Mai, Thailand evaluated 912 patients who underwent surgery for perforated peptic ulcer disease. The median age of patients was 72 years, and males accounted for 77.74% of cases. Postoperative complications occurred in 9.54% of patients, including surgical site infection, pneumonia, and need for reoperation. The overall mortality rate was 1.97%, while the majority of patients recovered without complications. Advanced age was strongly associated with postoperative morbidity. (6)

In addition to clinical factors, health system factors also influence outcomes of emergency surgical conditions. Studies have shown that patients in low- and middle-income countries often face barriers to timely surgical care, including delayed referral, lack of surgical facilities, transportation difficulties, and financial constraints. These factors contribute significantly to increased morbidity and mortality associated with perforated peptic ulcer disease. (15 ,16)

2.2 African Context

In many African countries, perforated peptic ulcer disease remains a major surgical emergency and frequently affects younger populations compared with Western countries. Several studies have shown that risk factors such as alcohol consumption, cigarette

smoking, NSAID use, and delayed hospital presentation contribute significantly to disease severity and outcomes. (8 ,20)

A prospective case series conducted in Monrovia, Liberia reported a median age of 33 years among patients with perforated peptic ulcers, with males accounting for 85% of cases. A majority of patients had a history of gastritis and antacid use prior to presentation. The median time between onset of symptoms and surgery was 4.5 days, indicating significant delays in accessing surgical care. The overall in-hospital mortality following surgical treatment was 35%. Prolonged duration of symptoms and age greater than 30 years were significantly associated with increased mortality. (7)

A tertiary hospital study conducted in northwestern Tanzania evaluated 84 patients treated surgically for perforated peptic ulcers. Males slightly outnumbered females, and the median age was 28 years, with the majority of patients belonging to the 21–30-year age group. Approximately 69% of patients had no prior history of peptic ulcer disease. Risk factors including alcohol consumption, smoking, and NSAID use were common. The majority of perforations (90.4%) occurred in the duodenum, and the most commonly performed surgical procedure was Graham's omental patch repair. Postoperative complication and mortality rates were 29.8% and 10.7% respectively. Significant predictors of complications included premorbid illness, HIV infection, CD4 count below 200 cells/µl, delayed treatment, and acute perforation. (8)

A retrospective cohort study conducted in Côte d'Ivoire involving 161 patients reported that 27.5% of patients developed postoperative complications and 19.3% died. The most common postoperative complications were septic shock, hypovolemia, wound infection, and gastrointestinal fistula. Early surgical intervention within 24 hours significantly improved outcomes, while delayed hospital admission beyond 72 hours was strongly associated with increased mortality. Other significant predictors included comorbid diseases, tachycardia, purulent intra-abdominal fluid collection, and electrolyte abnormalities such as hyponatremia. (9)

In Kenya, a study conducted at Kenyatta National Hospital analyzed patients admitted with perforated peptic ulcer disease over a two-year period. Males accounted for 86.2% of the patients, and more than half were younger than 35 years. Alcohol consumption, cigarette smoking, and NSAID use were identified as major risk factors. The complication

rate was 25%, and mortality occurred in four patients. Treatment delay was found to be the most significant factor associated with complications and poor outcomes. (10)

Studies from Nigeria also report similar patterns, where perforated peptic ulcer disease predominantly affects young adult males and is associated with high morbidity and mortality. Mortality rates ranging from 15–20% have been reported, mainly due to septic complications, delayed presentation, and limited access to timely surgical care. (19)

2.3 Ethiopian Context

In Ethiopia, perforated peptic ulcer disease remains one of the common causes of acute abdomen requiring emergency surgical intervention. Several hospital-based studies have demonstrated that the disease predominantly affects young adult males and is often associated with delayed presentation to healthcare facilities. (11 ,12)

A retrospective review conducted at Tikur Anbessa Specialized Hospital in Addis Ababa analyzed 74 cases of perforated peptic ulcer disease. The mean age of patients was 32.6 years, with a male-to-female ratio of 7.2:1. Approximately 22% of patients had no prior history of peptic ulcer disease. Diagnostic delay was observed in 95% of cases. Most perforations occurred in the duodenum, and many patients had purulent peritonitis at laparotomy. Fourteen patients died during hospitalization, highlighting the severe nature of the condition in this setting. (11)

Another study conducted at the same institution evaluated 351 patients with complicated peptic ulcer disease. During the study period, complicated peptic ulcers accounted for 3.8% of major surgical procedures. The mean age was 36.5 years, and the male-to-female ratio was 5.6:1. The most common presenting symptoms were abdominal pain and vomiting. Gastric outlet obstruction was the most common complication followed by perforation requiring surgical management. The most commonly performed surgical procedure was truncal vagotomy with drainage. Approximately 5% of patients died during hospitalization. (12)

A five-year retrospective study conducted between 2013 and 2017 at Saint Paul's Hospital Millennium Medical College in Addis Ababa reported postoperative complications in 22.8% of patients undergoing surgery for perforated peptic ulcer disease. The most common complication was superficial surgical site infection. Other complications included wound dehiscence, hospital-acquired pneumonia, postoperative collections, acute kidney

injury, and repair site failure. Factors significantly associated with postoperative morbidity included advanced age, female sex, presence of comorbidities, hypotension, tachycardia, and delayed presentation. (21)

Another Ethiopian study analyzing the pattern and seasonal variation of perforated peptic ulcer disease reported that duodenal ulcer perforation was significantly more common than gastric perforation. The disease predominantly affected young male patients and showed variation in incidence across different seasons, suggesting possible environmental and lifestyle influences. (23)

A recent retrospective study conducted in Jigjiga, eastern Ethiopia, reported that perforated peptic ulcer disease accounted for approximately 9.6% of emergency surgical operations. Postoperative complications occurred in about 9.1% of patients, with superficial surgical site infection being the most common. The mortality rate was 5.5%, and the most frequent cause of death was multiple organ failure secondary to severe sepsis. Duodenal ulcer perforation was the most common type of perforation, with a duodenal-to-gastric ulcer ratio of approximately 14.8:1. (22)

Overall, the available evidence indicates that perforated peptic ulcer disease remains a significant surgical problem in Ethiopia, with relatively young patient populations affected and outcomes largely influenced by delayed presentation, comorbid conditions, and postoperative complications. (11 ,21 ,22)

2.4 Outcome and Associated Factors of Perforated Peptic Ulcer Disease

2.4.1 Outcome of Perforated Peptic Ulcer Disease

Perforated peptic ulcer disease (PPUD) remains one of the most severe complications of peptic ulcer disease and is associated with significant morbidity and mortality despite advances in surgical and medical management. Globally, perforation occurs in approximately 2–10% of patients with peptic ulcer disease and accounts for the majority of deaths related to the condition. The high mortality associated with PPUD is mainly attributed to delayed diagnosis, sepsis, and the presence of comorbid conditions, particularly in elderly patients (18). Mortality following emergency surgery for perforated peptic ulcer is strongly correlated with preoperative shock, coexisting medical illness, and prolonged duration of perforation prior to surgical intervention (3).

Several studies have documented considerable postoperative morbidity among patients undergoing surgical treatment for perforated peptic ulcer. A retrospective cohort study conducted in Thailand involving 912 patients reported postoperative complications in approximately 9.5% of patients, including surgical site infection, pneumonia, and the need for reoperation. The mortality rate in this study was about 2%, and patients who developed complications were significantly older compared to those without complications (6). Similarly, a prospective study from Tanzania reported postoperative complication and mortality rates of 29.8% and 10.7%, respectively, with the majority of complications related to sepsis and intra-abdominal infection (8). In West Africa, a study conducted in Côte d'Ivoire found that postoperative complications occurred in 27.5% of patients with perforated peptic ulcer, while the mortality rate reached 19.3%. The most frequent complications included septic shock, wound infection, hypovolemia, and gastrointestinal fistula formation (9). Likewise, research conducted in Kenya reported a complication rate of 25% and emphasized that delayed presentation and acute perforation were major contributors to adverse postoperative outcomes (10).

Studies conducted in Ethiopia have also demonstrated substantial morbidity and mortality associated with perforated peptic ulcer disease. A five-year retrospective study at Saint Paul's Hospital Millennium Medical College reported postoperative complications in 22.8% of patients, with superficial surgical site infection being the most common complication followed by pneumonia, wound dehiscence, postoperative collections, and repair site failure (21). Similarly, research from Minilik II Memorial Referral Hospital reported complication rates of approximately 22.9%, with wound infection being the most common postoperative complication and patch failure requiring re-laparotomy in several patients (23). Another recent study conducted in Jigjiga hospital reported postoperative complications in 9.1% of patients, with surgical site infection, pneumonia, and acute kidney injury being the most common complications (22).

2.5 Associated Factors for Postoperative Complications and Mortality

2.5.1 Delayed Presentation

Several studies have demonstrated a strong association between delayed hospital presentation and postoperative complications. In a Tanzanian study, delayed presentation beyond 24 hours was significantly associated with increased postoperative morbidity and

mortality (8). Similarly, research conducted in Kenya found that treatment delay was one of the most important predictors of postoperative complications in patients with perforated peptic ulcer disease (10). A cohort study from Côte d'Ivoire also demonstrated that delayed hospital admission beyond 72 hours significantly increased the risk of postoperative complications and mortality (9).

Delayed presentation is also common in low-income settings due to multiple barriers including limited access to healthcare facilities, poor referral systems, socioeconomic challenges, and cultural practices such as reliance on traditional medicine. A systematic review of barriers to surgical care in low- and middle-income countries identified delayed healthcare seeking behavior and limited access to surgical services as major contributors to adverse outcomes in emergency surgical conditions such as perforated peptic ulcer disease (15). Studies conducted in Ethiopia have similarly reported significant delays in presentation among patients with complicated peptic ulcer disease, emphasizing the need for improved early referral and access to emergency surgical care (11).

2.5.2 Preoperative Shock

Preoperative shock is another critical determinant of postoperative outcome in patients with perforated peptic ulcer disease. Shock in these patients typically results from severe peritonitis, sepsis, dehydration, and significant fluid loss into the peritoneal cavity. Hypotension leads to reduced tissue perfusion and oxygen delivery to vital organs, which can result in organ dysfunction and increased postoperative morbidity and mortality. Several studies have identified preoperative shock as an independent predictor of poor outcomes. The classic Boey risk score, which is widely used to predict mortality in perforated peptic ulcer disease, includes preoperative shock as one of its three major prognostic factors (13). In addition, studies from Tanzania demonstrated that patients presenting with shock at admission had significantly higher mortality compared with those who were hemodynamically stable (8). Similarly, research from Côte d'Ivoire found that patients with hemodynamic instability at presentation had significantly increased risk of postoperative morbidity and mortality (9). The presence of shock also complicates perioperative management because these patients require aggressive resuscitation, correction of electrolyte imbalances, and careful monitoring in the postoperative period. Inadequate resuscitation before surgery can lead to persistent organ hypoperfusion,

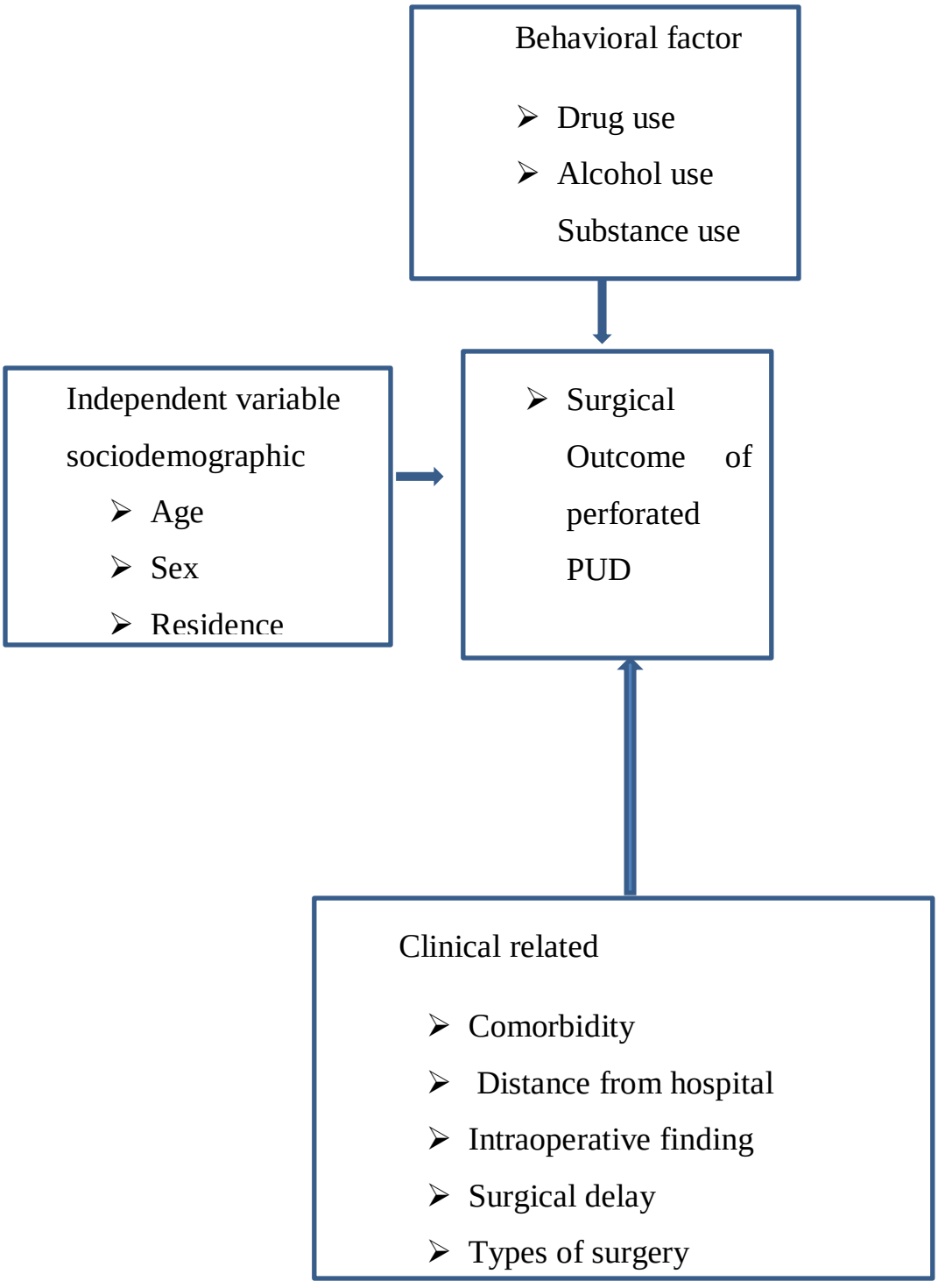
increasing the risk of postoperative complications such as septic shock, acute kidney injury, and multi-organ failure.

2.5.3 Older Age

Advanced age is another important predictor of postoperative complications and mortality in perforated peptic ulcer disease. Elderly patients are more likely to have reduced physiological reserve and a higher prevalence of comorbid conditions such as cardiovascular disease, diabetes mellitus, and chronic kidney disease. These factors impair the body's ability to respond to severe infection and surgical stress. Several studies have demonstrated that increasing age significantly increases the risk of postoperative complications. A prospective study conducted in Germany reported that age greater than 60 years was an independent predictor of postoperative complications in patients with perforated peptic ulcer disease (5). Similarly, research conducted in Thailand found that patients who developed postoperative complications had a significantly higher median age compared to those without complications (6).

Studies conducted in Africa have also demonstrated similar findings. In Tanzania, age greater than or equal to 40 years was significantly associated with increased mortality among patients with perforated peptic ulcer disease (8). Likewise, research conducted in Liberia found that increasing age was independently associated with in-hospital mortality among patients undergoing surgery for perforated peptic ulcer (7). The increased risk of complications in older patients can be explained by several physiological mechanisms. Aging is associated with reduced immune response, impaired wound healing, and decreased cardiovascular and respiratory reserve. These factors increase susceptibility to postoperative infections, respiratory complications, and organ dysfunction following major abdominal surgery.

Diagram .1 conceptual framework



3. OBJECTIVES

3.1 General Objective:

To assess the surgical treatment outcomes and determining factors of patients with perforated peptic ulcer disease who underwent surgical treatment at Wolkite University Specialized Hospital from September 12/2019 to august 2025

3.2 Specific Objectives

- To determine the surgical outcome of PPUD who underwent surgical treatment at Wolkite University Specialized Hospital from September 12/2019 to august 2025
- To determine associated factor that affect treatment outcome of PPUD who underwent surgical treatment at Wolkite University Specialized Hospital from September 12/2019 to august 2025

4, METHODOLOGY

4.1. Study Area

Wolkite University specialized Hospital (WUSH) is found in central region of Ethiopia. The teaching hospital is located in Wolkite town of Gurage Zone found at 158 km south to the capital city, Addis Ababa. The teaching hospital was established in 2018 and serves for about 4 million people in the region. It has a total capacity of 220 inpatient beds in four major departments and other units with a total of 115 physicians, 240 non-physician health professionals and 156 supportive and technical staffs. There are 6 general surgeon, two orthopedic surgeon, one pediatric surgeon and one neurosurgeon. average 800 patient get service per month in this hospital. There are around 1000 laparotomy done over the past six year and among these 133 was due to perforated PUD.

4.2. Study Design

A hospital-based retrospective cross-sectional study was conducted.

4.3. Study Period

The study was conducted in wolkite University comprehensive specialized hospital from September 12/2019 to august 2025

4.4. Study Population

All patients undergone surgery for perforated peptic ulcer at WUSH between September 12/2019 to august 2025

4.5 Inclusion and exclusion criteria

4.5.1 Inclusion criteria

All patients who were admitted and operated for perforated peptic ulcer diseases in the study period

4.5.2 Exclusion criteria

- Patients registered for PPUD on log book but with lost card
- Patients having card but with incomplete patient file (operation note, progress note and history sheet and discharge note)
- Patients undergone exploratory laparotomy but perforation was not caused by PUD

4.6 Sample size determination and sampling technique

4.6.1 Sample size determination

The single population proportion formula was used and computed by considering 9.7% estimated prevalence of poor treatment outcome of perforated PUD in Ethiopia (22), 5% precision (d=0.05), 95% level of confidence (z=1.96) and 10% non-response rate. The sample size will be calculated as follow

$$n = \frac{Z^2 p\,(1 - p)}{w^2} \quad \text{or} \quad n = \frac{z^2 \times p(1-P)}{(1 + \frac{n}{N})}$$

Where n= the sample size

p= proportion of population (prevalence rate) = 0.097

W=margin of error expressed in proportion (0.05)

Z=1.96 the calculated finally the sample size will be = 148

4.6.2 Sample size determination for associate factor

1, Delayed presentation (>24 h)

- Observed: exposed outcome $P_1 = 0.857$, unexposed $P_2 = 0.172$, exposed prevalence ≈ 0.165.
- Required total (80% power) ≈ 17 records (≈3 exposed + 14 unexposed).
- With 10% contingency → ≈ 19 records.

2, Pre-operative shock

- Observed: $P_1 = 0.90$ (complications among shocked), $P_2 = 0.103$, exposed prevalence ≈ 0.236
- Required total (80% power) ≈ 6 records (≈2 exposed + 4 unexposed)
- With 10% contingency → ≈ 7 records.

3, Comorbidity (any)

- Observed: $P_1 = 0.80$ (complications among comorbid), $P_2 = 0.248$, exposed prevalence ≈ 0.079.
- Required total (80% power) ≈ 66 records (≈6 exposed + 60 unexposed)
- With 10% contingency → ≈ 73 records. Sample size for single population formula was taken so final sample size was 148

4.6.2 Sampling technique

All eligible cases during the defined time frame was included.

4.7 Data Collection Techniques and Tools

First, operation log book records were reviewed and lists of operated cases for PUD perforation during the study period (September 12/2019 to august 2025) was developed. Then, using patient's card number on the operation log book records, patient's card was sought out from the hospital's card office. Finally, data was collected from patient's cards using the checklist adopted from similar study. Which contain four-part, socio-demographic, risk and prehospital condition, intraoperative finding, and postoperative condition.

4.8 Study Variables

4.8.1 Independent variables (factors affecting PPUD treatment outcome)

Socio-demographic

- ✓ Age
- ✓ Sex
- ✓ Residence

Behavioral factors:

- ✓ Alcohol intake
- ✓ Smoking
- ✓ Chat chewing

Clinical related factors:

- ✓ Co morbidity-DM, Hypertension, CLD, HIV/AIDS, cardiac disease, etc ¬
- ✓ Previous dyspepsia
- ✓ History of drug use
- ✓ Duration of illness
- ✓ Shock at presentation.

Treatment related factors

- ✓ Type of surgery
- ✓ Peritoneal contamination
- ✓ Size of perforation
- ✓ Site of perforation

4.8.2 Dependent variable

PPUD treatment outcome

- ✓ Favorable outcome
- ✓ unfavorable outcome

4.9 Operational definitions

unfavorable outcome –If patient developed at least one of the complications or Died (5)

favorable outcome- If patient sent out of hospital without developing any of the complications (5)

Discharge without complications- If patient sent out of hospital without developing any of the complications (3)

Surgical site infection-any sign of infection (purulent discharge, redness, tenderness, induration) over the site of surgical incision made to treat PPUD within 30days of operation. (2)

Duration of current illness - Denotes time interval from acute onset of symptoms to presentation to the hospital - Delayed is defined as duration > 48hrs (2)

PPU - Diagnosed with the combination of clinical symptoms of peritonitis and radiological signs of digestive tract perforations and ascertained after laparotomy. (3)

Wound dehiscence-spontaneous rupture or opening of surgical wound made to treat PPUD usually associated with surgical site infection. (2)

Intra-abdominal collection-presences of pus inside organ spaces of abdomen detected either by ultrasound or physical examination (presence of fluid thrill & shifting dullness) after patient is operated for PPUD. (2)

Shock - Systolic blood pressure < 90mmHg (2)

Death- Patient who died inside hospital after he is operated for PPUD

4.10 Data quality control

During data collection there was close monitoring and questionnaires were inspected to check for errors of omission and commission. Data was collected and analyzed with respect to the study objective

4.11 Data analysis

After data collection each questionnaire was checked serially for completion. The data was coded, cleaned, entered in to EPI Data 3.4 then transferred and analyzed by SPSS version 27.0. descriptive statics including percentage, frequency, distribution, mean and standard deviation was used to describe the data on treatment outcome. Binary logistic analysis was done to select the variables to be entered into the final logistic multivariable analysis. Factors with P value of <0.2 was entered into multivariable logistic regression analysis model and association between the independent variables and outcome was assessed using OR at 95% confidence interval. Every variable with P-values less than 0.05 in multivariable logistic model was considered as statistically significant

4.12 Ethical considerations

All ethical issues were considered as per the guidelines of the World Health Organization (WHO) & culture & religion of study population. Before starting of the data collection process, Wolkite University College of Medical and Health Science Institutional Health Research Ethics Review Committee (IHRERC) was secured ethical clearance. Permissions was taken from the administrative office of Wolkite specialized hospital as well as from the Departmental Heads of Surgery. The study was conducted with maintaining privacy. Patient confidentiality was strictly maintained using anonymous data collection and coding.

4.13. Dissemination of Findings

The result will be commented by the advisors and then; -

- Presented to Wolkite University and the hospital surgical department
- Shared through presentations at scientific meetings
- Submitted to regional and zonal health bureau
- Submitted to MOH to help for police making
- Submitted for publication in peer-reviewed medical journals

5 RESULT

5.1 Sociodemographic characteristics of the study population

Out of 134 emergency operated cases of PPU that were documented on the operation log books, the charts of 113 cases were found making retrieval rate of 84%. 5card was registered on logbook but they were lost, 7 cards registered to be PPUD was found to be other case, 3 patients were registered but ID number was not recorded on logbook and 6 cards was excluded due to loss of important variable. Out of 113 patient 96(85%) were male making M:F ratio 5.7:1. majority are above 40(51%) Smallest age is 7 years and largest is 90 with mean age is 42. majority live in rural area 77.9

Table 1: Age frequency distribution of the study population, n=113

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<20	9	8.0	8.0	8.0
	21-40	47	41.6	41.6	49.6
	41-60	44	38.9	38.9	88.5
	>60	13	11.5	11.5	100.0
	Total	113	100.0	100.0	

5.2, Risk factors and Pre-Hospital Conditions

Proportion of patients that reported prior history of PUD was 54.9%. nine patients out of 113 claim a habit of cigarette smoking. Ten patients had a known comorbid illness (eight had hypertension and two had both hypertension and heart failure). Twenty (17.7%) patients presented in shock at the time of their presentation. The majority 60.2% present after 24hr of presentation.

Table 2: Risk factors and Pre-Hospital Conditions

Risk Factors & prehospital condition	N=113	%
Hx of peptic ulcer disease	62	54.9%
Hx of medication use (NSAID)	3	2.7%
Hx of cigarette smoking	9	8%
Hx of alcohol consumption	11	9.7%
Hx of comorbidity	10	8.8%
Shock at presentation	20	17.7%
Fasting	0	0%

Table 3: frequency distribution of study population based on duration of current illness, n=133

Time of presentation	N	%
<24hr	45	39.5%
24-72 hr	34	30.1%
>72hr	34	30.1%

5.3, Intraoperative finding

5.3.1 Intraoperative Finding (Site of perforation) & Type of procedure performed

At laparotomy, most (95.6%) perforations were located at first part of duodenum. Simple closure of the perforations (Graham's patch) was the procedure performed in all of the cases

5.4 Post-Operative condition & overall outcome

Out of 113 cases that were reviewed 24(21.2%) of them developed post-operative complications. Sepsis and SSI was the commonest complication documented at 10.6% followed by pneumonia (9.4%). Graham's patch leak occurred in three cases (Table 4). Average duration of hospital stay postoperatively was 7.8day max was 48 day. 10 cases out of 113 died while in the hospital making overall mortality of this study 8.9%.

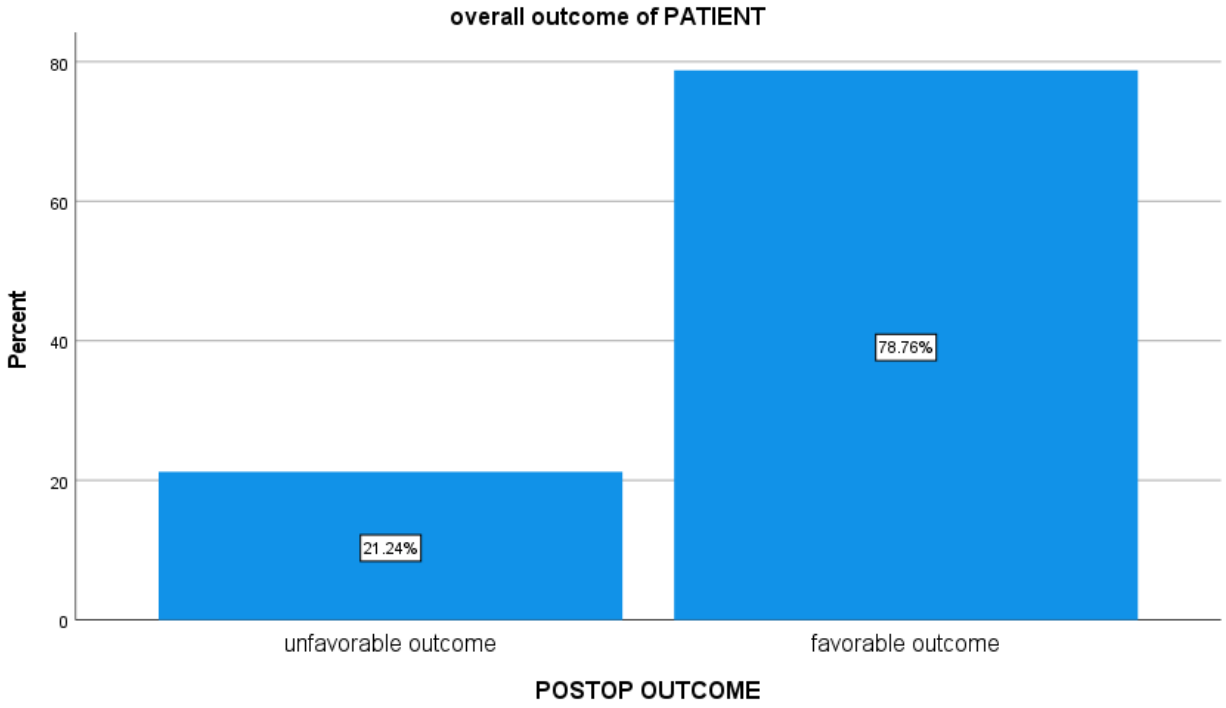


Figure 1 over all outcome of patient

Table 4: postoperative complication

Types of complication	N	%
Sepsis	12	10.6%
Pneumonia	9	7.9%
SSI	12	10.6%
Patch failure	3	2.7%
Wound dehisce	3	2.7%
Total	39	
With no complication	89	78.8%

First binary regression analysis was done and those with P value of less than 0.2 taken significant. age of patient's, sex, residence of patient, presence of comorbidity, duration of

illness and preoperative shock was analyzed but age, duration of illness presence of comorbidity and preoperative shock was found to be significant. Hosmer-lemeshow goodness of fit show strongly fit (P= 0.87). multivariate logistic regression was used. According to multivariate logistic regression analysis of unfavorable treatment outcome was shown to be significantly associated with delayed presentation (p=0.04) & shock at the time of admission (p=0.039).

Table 5: predictors of poor treatment outcome according to multivariate logistic regression analysis

Predictor factor	Crude OR (95%CI)	Adjusted OR $ CI	P value
Age <40(56)	1	1	**0.02**
>40 (57)	10.312(1.260-84.377)	2.78(2.205- 4.877)	
Duration of current illness			**0.04**
<24hr	1	1	
>24hr	6.721(2.820-54.950)	4.830(1.439-53.156)	
Shock			**0.039**
Yes	33(21.34-44.5)	24(20.23-25.8)	
No	1	1	
Comorbidity			0.97
Yes	1	1	
No	0.862(0.98-7.594)	1.024(0.58-17.98)	

6, DISCUSSTION

This study assessed the clinical profile, management, and outcomes of patients with perforated peptic ulcer. The majority of patients (50.4%) were older than 40 years, with a mean age of 42.4 years, while most patients (88.5%) were younger than 60 years. Male patients predominated with a male-to-female ratio of 5.6:1. Nearly half of the patients (44.2%) had no prior history of peptic ulcer disease, and only a small proportion reported non-steroidal anti-inflammatory drug (NSAID) use. Most patients (60.2%) presented to the hospital more than 24 hours after the onset of symptoms. Intra-operatively, the majority of perforations (95.6%) were located in the first part of the duodenum, and almost all patients were managed by simple closure of the perforation. The overall postoperative complication rate was 21.2%, while the overall mortality rate was 8.8%. Multivariate logistic regression analysis showed that age ≥40 years, shock at presentation, and delayed presentation (>24 hours) were significantly associated with postoperative complications, and mortality

The overall postoperative complication rate in this study was 21.2%, which is comparable to reports from Ethiopia (22%) but slightly lower than those reported in other African countries, including Kenya (25%), Ivory Coast (27.5%), and Tanzania (29.8%). Despite the relatively late presentation of patients in this study, the lower complication rate may be explained by improved surgical care, younger patient age, and a relatively low prevalence of comorbid conditions. Interestingly, Qin Yang et al**. (5)** reported a higher complication rate of 39% in Germany, which may be attributed to the older age of patients in that population and presence of comorbidity. In the present study, sepsis and surgical site infection accounted for 10.6% of complications, while patch leakage occurred in 2.7% of cases. These findings are comparable to the study by Chalya et al. (8**)**, which reported sepsis in 11.8% and surgical site infection in 9.3% of patients. However, Nasio et al. (10) reported a higher leakage rate of 10.7%. The overall mortality rate in this study was 8.8%, which is lower than that reported in several African studies. For example, Nasio et al. (10**)** reported a mortality rate of 14.3%, while Soro Kountele Gona et al. (9) reported a mortality rate of 19.3%. Similarly, a study conducted by Ersumo et al. (11) reported a mortality rate of 18.9%. Interestingly, the mortality rate in this study is closer to figures reported in developed countries; for instance, the German study by

Qin Yang et al**. (5)** reported a mortality rate of 13%. The relatively lower mortality rate observed in this study may be attributed to improved surgical care, the involvement of experienced surgeons, younger patient age, and a lower prevalence of comorbid conditions.

Delayed presentation was one of the strongest predictors of postoperative complications in this study. Patients who presented more than 24 hours after the onset of symptoms had a significantly higher risk of developing postoperative complications (P=0.04 AOR1 4.830(1.439 53.156)). This observation is supported by several previous studies. For example, Chalya et al**.** and Nasio et al**.** both reported that delayed hospital presentation was associated with increased postoperative morbidity and mortality among patients with perforated peptic ulcer disease. Similarly, Søreide et al. emphasized that time from perforation to surgical intervention is a critical determinant of outcome. (11,17) Delayed presentation is particularly common in low- and middle-income countries due to several factors including limited access to healthcare services, financial constraints, cultural beliefs, and initial treatment at primary health facilities. As described by Grimes et al**.**, barriers to surgical care in low-resource settings often lead to delays in seeking and receiving definitive surgical treatment, which contributes significantly to poor outcomes. (18) delayed presentation was highly associated with poor outcome because there is continues duodenal and gastric content leak in to peritoneum causing bacterial contamination, generalized peritonitis, sepsis and multiorgan failure which result in mortality and morbidity of the patient.

Another important predictor of postoperative complications identified in this study was shock at presentation. Patients presenting with shock had a significantly higher risk of developing postoperative complications and mortality (P=0.039, AOR24(20-25). This finding is consistent with the well-known Boey risk factors, which include shock at admission, major medical illness, and delayed perforation (>24 hours) as predictors of poor outcomes in perforated peptic ulcer disease. Studies by Søreide et al**.** also confirm that preoperative hemodynamic instability is one of the most important prognostic factors in these patients. (9) Similarly**,** Lee et al. demonstrated that patients presenting with shock had significantly higher postoperative complication and mortality rates compared with those who were hemodynamically stable (17). Studies from Tanzania, Côte d'Ivoire, and Nigeria have also reported that shock at presentation significantly increases the risk of postoperative morbidity and mortality in

perforated peptic ulcer disease (8,9,19). In addition, Søreide et al**.** emphasized that early recognition and aggressive resuscitation of patients presenting with shock are essential to improve surgical outcomes in perforated peptic ulcer disease (1). Adequate fluid resuscitation, early administration of broad-spectrum antibiotics, and prompt surgical intervention are critical steps in preventing progression to severe sepsis and reducing postoperative complications. This is because Shock results in reduced tissue perfusion and oxygen delivery, which compromises the function of vital organs and impairs the immune response and collagen synthesis, poor wound healing, septic shock and MOF that increase mortality and morbidity of patient.

Older age was found to be significantly associated with increased postoperative complications in this study. Although the majority of patients in this study were younger than 60 years, patients aged 40 years and above demonstrated a higher risk of postoperative morbidity. (P=0.02 AOR2.78((2.205- 4.877) Similar findings have been reported in several studies evaluating outcomes of perforated peptic ulcer disease. For example, a study conducted in Germany by Qin Yang et al. demonstrated that advanced age was strongly associated with increased postoperative complications and mortality following surgery for perforated peptic ulcer (5). Likewise, Lee et al. reported that age is an independent predictor of postoperative morbidity and mortality in patients undergoing surgery for perforated peptic ulcer disease (17). Several studies from both developed and developing countries have consistently reported that older patients have significantly worse outcomes following perforated peptic ulcer surgery. For example, a study from Thailand reported that advanced age was one of the strongest predictors of postoperative complications and mortality among patients undergoing surgery for perforated peptic ulcer disease (6). Similarly, studies conducted in Tanzania and Côte d'Ivoire also reported that increasing age significantly increases the risk of postoperative morbidity and mortality (8,9). The higher complication rates observed in developed countries may partly be explained by the older age distribution of patients presenting with perforated peptic ulcer disease in those settings (5). this increased risk of post-operative complication in older patient can be explained with reduced physiological reserve and diminished ability to respond to surgical stress, immune compromised, which result in decreased wound healing, and increased susceptibility to infection like SSI and intrabdominal sepsis

The findings of this study have important clinical and public health implications for the management of perforated peptic ulcer disease in resource-limited settings. The identification **of** delayed presentation, preoperative shock, and older age as significant predictors of postoperative complications and mortality highlights the need for early diagnosis, prompt referral, and rapid surgical intervention to improve patient outcomes. Strengthening the referral system and increasing community awareness about early health-seeking behavior may reduce delays in presentation, which remains a major contributor to poor outcomes. In addition, early aggressive resuscitation and careful perioperative monitoring of high-risk patients, particularly those presenting with shock and advanced age, are essential to reduce postoperative morbidity and mortality. These findings also support the importance of implementing standardized risk assessment tools and improving emergency surgical care capacity in hospitals in order to optimize the management and survival of patients with perforated peptic ulcer disease.

6.1 Limitation of the study

- Because of the retrospective nature of the study some of the recordings on patient's charts were incomplete or some charts were lost.
- The study was conducted in a tertiary and teaching hospital so it might not be a representative of the general population

6.2 strength of study

- All operated case was included both adult and pediatric case
- Used a structured, pretested questionnaire adapted from similar study

7, CONCLUSION & RECOMMENDATION

7.1 Conclusion

PPU has high rates of overall morbidity & mortality.one fouth of patient had unfavorable outcome. Age, preoperative shock & delayed presentation are found to be significantly associated with post-operative complications and mortality according to this study. Early presentation of patients to surgical care facilities may reduce the overall morbidity and mortality in cases of peptic ulcer perforation. And the significant delays in seeking medical care seen in our case highlights the need for targeting this group of the population in efforts to reduce delay in presentation.

7.2 Recommendation

For health care professional

- ✓ According to the result of this study, there is a need for increased awareness among healthcare providers specially those working at health center and small private clinic about the early clinical feature of PPUD, as early presentation is a key factor in reducing post-operative complications and mortality.
- ✓ Patient with clinical feature of PPUD should be referred to area where surgeon is available.
- ✓ Special care should be taken for those patient older than 40 years old and those with preoperative shock to minimize mortality and morbidity
- ✓ Adequate rescitations should be done before operating patient
- ✓ Improving postoperative care of patient operated for PPUD to identify complication.
- ✓ Timely management of postoperative complication if occurred

For hospital administration, zonal health bureau and MOH

- ✓ Further study should focus on understanding the local risk factors, and their impact on the incidence and prognosis of PPUD
- ✓ Clinical feature and risk factor of PPUD should be incorporated in health education by using FM, or leaflets
- ✓ Feedback should be sent for health center and small private clinic about delayed referral of patient as time matter for treatment outcome

- ✓ As teaching institution all undergrad and postgraduate should be made to be familiar with PPUD treatment outcome and determinant factor
- ✓ There should be training program for low-level HCP working at HC and small private clinic
- ✓ Routine screening for H pylori and regular follow-ups for patients with a history of peptic ulcer disease could also help in reducing the risk of perforation
- ✓ There should be institutional protocol on management of PPUD
- ✓ Improve data recording system to computerize system for feature study

For the community

- ✓ Patient should be brought to hospital if had severe abdominal pain
- ✓ Should be aware of risk factor for perforation if had history of dyspepsia
- ✓ There should be regular checkup during worsening of epigastric pain rather than using over the counter medication
- ✓ Avoid cigarette smoking, and aware of medication they are taking for any pain relief

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9.Annex

Questionnaire

wolkite University department of surgery questionnaire for retrospective study to assess outcome of perforated PUD patients who underwent emergency surgical operation in WUSH and associated factor from Meskerem, 1, 2012 and Hamile, 22, 2017 E.C

Part one: Socio-demographic data

1. Age_____

2. Sex. 1 Male_____ 2. Female_____

3. Residence. 1. Urban 2. Rural

Part two; Risks and pre-hospital condition

4. History of peptic ulcer disease 1) Yes 2) No

5. History of Medication use (NSAID) 1) Yes 2) No

6. History of cigarette smoking 1) Yes 2) No

7. History of alcohol consumption 1) Yes 2) No

8. Co-morbidities 1) Yes 2) No

9. If yes, for Q9 specify: _____

10. Fasting? 1)Yes 2) No

11. If yes to Q10, for how long? _____

12. Duration of current illness_____

13. Shock (SBP<90mmhg) at presentation 1ye5…… 2, no

Part three; Intraoperative details

14.Intraoperative finding (site of perforation) _____

15.Type of procedure performed_____

Part four: Post-operative condition

16.Any post op complication 1) Yes____ 2) No_____

17.If yes, what kind of complication?

1)Sepsis 2) Pneumonia 3) SSI 4) Intra-abdominal abscess

5) Wound dehiscence 6) Patch leak

7) Others (specify). _____

18. Total duration of hospital stay? _____

19.Final outcome 1. Improved 2. Death