

Management Outcome and Associated Factors of Perforated Peptic Ulcer Disease at Yekatit 12 Hospital Medical College and Tirunesh Beijing Hospital

Wondwossen Amtataw^{1*}, Tsedalu Worku¹, Surafel Mulatu¹ and Getabalew Endazenaw²

¹Department of Surgery, Yekatit 12 Hospital Medical College, Addis Ababa, Ethiopia.

²Department of Public Health, Yekatit 12 Hospital Medical College, Addis Ababa, Ethiopia.

*Corresponding author

Wondwossen Amtataw

Department of Surgery Yekatit 12 Hospital Medical College,
Addis Ababa, Ethiopia.

Submitted : 31 Jan 2024 ; Published : 23 Feb 2024

Citation: Amtataw, W., Worku, T., Mulatu, S., Endazenaw, G. (2024). Management Outcome and Associated Factors of Perforated Peptic Ulcer Disease at Yekatit 12 Hospital Medical College and Tirunesh Beijing Hospital. J Medical Case Repo, 6(1):1-6. DOI : <https://doi.org/10.47485/2767-5416.1059>

Abstract

Background: Perforated peptic ulcer disease is one of the emergency surgical conditions of peptic ulcer complications with high mortality and morbidity. Although this emergency condition is prevalent in the study areas it is the first study that showed its magnitude and management outcome.

Objective: The purpose of this study was to determine the outcome and factors associated with perforated peptic ulcer disease.

Methodology: A cross-sectional study design was used. Data were analyzed using SPSS version 25 and binary logistic regression was used to see factors associated with outcomes. P value ≤ 0.05 was considered significant.

Result: A total of 95 patients were studied. Males outnumbered females by a ratio of 8.5:1. The mean and median age of patients was 31.74 ± 13.83 and 27 years respectively. Most perforations were located on the first part of the duodenum (78, 76.5%). Most patients (90, 88.2%) had Graham's omental patch repair. There were fifty-six post-operative complications recorded in 20 (21.1%) patients. Superficial surgical site infection (10.5%), wound dehiscence (9.5%), respiratory infections (20.1%), sepsis (17.9%), acute kidney injury (12.6%), and ECF (1.1%) were the complications recorded. Co-morbidity [AOR: 19.46 (2.39-158.39)] and SBP < 90mmHg [AOR: 5.76 (1.74-19.18)] were significantly associated with post-operative complications. The mortality rate was 5.3% (95% CI: 1.7% to 11.9%) and only co-morbidity [AOR: 10.85 (7.64, 15.40)] was statically associated with mortality.

Conclusion: The mortality rate of this study was low as compared with the majority of studies done the country and the region.

Keywords: peptic ulcer perforation, morbidity, mortality

Introduction

Peptic ulcer disease (PUD) is a worldwide health problem affecting about 4 million people annually and results in high morbidity, mortality, and economic loss [1]. It arises due to a break in the gastrointestinal lining due to either excess stomach acid production or blunted mucosal defense. Although the introduction of novel peptic ulcer drugs caused a prompt decline in elective operation for peptic ulcer disease emergency surgery for peptic ulcer complications like perforation is still being done [1, 2]. Perforation peptic ulcer (PPU) is the most common complication requiring emergency surgery in patients with PUD accounting for up to 40% of ulcer-related deaths and it carries a mortality rate ranging from 1.3% to 20% [3, 4].

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. Although morbidity and mortality have declined in high-income countries over the last 3 decades with an advance in medical therapy targeting H.pylori, perforation from PUD continues to be a challenge in low- and middle-income countries like African countries. In developing countries the young population is more affected than old and there is male predominant. In West, the patients tend to be elderly and there is a high incidence of ulcerogenic drug ingestion [1, 4, 5].

Patients with PPU may present with severe, sudden-onset epigastric pain, which can become generalized [3]. The peritonitis resulting from acid exposure may present as abdominal 'board-like rigidity'. The clinical picture may be less clear in the obese, the immunocompromised, patients on

steroids, patients with a reduced level of consciousness, the elderly, and children. In these situations, the clinical history and examination may be non-specific prompting additional imaging and laboratory studies to rule out differential diagnoses' The presence of gas under the diaphragm on plain abdominal erect X-ray is diagnostic in 75% of the cases [4, 6, 7].

The recent advances in antiulcer therapy have shown that simple closure of perforation with an omental patch followed by eradication of H.Pylori is a simple and safe option in many centers and has changed the old trend of truncal vagotomy and drainage procedures [1, 4, 8-10].

Older age, delayed presentation, hemodynamic instability at presentation, and delay in diagnosis and initiation of surgical treatment after patient presentation have been reported associated with high mortality and morbidity after surgery [1, 11-13].

Perforated peptic ulcer disease is one of the common conditions for which emergency surgical procedure is performed at Yekatit12 Hospital Medical College (Y12HMC) and Trunesh Beijing Hospital (TBH). Though the problem is reported as so common and overwhelming there was no study conducted that shows the actual burden and management outcome of the disease.

This study, it was tried to show the outcome of the disease and associated factors which will help to design strategy, primary prevention aimed at reducing the rate of PUD, and secondary prevention aimed at modification of health strategy and improving patient outcome.

Methods and Materials

Study area and Period

The study was conducted in Y12HMC and TBH from December 1/ 2021 - November 30/2023 G.C. Both institutions are found in Addis Ababa Ethiopia administered under Addis Ababa Health office and they are also training centers.

Study Design

A health facility-based cross-sectional study design was used to assess prevalence of surgical site infections and associated factors among patients in Yekatit 12 Hospital Medical College.

Source Population and Study Population

All patients whom surgical procedures done for perforated PUD from December 1/2021 - November 30/2023 G.C to the study areas were included in the study.

Inclusion and Exclusion Criteria

Patients operated for perforated PUD in the specified study period with complete documentation were included in the study whereas perforations caused by other than PUD (tumor, trauma) and patients with pediatric age groups were excluded.

Study Variables

The outcome of the patient (morbidity and mortality of patients

with perforated PUD) were dependent variables whereas socio-demographic variables (age, sex), exposure risk variable (history of alcohol ingestion, history of smoking, history of NSAID use, history of h pylori infection, Gastrinomas, ZES), clinical variables (duration of medical illness, co-morbid illness, shock at presentation, site of perforation, type of procedure done, use of drain, amount of fluid sucked, size of perforation) were taken as independent variables.

Data collection technique and quality control

Data were gathered using a data extraction checklist from the electronic medical records and these checklists were designed through literature review and a pretest was done. Data collectors were trained junior surgery residents on the data collection tool and how to conduct data collection. The principal investigator supervised the data collection process and checked the completeness and consistency.

Data analysis and presentation

SPSS statistical software version 25 was used to enter and analyze data. Descriptive statistics such as frequency, percentage, mean, standard deviation (SD), or median were used for most of the variables, and results were presented using tables and narrative descriptions. We included predictors to the multivariable binary logistic regression model whose univariate analysis P-value is ≤ 0.25 to identify factors associated with surgical site infections. A statistically significant association was declared based on adjusted odds ratio (AOR) with 95% confidence interval (CI) and p-values < 0.05 . Model fitness was checked using Hosmer and Lemeshow goodness-of-fit test.

Ethical Consideration

Ethical clearance was obtained from the Institutional Review Board of Y12HMC (Reference number: Y12HMC290/22, dated July 21/2022). Permission and written consent were taken from the college management and oral consent was taken from the record office department of both institutions to collect patient cards. The information gained from the patient cards upon data collection was kept confidential by using codes for each card throughout the study. The procedures followed were by the ethical standards of the Helsinki Declaration.

Results

Sociodemographic characteristics

A total of 95 patients were studied. Males outnumbered females by a ratio of 8.5:1. The mean and median age of patients was 31.74 ± 13.83 and 27 years respectively. The majority of patients, 73 (76.8%) were younger than 40 years. Sixty-two (61.4%) patients reported a previous history of dyspepsia and 38 (37.6%) had a history of treatment for peptic ulcer disease. 9 (8.9%) patients reported a history of recent ingestion of alcohol. other risk factors recorded included chewing chat and smoking 18 ((17.8%) and 6 (5.9%) respectively. Seven (6.9%) patients had co-morbidities including hypertension, diabetes mellitus, RVI, cardiac disease, respiratory illnesses, and others, and 65 (68.4%) histories of dyspepsia, 34 (52.3%), 19 (20%) history of chewing chat, 9 ((.5) history of alcohol ingestion and only 2 (2.1%) had history of NSAID use.

Clinical presentation at admission

The duration of illness ranged from 3 hours to 168 hours with a mean and median duration of 43.40 ± 35.01 hours and 24 hours respectively. In most patients, 66 (69.5%) were presented before 48 hours of onset of their symptoms. All 95 (100%) of patients presented with sudden onset of severe abdominal pain, 68 (71.58%) had nausea and 75 (78.9%) had vomiting, twenty-five (26.3%) of patients presented with shock with systolic BP <90 mmHg and 80 (84.2%) of patients presented with tachycardia with PR >100 beats/minute. Abdominal tenderness was demonstrable in 93 (97.9%) patients.

Intra-operative finding

Most perforations were located on the 1st part of the duodenum (78, 82.1%), whereas in 9 (9.47%) patients had their ulcers located on the antral part of the stomach, 5(5.2%) and 3% others. The duodenal to gastric ulcer ratio was 7:1. Seventy-three (76.84%) of the perforations were of minimal size (≤ 5 mm), and the rest 22 (23.16%) were greater than 0.5 cm. The amount of peritoneal fluid in 30 (31.6%) of patients was <0.5

liter. Most patients, 90 (94.73%) had Graham's omental patch of the perforations with a pedicle omental patch the rest had simple direct closure. Subhepatic drain was left in only two patients.

Post-operative complication

There were fifty-six post-operative complications recorded in 20 (21.1%) patients. Superficial surgical site infection (10.5%), wound dehiscence (9.5%), respiratory infections (20.1%), sepsis (17.9%), acute kidney injury (12.6%), and ECF (1.1%) were the complications recorded.

The presence of co-morbidity [COR:19.46 (2.39-158.39)], hypotension with SBP <90 mmHg [COR:5.76 (1.74-19.18)], and length of pre-op stay [COR:3.30 (1.18-9.27)] were significantly associated with postoperative morbidity with Univariate analysis but only shock at presentation [AOR: 5.76 (1.74-19.18)] and comorbid illness [AOR: 19.46 (2.39-158.39)] had strong association with morbidity with multivariate logistic regression analysis with P value <0.05 (Table 1).

Table 1: factors associated with complications of PPU operated patients at Y12HMC and TBH from December 1/ 2021 - November 30/2023 G.C.

Variable		Complications		Univariate analysis	Multivariate logistic regression analysis
		Yes	No	COR,95%CI	AOR,95%CI
Age	≤ 40	16	61	1	1
	>40	4	14	1.09(0.32-3.76)	1.94(0.43-8.79)
Co morbid illness	Yes	5	2	12.16(2.15-68.72)	19.46(2.39-158.39)
	No	15	73	1	1
length of pre op stay	<48 hrs	7	48	1	1
	>48 hrs	13	27	3.30(1.18-9.27)	1.99(0.521-7.622)
Systolic BP	<90 mmhg	11	17	4.17(1.48-11.72)	5.76(1.74-19.18)
	>90 mmhg	9	58	1	1

Factors associated with mortality

A total of 5 patients (5.3%) died at the hospital postoperatively. MOF secondary to severe sepsis and ARF were the most common causes of mortality. The mean age of the mortality group was 51.5 years. Among patients who died postoperatively, four patients had a co-morbid illness and three patients were in the age group of >40 years. Only having a co-morbid disease [COR: 11.6 (9.76, 13.76)] and age above 40 years of patients [COR: 7.50 (1.15, 48.81)] was significantly associated with mortality with univariate analysis otherwise only having the comorbid illness was [AOR: 10.85 (7.64, 15.40)] significantly association with mortality with P value <0.05 (Table 2).

Table 2: factors associated with mortality of PPU operated patients at Y12HMC and TBH from December 1/ 2021 - November 30/2023 G.C.

Variable		Deaths		Univariate analysis	Multivariate logistic regression analysis
		Yes	No	OR,95%CI	AOR,95%CI
Age	≤ 40	2	75	1	1
	>40	3	15	7.50(1.15-48.81)	6.61(0.47,92.90)
Co morbid illness	Yes	4	3	11.6(9.76-13.76)	10.85(7.64,15.40)
	No	1	87		1

Discussion and Conclusion

Although perforated peptic ulcer disease is a common surgical emergency condition and eradication of *H.pylori* has resulted in a vast decline in peptic ulcer prevalence in developed countries, the number of patients requiring surgery in developing countries is still paramount. In our study, a total of 95 patients were operated on for perforated peptic ulcer which occurs annually in about forty seven patients and it is consistent with other developing countries studied like Nigeria and Tanzania [14, 15].

Peptic ulcer disease was higher in males than females however the incidence of gastric ulcer has recently increased among females, resulting in attenuating the sex differences. Complications of peptic ulcer disease, bleeding, and perforation are more common in males than in females mainly due to the female sex hormone estrogen increases the expression of tight junction proteins that seal the gap between cells, reduce mucosal permanently, and stimulate the excretion of bicarbonate ion in the duodenal mucosa [16-19]. This study demonstrates peptic ulcer perforation is predominantly a male affliction as males outnumbered females by a ratio of 8.5 to 1. This finding is consistent with several other studies from SPMMC, Zewuditu hospital [7, 20] and other developing countries studies Tanzania, Nigeria, Muhimbili and Somalia [2, 14, 21]. But unlike developing countries in developed countries, studies showed elderly females predominant than men [21].

In this study, 81% of patients are younger than 40 years and this may be attributed to the demographic profile of high *H.pylori* infection, smoking, and alcohol ingestion in younger age groups in men thus increasing the risk of PPU in young age groups. Our study is also in conformity with studies done at Côte d'Ivoire, Minilik Hospital, SPMMC, and Tanzania with a median age of 34, 33.5, 30, 32.4 years respectively [14, 22-24]. Unlike other studies, age was not found to be significantly associated with either morbidity or mortality. More frequent presence of co-morbid diseases in older patients may be the cause of higher morbidity and mortality [25-28].

In this study 68.4% of patients had a history of dyspepsia which is comparable with other studies in Tanzania and Zewditu Memorial Hospital reported 69% and 75% of cases had a previous history of peptic ulcer disease respectively [14, 20].

In our study, most patients 69.5% had delayed presentation of more than 48 hours and this study was consistent with other studies in Tanzania, SPMMC, Zewuditu hospital [7, 14, 20]. Late presentation in our study may be attributed to a lack of accessibility to healthcare facilities and a lack of awareness of the disease. Sometimes patients take medication without a settled diagnosis and this also causes delays at local health facilities. But our study duration of symptoms didn't have a significant effect on either mortality or morbidity, contrary to other literature [29-32].

All most all patients (100%) had had classical presentation with sudden onset abdominal pain, nausea (71.6%), vomiting (78.9%), and abdominal tenderness (97.9%) which is consistent with others studies like in Zewudith Hospital, SPMMC, Ayder Hospital [7, 20, 33], but it is higher as compared to others studies done in Tanzania [14] which found abdominal pain 90%, Vomiting 37%, abdominal tenderness 88%. But the finding is higher as compared to studies done in Tanzania [7] were they found abdominal pain 97%, vomiting 37%, tenderness on 88% of patients.

In contrary to studies done in Côte d'Ivoire [11] where the reported associated co-morbid illness of 73%, the number of co-morbid illnesses in our study is only 7.37%. This value has consistent in a study done in Tanzania [7] where they reported 7% associated with co-morbid illness. As reported in literature [29, 30, 34], comorbidities are found to be important prognostic factors in our study. In our study comorbidities had a significant effect on both morbidity and mortality which is in agreement with other studies [27, 29]. With multiple logistic regression analysis we found that comorbidities were the most important risk factors for both morbidity [AOR: 19.46 (2.39-158.39)] and mortality [COR:11.6 (9.76, 13.76)].

In our study, duodenal ulcer perforation was the most common type of perforation with a duodenal to gastric ulcer ratio of 7:1. This is comparable to a study in Zewditu Memorial and Tanzania, which reported a duodenal to gastric ulcer ratio of 8.5:1, 12.7:1 [7, 9] respectively. However in some developed countries and studies done like Nigeria [15] reported a higher incidence of gastric ulcer perforations than duodenal ulcer perforation with 2:1. Unlike our study the median age of the study(Nigeria) was high (49.9 years) and as a result gastric perforations were found to be high. In this study, Graham's omental patch of the perforations with a pedicled omental patch was the operation of choice (97%) and a similar surgical treatment pattern was reported in most studies [35-37].

Overall complications rate in this study was 21.1% (95% CI: 13.4, 30.6%) which is comparable to what was reported by two Turkish studies 20.3% and 23% complications respectively (4, 38) but lower than Tanzanian (29%) and Zewditu (31%) studies [7, 9]. In our study, superficial surgical site infection (10.5%), wound dehiscence (9.5%), respiratory infections (20.1%), sepsis (17.9%), acute kidney injury (12.6%), and ECF (1.1%) recorded which is in consistency with most studies from India a study done by Jasneet, New Delhi, India, and SPMMC [7, 11].

The mortality rate in our study is low 5.3% (95% CI: 1.7, 11.9%) as compared to majorities of the studies done at Tanzania (10.7%), Nigeria (17.3%) [14, 15], but it is comparable with studies India (5.2%), Turkish (5.8%) [4, 11]. Mortality was high in patients with concomitant diseases, which is in agreement with study done by Phillipo L Chalya Tanzania [14].

In conclusion in our study perforated peptic ulcer disease occurs mostly in young patients and mortality rate of this

study was also low as compare with majority of other studies. Although advanced age, shock upon presentation and delayed presentations are strong risk factors in other studies, in our study only these factors had no association neither to morbidity nor mortality.

Informed Consent

We obtained documented and witnessed informed verbal consent for publication from the administration bodies otherwise informed consent from the subjects was not required.

Competing Interest

No conflict of interest

Author's Contribution

Getabalew Endazenaw: Analyzed and interpreted of data, review main manuscript text, approved the summated version and agrees for publication.

Dr Wondwossen Amtataw: Developed the concept and designed it, write main manuscript, approved the summated version of the article and agreed for the contribution of the article.

Dr Tsedalu Worku: Review and edit manuscript, supervised data collection approved the summated version and agrees for publication.

Dr Surafel Mulatu: Review and edit manuscript, supervised data collection, approved the summated version and agrees for publication.

Acknowledgments

The author acknowledges general surgery residents anesthetists and operation theater nursing staffs for their valuable support while collecting data. We also extend our deepest gratitude to the institution quality directorate staffs for their contribution and lastly the administration bodies for their permission to conduct the research.

References

1. Chung KT, Shelat VG. Perforated peptic ulcer-an update. *World journal of gastrointestinal surgery*. 2017;9(1):1. DOI: 10.4240/wjgs.v9.i1.1. PMID: 28138363. PMID: 28138363.
2. Ngerageza JG. Factors associated with peptic gastroduodenal ulcer perforations in adult patients at Muhimbili National Hospital: Muhimbili University of Health and Allied Sciences; 2011.
3. Søreide K, Thorsen K, Harrison EM, Bingener J, Møller MH, Ohene-Yeboah M, et al. Perforated peptic ulcer. *The Lancet*. 2015;386(10000):1288-98. DOI: 10.1016/S0140-6736(15)00276-7.
4. Taş İ, Ülger BV, Önder A, Kapan M, Bozdağ Z. Risk factors influencing morbidity and mortality in perforated peptic ulcer disease. *Turkish Journal of Surgery/Ulusal cerrahi dergisi*. 2015;31(1):20. DOI: 10.5152/UCD.2014.2705.
5. Hooi JK, Lai WY, Ng WK, Suen MM, Underwood FE, Tanyingoh D, et al. Global prevalence of Helicobacter pylori infection: systematic review and meta-analysis. *Gastroenterology*. 2017;153(2):420-9. DOI: 10.1053/j.gastro.2017.04.022.
6. Bupicha JA, Gebresellassie HW, Alemayehu A. Pattern and outcome of perforated peptic ulcer disease patient in four teaching hospitals in Addis Ababa, Ethiopia: a prospective cohort multicenter study. *BMC surgery*. 2020;20(1):1-8. doi: 10.1186/s12893-020-00796-7.
7. Teshome H, Birega M, Taddese M. Perforated peptic ulcer disease in a tertiary hospital, Addis Ababa, Ethiopia: five year retrospective study. *Ethiopian Journal of Health Sciences*. 2020;30(3). DOI: 10.4314/ejhs.v30i3.7.
8. Weledji EP. An overview of gastroduodenal perforation. *Frontiers in Surgery*. 2020;7:573901. DOI: 10.3389/fsurg.2020.573901.
9. Yawar B, Marzouk AM, Ali H, Ghorab TM, Asim A, Bahli Z, et al. Seasonal Variation of Presentation of Perforated Peptic Ulcer Disease: An Overview of Patient Demographics, Management and Outcomes. *Cureus*. 2021;13(11). DOI: 10.7759/cureus.19618.
10. Swann N, LeTendre N, Cox B, Recabaren J. Evaluating the evolving morbidity of omentoplasty for perforated peptic ulcer disease. *The American Surgeon*. 2020;86(10):1289-95. DOI: 10.1177/0003134820964226.
11. Gulzar JS, Paruthy SB, Arya SV. Improving outcome in perforated peptic ulcer emergency surgery by Boey scoring. *International Surgery Journal*. 2016;3(4):2120-8. DOI: <https://doi.org/10.18203/2349-2902.isj20163585>
12. Patel S, Kalra D, Kacheriwala S, Shah M, Duttaroy D. Validation of prognostic scoring systems for predicting 30-day mortality in perforated peptic ulcer disease. *Turkish Journal of Surgery*. 2019;35(4):252-258. DOI: 10.5578/turkjsurg.4211.
13. An SJ, Davis D, Kayange L, Gallaher J, Charles A. Predictors of mortality for perforated peptic ulcer disease in Malawi. *The American Journal of Surgery*. 2023;225(6):1081-5. DOI: 10.1016/j.amjsurg.2022.11.029.
14. Chalya PL, Mabula JB, Koy M, Mchembe MD, Jaka HM, Kabangila R, et al. Clinical profile and outcome of surgical treatment of perforated peptic ulcers in Northwestern Tanzania: A tertiary hospital experience. *World Journal of Emergency Surgery*. 2011;6(1):1-10. DOI: 10.1186/1749-7922-6-31.
15. Dongo A, Uhumwagho O, Kesieme E, Eluehike S, Alufohai E. A Five-year review of perforated peptic ulcer disease in Irrua, Nigeria. *International scholarly research notices*. 2017;2017:8375398. DOI: 10.1155/2017/8375398
16. Kim N. Peptic ulcer disease. Sex/Gender-Specific Medicine in the Gastrointestinal Diseases: *Springer*; 2022. p. 131-51.
17. Matsukura N, Onda M, Tokunaga A, Kato S, Yoshiyuki T, Hasegawa H, et al. Role of Helicobacter pylori infection in perforation of peptic ulcer: an age-and gender-matched case-control study. *Journal of clinical gastroenterology*. 1997;25:S235-S9. DOI: 10.1097/00004836-199700001-00037.
18. Wysocki A, Budzyński P, Kulawik J, Drożdż W. Changes in the localization of perforated peptic ulcer and its relation to gender and age of the patients throughout the last 45 years. *World journal of surgery*. 2011;35:811-6. DOI: 10.1007/s00268-010-0917-2.

19. Kurata JH, Haile BM, Elashoff JD. Sex differences in peptic ulcer disease. *Gastroenterology*. 1985;88(1):96-100. DOI: 10.1016/s0016-5085(85)80139-6.
20. Asefa Z. Perforated peptic ulcer disease in Zewditu Hospital. *Ethiopian medical journal*. 2012;50(2):145-51.
21. Ali AM, Mohamed AN, Mohamed YG, Keleşoğlu Sİ. Clinical presentation and surgical management of perforated peptic ulcer in a tertiary hospital in Mogadishu, Somalia: a 5-year retrospective study. *World Journal of Emergency Surgery*. 2022;17(1):1-8. DOI: <https://doi.org/10.1186/s13017-022-00428-w>
22. Gona SK, Alassan MK, Marcellin KG, Henriette KY, Adama C, Toussaint A, et al. Postoperative morbidity and mortality of perforated peptic ulcer: retrospective cohort study of risk factors among Black Africans in Côte d'Ivoire. *Gastroenterology Research and Practice*. 2016;2016:2640730. DOI: 10.1155/2016/2640730
23. Bekele A, Zemenfes D, Kassa S, Deneke A, Taye M, Wondimu S. Patterns and seasonal variations of perforated peptic ulcer disease: experience from Ethiopia. *Annals of African Surgery*. 2017;14(2). DOI: 10.4314/aas.v14i2.7
24. Tadesse M, Musie E, Teklewold B, Hailu E. Prevalence of H. Pylori in Perforated Peptic Ulcer Disease at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia. *Ethiopian journal of health sciences*. 2021;31(5):969-974. DOI: 10.4314/ejhs.v31i5.8.
25. Kim J-M, Jeong S-H, Lee Y-J, Park S-T, Choi S-K, Hong S-C, et al. Analysis of risk factors for postoperative morbidity in perforated peptic ulcer. *Journal of gastric cancer*. 2012;12(1):26-35. DOI: 10.5230/jgc.2012.12.1.26
26. Nakano A, Bendix J, Adamsen S, Buck D, Mainz J, Bartels P, et al. 30-days mortality in patients with perforated peptic ulcer: a national audit. *Risk management and healthcare policy*. 2008:31-8. DOI: 10.2147/RMHP.S4486
27. Imhof M, Epstein S, Ohmann C, Röher H-D. Duration of survival after peptic ulcer perforation. *World journal of surgery*. 2008;32:408-12. DOI: 10.1007/s00268-007-9370-2
28. Bas G, Eryilmaz R, Okan I, Sahin M. Risk factors of morbidity and mortality in patients with perforated peptic ulcer. *Acta Chirurgica Belgica*. 2008;108(4):424-7. DOI: 10.1080/00015458.2008.11680254
29. Nogueira C, Silva AS, Santos JN, Silva AG, Ferreira J, Matos E, et al. Perforated peptic ulcer: main factors of morbidity and mortality. *World journal of surgery*. 2003;27:782-7. DOI: 10.1007/s00268-003-6645-0
30. Arveen S, Jagdish S, Kadambari D. Perforated peptic ulcer in South India: an institutional perspective. *World journal of surgery*. 2009;33:1600-4. DOI: 10.1007/s00268-009-0056-9
31. Taj MH, Mohammad D, Qureshi SA. Outcome of omentopexy as primary repair in perforated duodenal ulcer. *Journal of the College of Physicians and Surgeons--pakistan: JCPSP*. 2007;17(12):731-5.
32. Kocer B, Surmeli S, Solak C, Unal B, Bozkurt B, Yildirim O, et al. Factors affecting mortality and morbidity in patients with peptic ulcer perforation. *Journal of gastroenterology and hepatology*. 2007;22(4):565-70. DOI: 10.1111/j.1440-1746.2006.04500.x
33. Takele M, Araaya GH. Pattern of non-traumatic acute abdomen in patients from Ayder Comprehensive Specialized Hospital, Northern Ethiopia: a retrospective analysis. *East African Journal of Health Sciences*. 2019;1(1):55-61.
34. Hirsch IB, McGill JB. Role of insulin in management of surgical patients with diabetes mellitus. *Diabetes Care*. 1990;13(9):980-91. DOI: 10.2337/diacare.13.9.980
35. Renganathan M. Study to compare the efficacy of Free Omental Patch Closure versus Grahams Live Omental Patch Closure in patients with duodenal Perforation: *Stanley Medical College, Chennai*; 2015.
36. Bingener J, Sbayi S, Patel S. Omental Gastrotomy Closure-Model for a NOTES Graham Patch. *Gastrointestinal Endoscopy*. 2008;67(5):AB120. DOI : 10.1016/j.gie.2008.03.186
37. Unar SK, Danish AA, Bhurt AA, Laghari AA. Outcome of duodenal ulcer perforation after graham omental patch repair. *Annals of Punjab Medical College*. 2019;13(1):14-7. DOI: <https://doi.org/10.29054/apmc/2019.37>.

Copyright: ©2024 Wondwossen Amtataw. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.