

Patterns and Seasonal Variations of Perforated Peptic Ulcer Disease: Experience from Ethiopia

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Abstract

Background: Perforated Peptic Ulcer Disease occurs in 2-10% of patients with ulcer disease and its principal treatment is surgical. **Objective:** To describe the socio-demographics of the patients, seasonal variation in its incidence, modes of surgical management and outcome of patients. **Methods:** This was a retrospective study on patients operated for acute perforated peptic ulcer at the Minilik II Memorial Referral Hospital, Ethiopia over a three-year period. **Results:** Eighty-seven patients were studied, 75 (86.2%) males were predominant. Current use of Chat and Cigarettes were reported by 44 (50.5%) and 41 (47.1%) of patients. Significant number of patients 39 (44.8 %) were operated during the Ethiopian rainy Season of July-September. The commonest presenting symptoms were sudden onset epigastric pain that become very severe in 83 (95.5%). Perforation of the anterior aspect of first part of the duodenum is the most common intra-operative findings in 88.7% (77) of cases and Pedicled omental patch repair after Cellan-

Jones was performed in 83 (95.4%) of the patients. A total of 42 complications occurred in 20 (22.9%) of the patients, the commonest being wound infection. Ten (11.4%) underwent re-laparotomy. Nine patients (10.3%) died. **Conclusion:** This study has shown that perforated PUD affects young males who are smokers, alcohol users and khat chewers. It is also very common during the rainy Ethiopian months. We recommend further studies to study the interplay of these risk factors in the pathogenesis of perforations, especially their interaction with *H. Pylori* infection.

Key words: Perforated PUD, Omental Patch, Seasonal variation, risk factors,

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Introduction

Peptic Ulcer Disease (PUD) is a common disease of global public health concern. Literature shows that its incidence has been estimated at between 1500 and 3000 per 100,000 inhabitants per year (1, 2). There is a wealth of literature worldwide regarding the decrease in the incidence of uncomplicated peptic ulcer disease after the introduction of H-receptor antagonists in the 1970s; proton-pump inhibitors (PPIs) and the discovery of *Helicobacter pylori* (*H. pylori*) as a causative agent in the 1980s. Accordingly, the incidence of elective surgery for peptic ulcer has markedly decreased (1-3). Surprisingly however, the incidence of and mortality from perforated peptic ulcer surgery has remained stable or even slightly increased (1-4) despite improvements in perioperative care. Acute perforations are reported in 2-10% of patients with ulcer disease and accounts for more than 70% of deaths associated with PUD (4, 5). The incidence of duodenal perforation is 7–10 cases/100,000 adults per year (2). The pattern of

perforated PUD is said to vary from one geographical area to another. In developing countries of Africa including Ethiopia, research has consistently shown that most perforated PUD patients are young males with past history of dyspepsia (7, 8). Their presentation for treatment is usually delayed hence with advanced peritonitis and sepsis. In addition, their post-operative morbidity and mortality are significant as compared to the developed world (8-14). The principal treatment of perforated ulcer disease still remains to be surgical.

Hence, the main objective of this study is to describe the socio-demographic characteristics, seasonal variation in the incidence, clinical presentation of the patients, modes of surgical management, outcome of patients and assessing risk factors for perforated PUD at the Minilik II memorial hospital.

Methods

This is a cross sectional retrospective study of patients

admitted and operated for acute perforated peptic ulcer disease at the Minilik II Memorial Referral Hospital, in Addis Ababa Ethiopia. Minilik II memorial referral hospital is the oldest hospital in the country currently serves as an affiliate teaching hospital for the Addis Ababa University, School of Medicine. It has 150 surgical beds, about 100 of which are dedicated to General Surgery. It is staffed with 7 consultant surgeons and no less than 15 rotating surgical residents at a time. The study period was between June 1, 2013 and June 30, 2016 (a three-year period). Data was retrieved from medical records of patients, ward and operation theatre registry books and monthly audit report documents. Data extracted included bio-data of the patients, time of onset and presenting symptoms, previous history of PUD, alcohol, cigarette and chat and use of Non steroidal anti-inflammatory drugs (NSAIDS). The relevant physical finding at admission, resuscitative measures, operative findings and treatment were also recorded. Outcome of treatment, including length of hospital stay and post-operative complications and mortality were also noted. Statistical analysis was performed using EP-INFO statistical package. The mean standard deviation (SD), median and ranges were calculated for continuous variables whereas proportions and frequency tables were used to summarize categorical variables. Chi-square (χ^2) test were used to test for the significance of association between the independent (predictor) and dependent (outcome) variables in the categorical variables. The level of significance was considered as $P < 0.05$. The study has received its ethical clearance from the Research and Publication committee of the Department of Surgery, School of Medicine.

Results

A total number of 111 patients were operated during the study period; however the complete records of 87 patients were retrieved. There were 75 (86.2%) males and 12 females (13.8%) patients. Their ages ranged from 23-74 years with a mean age of 33.4 years. Majority 38 (43.6%) were in the age group of 31-40 years. Details of the socio-economic profiles are shown on table 1.

Current use of Chat and Cigarettes were reported in 44 (50.5%) and 41 (47.1%) of patients while in 37

Table 1: Biodata of Patients Operated for Perforated Peptic Ulcer Disease

Characteristics	Frequency (N=87)	Percentage (100%)
Age in years		
21-30	10	11.4
31-40	38	43.6
41-50	18	20.6
51-60	11	12.6
61-70	7	8
71-80	3	3.4
Sex		
Male	75	86.2
Female	12	13.8
Residence		
Addis Ababa	77	88.5
Out of Addis Ababa	10	11.5
Additional history		
Chat chewing	44	50.5
Cigarette smoking	41	47.1
Previous history of dyspepsia/PUD	37	43.0
Alcohol use	19	21.8
NSAID use	2	2.3

NSAID, Non Steroidal Anti-inflammatory Drugs; PUD, Peptic Ulcer Disease

(43.0%), there was previous history of treatment for dyspepsia and or PUD. Significant seasonal predilection in the incidence of perforated peptic ulcer disease was noted in that 39 (44.8 %) of the patients were operated during the Ethiopian Rainy Season of July-September (Figure 1). This was also found to be statistically significant ($P < 0.05$). Figure 1: The duration of symptoms at presentation was less than 6 hours in only 9 (10.3%) while the mean duration of illness was 44.9 hours (Range= 1-360 hours). The commonest presenting symptoms were sudden onset epigastric pain that become very severe in 83 (95.5%) and nausea/vomiting in 79 (90.8%) of the patients. Sixteen patients (18.3%) presented in hypotensive state. Plain abdominal x/ray was performed in 53 patients that showed air under the diaphragm in 39 (75%) of the patients. Three patients (3.3%) were operated with a diagnosis of acute appendicitis and 2 (2.2%) were operated for small bowel obstruction, in all the five cases the diagnosis of perforated PUD was made intra-operatively. (Table 2)

Table 2: Clinical Presentation of Patients Operated for Perorated Peptic Ulcer Disease

Characteristics	Frequency	Percentage
<u>Common presenting symptoms</u>		
	82	94.2
Classical severe abdominal pain	79	90.8
Anorexia/vomiting	55	63.2
Abdominal distension	21	24.1
Constipation	11	12.6
Diarrhea	7	8.0
Fever		
<u>Positive physical finding</u>		
Generalized abdominal tenderness	84	97.6
Right lower quadrant tenderness	2	2.2
Tachycardia	43	49.4
Hypotension	16	18.3
Raised axillary temperature	6	6.8

Intra-operative findings showed perforation of the anterior aspect of first part of the duodenum in 77 (88.7%) of cases; with size of the perforations measuring 0.5cm in widest diameter in 69 (89.6%). The distal stomach was perforated in 10 (11.3%). Intra peritoneal collection of gastric content mixed with pus in excess of 1000ml was encountered in 78 (90.7%). All patients were surgically managed and pedicled omental patch repair after Cellan-Jones was performed in 83 (95.4%) of the patients. Four patients (4.5%), all with gastric perforation were managed with direct repair of the perforation without an omental patch after taking biopsy from the ulcer margin. Malignant gastric ulcer was strongly suspected based on the intra operative findings, however only one of these was confirmed to be adenocarcinoma by histopathology. A total of 42 complications occurred in 20 (22.9%) of the patients, the commonest being wound infection in 15 (17.8%). Ten (11.4%) of the patient underwent re-laparotomy, and 4 (4.5%) underwent two re-laparotomies: The reasons for re-operation included: failed omental patch in 6 (6.8%) and intra peritoneal collection without patch failure in 4 (4.6%). During the first re-laparotomy, all the 6 patch failures underwent peritoneal lavage, pedicled omental re-patching of the perforation site with an additional

vagotomy and gastro-jejunostomy. The re-patch failed in 4 (75%) of these patients, further requiring a second re-laparotomy and re-patch in one patient and jejuna-serosal patch repair procedure in 3. Nine patients (10.3%) died, eight with duodenal and one with gastric perforation: the cause of death in eight was septic shock and multiple organ failure (3 after the first patch surgery, 1 after the first re-patch surgery, 1 after the second re-patch surgery, 1 after jejuna-serosal patch and 2 after re-laparotomy for recollection) and one patient died because of a fulminant hepatic failure in the background of chronic liver disease. Post-operative hospital stay ranged from 1-56 days, the mean and median post operative stay being 8.4 and 17.2 days (Table 3).

Table 3: Post-Operative Complications in Patients Operated for Perorated Peptic Ulcer Disease

Post operative complications seen	Frequency (N=42)	Percentage (100%)
Surgical Site Infections	15	17.8
Intra-abdominal collection that required re-operation	1	11.4
Patch failure	6	6.8
Recollection without patch failure	4	4.5
Wound Dehiscence/Burst Abdomen	5	5.7
Intractable Septic shock	4	4.5
Pneumonia/Respiratory failure	4	4.5
Entero-cutaneous (Duodenal) fistula	2	2.2
Acute fulminant liver failure in the background of chronic liver disease	1	1.1
Iatrogenic perforation of jejunum	1	1.1

Discussion

In this review, a total of 111 patients were operated at the study hospital. This figure is significantly higher than reports from hospitals in Liberia by Moses (9), Nigeria by Ugo-Chukwu (10) and from Tanzania by Philipo (11). However, it is similar to one report from Ethiopia by Zelalem (8). This report, including ours are data from two main hospitals in the capital city,

hence it would be plausible to assume that most patients with serious surgical conditions tend to present to these hospitals. However, the apparent higher incidence of perforated Peptic Ulcer in Ethiopia may be due to the increased prevalence of risk factors for perforated peptic ulcer disease among our patients. This is evidenced by the higher rate of smokers, alcohol consumers and chat chewers in this study and similar reports from Ethiopia (8). This is also supported by the finding that most of our patients are young males and the mentioned risk factors tend to be common in this age group; most of our patients were males (male: female ratio 6:1), and in their 4th decade of life. This is similar to studies in Ethiopia (8,) and other developing countries (9-12). The data regarding the effect of chat (*Katha Edulis*) on the stomach and duodenum shows that its chronic ingestion predisposes to gastritis and duodenitis (13), however its cause-effect relationship in peptic ulcer perforation has not been established so far. Therefore, further studies to establish the possible mechanism are recommended (14-16). In addition, Ethiopia has one of the highest seroprevalence of H.Pylori infection (17), which is a known cause of peptic ulcer and its complications. H. pylori infection and the accompanying inflammation disrupts the inhibitory control of gastrin release by decreasing antralsomatostatin, and this is more marked if the infecting organism is a cagA-positive strain. The resulting increase in gastrin release and gastric acid secretion is a key mechanism by which the H. pylori infection induces PUD (2, 14-16). Whether the prevalent H.Pylori infection plays a role in the increased incidence of perforation and its possible interaction with the other known risks for perforation needs to be further studied (15,16).

Our study has revealed an interesting and statistically significant seasonal variation in the incidence of perforated peptic ulcer disease in that close to 45% of the patient were diagnosed and operated during July August and September (During the rainy Ethiopian Season). The seasonal occurrence of peptic ulcer disease in general and its specific complications, particularly perforation has been well studied in the developed world and our finding is very different from data from Australia in 1984 (18), Israel in 1992 (19) and Turkey in 2006 (20) which show the disease is

more common in the months November-February. In addition, a multi-centric study from Italy has shown that the Nadir for perforated PUD is the month of July (21). Even though these seasons do not necessarily coincide with rainy seasons of the specific countries, the most probably reason for these seasonal variations are not fully defined in the studies.

Seasonal changes in atmospheric temperature and pressure, the seasonal nature of H. Pylori infection, the season nature of alcohol consumption and other reasons have been cited in the literature as explanation for the seasonal nature of the disease (14,-21). In our case, the months of July, August and September are months with heavy rain and cold in Ethiopia which possibly are associated with increased use of alcohol and Chat by the young male population. These months are also popular fasting seasons for Christians. Fasting may interfere with the gastric acid secretion and mucosal protection balance, hence may explain the increased incidence. H. Pylori infection may also be associated with seasonal flare ups during the rainy season. However, we recommend a higher level study to identify the real reason. Most (96%) of our patients presented with features of generalized peritonitis. The presence of generalized peritonitis is a sign of advanced stage of the disease, which is apparently caused by the delayed presentation of patients to the hospital. This is evidenced by the fact that only about 10% of patients presented within 6 hours of the disease onset. The studies from Ethiopia in 1985 (7) and 2012 (8) also showed that the overwhelming majority of patients presented very late. This showed that little progress has been achieved over the past 5 years to achieve early presentation. Similar late presentation is also reported from Africa (8-12). Delay in operative intervention may also play a significant role though there is no data that supports the statement in this study. According to this study, delay in presentation for more than 6 hours was found to be associated with the finding of shock at diagnosis, presence of generalized purulent peritonitis and intra peritoneal collection in excess of 1000mls. In addition, intra abdominal collection in excess of 1000ml during surgery and the presence of frank pus was significantly related to patch failure and risk of re-laparotomy (P<0.01). It had been noted that the sensitivity of erect

chest x-ray in diagnosing free air under the diaphragm is 75%, which is in line with other published reports (1, 2). Similar to other studies in Ethiopia and other African countries (7-12), the intra-operative findings showed perforation of the anterior aspect of first part of the duodenum in 77 (88.7%) and the ratio of duodenal to gastric perforation was 7.8:1. Cellan-Jones was performed in 83 (95.4%) of the patients. However, 6 (7.2%) of this patients developed patch failure following omental patch, which may be due to the advanced nature of the peritonitis and extremely fragile duodenal margin which doesn't hold sutures easily. Faulty repair technique may also play a role. The applied tension to the sutures should be strong enough to stabilize the omentum in place, but loose enough to preserve the omental blood supply. Strangulation of the omental patch due to increased tension on the knots is associated with a failure of the repair and continued post-operative leakage (2). The literature shows that mortality rate ranges from 10-30% (1). The rate of mortality from this study is 10.3% lower than what is reported from Ethiopia in 1985 (7) and 2012 (8), but comparable to a systematic review from Africa (6), Nigeria (10) and Tanzania (11). The relative improvement in mortality may be due to the recent advancement in surgical, anesthetic and ancillary facilities including intensive unit care for seriously sick patient. The rate of post-operative complication is 20 (22.9%) which is less than other published report (8-12). Limitations to this study included a chart retrieval rate of about 79%. This may have obvious implication on the completeness data collected. The retrospective nature of the study has made retrieval of some important data that would have added value to the study difficult. As Menelik Hospital is a tertiary hospital, advanced cases are more likely to be referred hence the findings may be difficult to generalize.

Conclusion

Peptic ulcer is a common surgical disease in our setting. Pedicled omental patch repair is proven to be a standard surgical technique in our setting with acceptable outcomes in the emergency setting. We recommend further studies to study the integration of the three mentioned risk factors in the pathogenesis of

perforations, especially their interaction with H. Pylori infection.

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