

Retrospective Evaluation of Surgical Emergencies in Perforated Peptic Ulcer Cases

Eden Sinha¹, Zaid Bin Afroz², Rudraprasad Roy Choudhury³

¹Assistant Professor, Department of General Surgery, Silchar Medical College and Hospital, Assam, India

²PG-Student, Department of General Surgery, Silchar Medical College and Hospital, Assam, India

³PG-Student, Department of General Surgery, Silchar Medical College and Hospital, Assam, India

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Corresponding Author: Dr. Eden Sinha

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Abstract:

Background: Perforated peptic ulcer (PPU) is a life-threatening surgical emergency, especially in geographic areas highly endemic for peptic ulcer disease (PUD) related to dietary and lifestyle habits. Early diagnosis and prompt therapeutic intervention reduce morbidity and mortality.

Aim: To retrospectively study the clinical profile, management and outcomes of patients treated surgically for PPU.

Methods: A retrospective observational study of 277 patients underwent surgery for PPU at Silchar Medical College and Hospital, Assam, India. The demographic profile, clinical presentation, associated comorbidities and risk factors, perforation site, size and surgical management, postoperative complications and outcomes were studied.

Results: Males were 83% of the cohort, with most patients aged 31-50 years (72%). Most patients presented with severe epigastric pain (97.3%) and abdominal tenderness (99%), and 31% showed shock. Comorbidities included diabetes in 19% and hypertension in 18%. Duodenal perforations predominated (91.95%), and most were less than 1cm (94%). Management consisted of simple closure with Graham's patch in a majority of cases (94%). Postoperative complications included surgical site infection (32.7%), and reactionary pleural effusion (25.7%). Mortality was 3.6% and 27.5% of patients were admitted to intensive care.

Conclusions: PPU commonly affects middle aged males, and duodenal perforations are the most frequent. Early diagnosis, timely surgical intervention and management of comorbidities are paramount in reducing morbidity and mortality.

Keywords: Perforated Peptic Ulcer, Duodenal Perforation, Graham's Patch, Surgical Emergency, Retrospective Study, Postoperative Complications.

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Introduction

Peptic ulcer disease remains one of the major gastrointestinal disorders globally, involving mucosal erosion of either the stomach or duodenum. Peptic ulcers are very common in the southern part of Rajasthan, largely because of environmental and food factors. Intake of hard water and a diet predominantly including spicy foods are a few of the causes identified to predispose the population to the development of ulcers and related complications. Of the many known complications, perforation of a peptic ulcer is the most severe, often requiring urgent surgical intervention to avoid serious consequences. The classical description of perforated peptic ulcer by Crisp in 1843 is apt and holds good even today, which highlights the immense clinical relevance of the condition [1,2].

Until the late 19th century, perforation of a peptic ulcer had been regarded as a uniformly fatal condition. In 1880, Mikulicz demonstrated the first surgical repair of a perforated gastric ulcer (PPU) which represented a major milestone in its surgical treatment [2]. Since this time, suture repair has been the mainstay of surgical care for PPU. Despite advances in effective medical management-the discovery of *H. pylori* and elimination therapy, as well as the large-scale use of PPIs-the spontaneous incidence of ulcer perforation has not decreased appreciably [3]. The overall frequency of PUD has diminished in recent decades with improved diagnostic and pharmacologic management, the clinical decision to operate for PPU as an acute surgical emergency remains frequent, exemplifying an ongoing clinical challenge in this complication [4]. Perforated peptic ulcer remains a serious health risk, particularly within

certain areas of the world where situations of lifestyle, diet, and access to healthcare systems interact. This retrospective review describes the spectrum of PPU management at our institution, including 277 cases. Using these cases, we attempted to outline demographic data, risk factors, and clinical courses of the disease, and by inference, describe preventative and management approaches that could be helpful [5].

Various factors are associated with an increased risk of peptic ulcer perforation, but lifestyle and pharmacologic exposures are predominant. It is well established that smoking is a major risk factor for PPU. In the population under review, bidi smoking, which is a very common habit in both males and females in rural areas, was predominantly found. Rauws et al. reported that the mortality of smokers was threefold higher compared with nonsmokers and that excess mortality in PPU largely resulted from smoking-related comorbidities [6]. The pathogenic mechanism underpinning the association between smoking and PPU involves the inhibition of pancreatic bicarbonate secretion, which enhances duodenal acidity, as well as impairment of ulcer healing [7].

Another established risk factor is the use of NSAIDs. Epidemiological studies have shown that users of NSAIDs have a five- to eight-fold increased risk of developing PPU. The drugs impair mucosal defense mechanisms, facilitating ulcer formation and eventual perforation. The role of alcohol intake in the pathogenesis of perforated peptic ulcer (PPU) is equally as significant as it is in males, as alcohol causes direct damage to the gastric mucosa and increases acid and serum gastrin secretion, leading to ulcer formation and complicating the inflammatory response [8]. Much less common but still identified in a small cohort (6 cases in this study) are patients using corticosteroids. Corticosteroids may lead to ulceration by delaying mucosal healing and modifying the inflammatory response, complicating the clinical picture of PPU further [9].

Finally, a perforated peptic ulcer is an emergent surgical diagnosis which, without early diagnosis and treatment, can result in morbidity and mortality. The goal becomes early identification of high-risk patients for early surgical intervention. Retrospective evaluation of cases of PPU provides epidemiologic and clinical data for the healthcare provider with the intention to improve preventative strategies, improve perioperative care, and improve patient survival. Recognizing regional differences in risk factors, such as diet, alcohol, smoking, and NSAIDs, becomes important to modify public health interventions and surgical protocols in a low-resource environment.

While the prevalence of PUD has been persistently declining over the years as a result of improved medical treatment, perforated peptic ulcer remains a

common life-threatening event. The current study aims a thorough retrospective evaluation of surgical emergencies in PPU patients, identifying and categorizing patient characteristics, risk factors and clinical outcomes within a defined regional context. These discussions will be particularly valuable in informing decision-making about both preventative and therapeutic strategies pertaining to this ongoing surgical issue.

Methodology

Study Design: This was a retrospective observational study aimed at evaluating the clinical features, management, and outcomes of patients with perforated peptic ulcer (PPU) who presented as surgical emergency.

Study Area: The study was carried out in the Department of General Surgery, Silchar Medical College and Hospital, Assam, India from January 2024 to December 2024.

Sample Size: All patients who were diagnosed and surgically treated for PPU during the study period were included. A total of 277 patients met the inclusion criteria.

Study Population: The study population consisted of male and female patients from all age groups, who were suspected of PPU and presented to the emergency/outpatient department and required surgical procedure at our institute.

Data Collection: The data was collected retrospectively from the medical records department and operation theater registers. A structured questionnaire proforma was designed to collect information for patient demographics (age, sex, and residence-rural or urban). Clinical history was reviewed from additional symptoms they presented, duration, other comorbidities, previous history of peptic ulcer disease and other risk factors such as NSAID or corticosteroid use, alcohol consumption, and smoking. Laboratory investigations included complete blood count, renal function tests, electrolytes, bleeding and clotting profile, urinalysis, HBsAg, and HIV serology as well as a ECG. Radiological investigations included X-ray chest P.A. view and X-ray abdomen erect posture to determine free gas under the diaphragm, with some cases including an ultrasound. Intraoperative findings were noted to include site and size of perforation, type of surgical procedure, and peritoneal contamination, as well as postoperative complications and outcomes for each patient (including mortality).

Inclusion Criteria

- Patients of all age groups and both sexes diagnosed with PPU
- Patients who underwent surgical management at Silchar Medical College and Hospital during the study period

- Complete medical and operative records available

Exclusion Criteria

- Patients managed conservatively without surgery
- Patients with incomplete or missing medical records
- Patients with perforations due to malignancy or trauma

Procedure: All patients were assessed initially with detailed history and clinical examination. Diagnosis of PPU was made on clinical basis of acute abdomen pain, stiffness and of free gas under the diaphragm by Xray or Cullens sign or Damar classes. Patients were resuscitated in the preoperative period with intravenous fluids, decompression using a nasogastric tube, broad spectrum antibiotics, proton pump inhibitors and hydration with tracking of urine output in all cases. Patients were subsequently operated under general anesthesia primarily through a midline incision. Small perforations were over sewn with non-absorbable silk sutures and patched with omentum (Graham's omentopexy) while larger defects were treated with omental plugging. In patients who presented in severe shock, drainage only was done. Irrigation of the peritoneal cavity was conducted using normal saline and drains were used if indicated.

Laparoscopic repair was done selectively based on the surgeon's experience and patient stability. Post operative care was monitored for immediate complications, recovery and death during hospital stay.

Statistical Analysis: The collected data was entered into the Excel software program for analysis through the use of SPSS version 25.0. Continuous variables were expressed as mean and standard deviation or as median and interquartile range; however categorical variables were expressed as frequency and percentage. The association between clinical parameters, risk factors, and outcomes was analyzed through the Chi-square test or Fisher's exact test for categorical variables and t-test or Mann-Whitney U test for continuous variables, where appropriate. A p-value less than 0.05 was judged statistically significant.

Result

Table 1 presents the study of population's distribution according to gender and age. Males predominated, comprising 83% of the cohort (n = 230), compared to females, who were 17% (n = 47). With regard to patient age, the majority were aged 31–50 years (72%, n = 199), followed by 51–70 years (15%, n = 42), 20–30 years (11%, n = 30), and a minority being over 70 years (2%, n = 6), thus showing that the majority of patients in the study were middle-aged males.

Variable	Category	Number (n)	Percentage (%)
Gender	Male	230	83
	Female	47	17
Age	20–30	30	11
	31–50	199	72
	51–70	42	15
	>70	6	2

Table 2 depicts the clinical presentations, symptoms, and signs of the research cohort (n = 277). The most frequently noted symptom was abdominal tenderness/guarding/rigidity/rebound, seen in 99% of patients (n = 274), and all patients presented with severe epigastric pain (97.3%, n = 269). Other

common features included abdominal distension (83%, n = 230) and vomiting (71%, n = 197). Constipation was noted in 50% (n = 139), shock in 31% (n = 86), and fever in 17% (n = 47), noting acute abdominal pain with tenderness was the most frequent clinical character in this cohort.

Symptoms/Signs	Number (n)	Percentage (%)
Severe epigastric pain	269	97.3
Vomiting	197	71
Abdominal distension	230	83
Constipation	139	50
Fever	47	17
Shock	86	31
Abdominal tenderness/guarding/rigidity/rebound	274	99

Table 3 provides a summary of co-morbidities, prior history of peptic ulcer disease (PUD), epigastric pain, and preadmission delay within the study

population (n = 277). Nineteen percent (n = 53) of patients reported having diabetes, and 18% (n = 50) reported having hypertension. In regard to prior

history, 21% (n = 58) of patients reported a previous diagnosis of PUD, while 79% (n = 219) had no previous diagnosis of PUD. Nearly half of the patients (49.32%, n = 137) reported having a history of epigastric pain or dyspepsia. When assessing preadmission delay, most patients (50.13%, n = 139) arrived 24–48 hours after symptom onset, 30.29% (n = 84)

arrived 48–72 hours after symptom onset, 10.45% (n = 29) arrived <24 hours after symptom onset, and 9.11% (n = 25) arrived >72 hours after symptom onset. This suggests that in the cohort, patients frequently delayed presentation, and metabolic and gastrointestinal co-morbidities were common.

Disease	Number (n)	Percentage (%)
Diabetes	53	19
Hypertension	50	18
Previously Diagnosed PUD (Peptic Ulcer Disease)		
Status	Number (n)	Percentage (%)
Yes	58	21
No	219	79
History of Epigastric Pain/Dyspepsia		
Status	Number (n)	Percentage (%)
Yes	137	49.32
Preadmission Delay (hours)		
Hours	Number (n)	Percentage (%)
<24	29	10.45
24–48	139	50.13
48–72	84	30.29
>72	25	9.11

Table 4 shows the site and size of perforations and the surgical procedures performed in the study population (n = 277). The vast majority of perforations occurred in the duodenum (91.95%, n = 255), followed by prepyloric (5%, n = 14) and gastric lesser curvature (2.95%, n = 8). Most perforations were small (<1cm, 94%, n = 260) and only 6% (n = 17) were greater than 1cm. Simple closure with

Graham's patch (open omentopexy, n = 260) was the most common form of surgical management. An omental plug was placed in 12 patients, laparoscopy was performed in 5 patients, and simple abdominal drainage was not performed in any patients. These outcomes show that small duodenal perforations were most common and treated primarily with traditional open surgical repair.

Variable	Category	Number (n)	Percentage (%)
Site of Perforation	Duodenum	255	91.95
	Prepyloric	14	5
	Gastric (lesser curvature)	8	2.95
Size of Perforation	<1 cm	260	94
	>1 cm	17	6
Surgical Procedures			
Procedure	Number (n)		
Simple closure with Graham's patch (open omentopexy)	260		
Laparoscopic	5		
Omental plugging	12		
Simple abdominal drainage	0		

Table 5 provides an overview of the postoperative complications recorded in the study population (n = 277). The most prevalent postoperative complication was surgical site infection, developing in 91 patients (32.7%). Reactionary pleural effusion was observed in 71 patients (25.7%), followed by pulmonary infections in 12 patients (4.5%). Wound dehiscence requiring secondary suturing occurred in 13 patients (4.7%). Other uncommon complications

included acute renal failure (0.5%) and re-perforation (0.5%). Jaundice occurred in 1 patient (0.3%). A total of 76 (27.5%) patients were treated in the SICU and 10 (3.6%) patients suffered cardio-pulmonary arrest resulting in death. In summary, while the data reveal that minor complications occurred fairly frequently amongst our population, more concerning complications, such as ICU admissions, did not occur as frequently and mortality was rare overall.

Table 5: Complications (n = 277)

Complication	Number (n)	Percentage (%)
Surgical site infection	91	32.7
Pulmonary infection	12	4.5
Reactionary pleural effusion	71	25.7
Wound dehiscence requiring secondary suturing	13	4.7
Acute renal failure	1	0.5
Managed in SICU	76	27.5
Re-perforation	1	0.5
Jaundice	1	0.3
Cardio-pulmonary arrest / mortality	10	3.6

Discussion

In this study, a dominance of male patients presenting with perforated peptic ulcer (PPU) at 83% is consistent with previous studies documenting male dominance in PPU. Svanes (2000) [10] found a 75-80% male incidence of PPU, and Nuhu et al. (2009) [11] showed an 82% incidence of male PPU diagnosed as well. This higher male incidence is often attached to male lifestyle such as smoking and alcohol use, both of which are strongly associated with perforated ulcers (Smedley et al., 1988; Doll et al., 1994) [12,13]. The study observed that 72% of patients were 31-50 years in age and middle-aged male adults appeared to have the highest incidence of PPU. The finding is supported by Chaliya et al., who reported that most patients in their series were 30-50 years of age, while it is acknowledged that many studies documented a slightly older peak age of 64 in Western countries (Svanes et al., 1995) [4]. Interestingly, only 2% of patients were >70 years of age, which may be related to lower exposure to risk factors among elderly populations and under-reporting of risk factors because of possible delayed presentation, co-morbidities or lack of control of their pre-existing illness.

Severe epigastric pain was reported by almost all of our cohort (97.3%), following abdominal distension in 83% and vomiting in 71% of patients. These findings align with other publications which report epigastric pain to be the hallmark of PPU (Makela et al., 2002; Chaliya et al., 2011) [8,14]. We noted constipation in 50% of patients, particularly late presenters, which was undoubtedly higher than the 35-40% reported in other studies, potentially reflecting a higher volume of late presenters in our cohort (Turkdogan et al., 1999) [15]. Fever was reported in 17% of patients in line with early systemic inflammatory response resulting from the contamination of the peritoneal cavity, while shock was seen in 31% of patients, which is slightly above the 20-25% noted in other series (Makela et al., 2002; Chaliya et al., 2011) [8,14]. This once again illustrates the importance of early resuscitation and surgical intervention.

A considerable number of patients presented with co-morbidities: 19% and 18% had diabetes and hypertension, respectively. Although both proportions were slightly lower than those reported in other Western studies, we would expect to see more comorbidity for an aging population, Henry et al. (1993) 16, and levels were still of clinical significance in relation to how they could have altered the postoperative course of the patient. The history of peptic ulcer disease was noted in 21% of patients, while almost 50% (49.3%) reported a prior tendency to epigastric pain or dyspepsia. This underdiagnosis or inadequate treatment of PUD mirrors what Chaliya et al. (2011) 14 reported, that the erratic treatment and late presentation to the hospital were contributing factors in the perforation. A final noteworthy factor is the preadmission delay who presented to the complex after >48 from initial symptoms, with 30% within 48-72 hours and some even presenting after 72 hours. This finding supports Stabile and Passaro (1984) 17 with pre-admission delays being frequent among rural or underserved communities and directly related to morbidity.

The duodenum was the most common location of perforation, 91.95% of all perforations occurred at a duodenal site, prepyloric and gastric sites were next. This is consistent with the literature, which states that duodenal perforations account for 85%–95% of PPU (Svanes, 2000; Nuhu et al., 2009) [10,11]. Most perforations were small (<1 cm), which aligns with literature by Makela et al. (2002) [8] that states that small perforations may be amenable to simple closure procedures. Among our cases, Graham's patch repair was the most frequent surgical intervention used in 260 patients, while laparoscopic repair and omental plugging were less common. This indicates access to surgical expertise but also relates to the size of the perforation; larger or complicated perforations require more advanced procedures (Chaliya et al., 2011) [14].

Complications in the postoperative period were common: 32.7% had a surgical site infection, while 25.7% developed reactionary pleural effusion. Pulmonary infection and wound dehiscence were less common, occurring in about 4-5% of the patients, and other complications such as acute renal failure,

re-perforation, and jaundice occurred infrequently. This rate of complications is similar to those in series reported earlier, although surgical site infection rates are slightly higher than the 25-30% reported in some series; this could be related to late presentation and nutritional status at presentation (Makela et al., 2002; Chaliya et al., 2011) [8,14]. A total number of 27.5% of the patients required intensive care management. The overall mortality rate was 3.6%, a figure well below that reported by some historical series which quoted mortality rates up to 5-10% in similar settings; this may be due to early recognition and aggressive resuscitation coupled with timely surgical intervention (Svanes, 2000; Nuhu et al., 2009) [10,11].

Taken together, the findings underline the global trend of PPU predominantly affecting middle-aged males with a predominance of duodenal perforations. The critical factor in diagnosing this condition early is symptom recognition – essentially, severe epigastric pain with signs of peritoneal irritation. Presentation can still often be delayed, more so in rural environments, reinforcing the importance of awareness at the public level and improved access to health services. Across the board, our results more or less align with the regional and international literature, although the slight differences in complication rates, and demographics further reinforce the effects of local lifestyle, health-care infrastructure, and comorbidity patterns on presentation and outcomes.

Conclusion

The results of the study suggested that the sample of patients with perforated peptic ulcers (PPU) consisted mostly of middle-aged males in their productive years of life. Most of these individuals had severe epigastric pain and abdominal tenderness with frequently concurrent episodes of vomiting, distention of the abdomen, and insults to their systemic vital signs which included but were not limited to shock. Some had co morbidity including diabetes and hypertension; however, many also had a prior history of peptic ulcer disease or chronic epigastric pain indicating very serious chronic gastro intestinal pathology. Symptoms and time courses in regard to presentation in the patient should also be considered as they may predispose to severity of the disease and outcomes in patients with PPU. The anatomic location of the ulcer was primarily in the duodenum, but generally small in size. Management of the ulcer was simple with closure and omental patch technique. Few patients underwent laparoscopic techniques. Surgical complications were seen in some patients exhibiting surgical site infections and pleural effusions. A large number of patients were admitted to an intensive care unit. Mortality was low but still concerned supporting the seriousness of PPU requiring early detection and timely surgical interventions. While findings from this study indicate a need for increased clinical suspicion for PPU,

timely diagnosis, surgical management may reduce morbidity and optimize outcomes in patients with PPU, the study suggests that these patients may also benefit from an early detection system.

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