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## Study of factors to assess the mortality and morbidity in perforated peptic ulcer disease

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### Abstract

**Background:** Perforated peptic ulcer (PPU) is one of the most common surgical emergencies worldwide more so in India. Despite of the decreased incidence of PPU due to proton pump inhibitors, H. pylori treatment regimen and improved awareness over the last decade, the morbidity and mortality of PPU still remain considerably high.

**Aim:** To determine the preoperative and intraoperative factors affecting post-operative morbidity & mortality in patients operated for PPU.

**Materials & Methods:** A prospective observational study of 140 patients who were operated for PPU was done. A detailed data based on age, history of smoking & alcohol intake, concomitant comorbid diseases, shock & abnormal renal function, duration of presentation to hospital after onset of symptoms, peritoneal contamination and size of perforation was obtained. All cases were followed up for a period of 6 months postoperatively for complications.

**Observation:** Increased morbidity & mortality was observed in patients aged above 65 years. 44% of alcoholics had morbidity and 6.6% had mortality. 51.4% patients had concomitant comorbid diseases, of which 51.4% developed post-operative complications & mortality was 8.3%. 40% of cases presenting with shock had morbidity and 4.4% had mortality. 64.3% of cases presenting to hospital after 36 hours had either morbidity or mortality. Majority of patients with purulent peritoneal contamination had either morbidity or mortality. Perforation of size greater than 0.5cm<sup>2</sup> showed morbidity in 44% & mortality in 16%. The overall morbidity and mortality of our study is 35% (n=49) and 5% (n=7) respectively.

**Conclusion:** Risk factors for morbidity and mortality in PPU are elderly age, alcoholism, associated medical illness, pre-operative shock & sepsis, improper fluid resuscitation, perforation to surgery interval more than 36 hours, purulent peritoneal collection & perforation of size >0.5 cm<sup>2</sup>. Important post-operative factors increasing morbidity and mortality include respiratory complications, sepsis, wound infection, wound dehiscence, acute renal failure and multi organ failure.

**Keywords:** Emergency surgery, morbidity, mortality, peptic ulcer, perforated peptic ulcer

### Introduction

The epidemiology of peptic ulcer disease has changed in the past two decades with declining incidence rates <sup>[1, 2]</sup>. Despite better understanding of peptic ulcer disease, effective resuscitation, developments in treatment and prompt surgery under modern anaesthesia techniques <sup>[3]</sup>, peptic ulcer perforation remains a serious surgical problem with significant mortality and morbidity risk <sup>[4-9]</sup>. Significant proportions of patients still die from complicated peptic ulcer indicating the need for improved preoperative optimization and postoperative care among these patients <sup>[4]</sup>. Mortality rate is 9% and complication rate is 30% <sup>[9]</sup>.

The classic triad of sudden onset of abdominal pain, tachycardia & abdominal rigidity is the hallmark of PPU <sup>[6]</sup>. Obliteration of liver dullness is also noted in majority of patients. Exploratory laparotomy & primary closure followed by Grahams omental patch repair remain the gold standard while laparoscopic surgery should only be considered when expertise is available <sup>[6, 10]</sup>. This is followed by H. pylori eradication therapy to prevent recurrence <sup>[10, 11]</sup>.

The combination of older age group, <sup>[3, 5, 7, 8, 12-14]</sup> active cancer, <sup>[13, 14]</sup> hyperbilirubinemia, <sup>[14]</sup> hypoalbuminemia, <sup>[13, 14]</sup> elevated creatinine and delay from perforation to surgery of >24 hrs <sup>[8, 11, 12, 14]</sup> are best predictors of mortality. Female gender, <sup>[3, 15]</sup> higher BMI, <sup>[7]</sup> preoperative shock, <sup>[8, 11, 12]</sup> pre-operative organ failure, <sup>[5]</sup> delayed presentation, <sup>[5, 8]</sup> pre-existing illness like diabetes, hypertension, COPD, ischemic heart disease, <sup>[12]</sup> definitive surgery, <sup>[11]</sup> size of perforation more

than 1 cm<sup>2</sup>, [3, 7, 15] post-operative leak & other postoperative complications [13] were found to be significant factors influencing mortality and morbidity [3, 5, 8]. Comorbidities such as pulmonary disease, Cardiac disease & active cancer were identified as independent risk factors for fatal long-term outcome [3, 13]. Early diagnosis and treatment [6], treating associated medical diseases [11], improving early decision-making, reducing preoperative delay, improved perioperative monitoring [16] ensuring adequate proficiency in the various surgical techniques and addressing the unique postoperative circumstances of each patient [7, 8] may be beneficial in optimizing outcomes of complicated PUD [4].

**Materials and methods**

A prospective observational study was done in a tertiary care teaching hospital on a time-based sample of 140 patients who underwent surgery for PPU after obtaining informed consent from all individual participants included in the study. Patients of age >18 years with duodenal or gastric perforation of peptic ulcer origin were studied. However, patients with traumatic/malignant/ iatrogenic peptic perforation, age <18 years & patients with recurrent or stomal ulcer perforation were excluded from study.

History of suspected PPU patients regarding age, history of smoking and alcohol intake, associated illnesses and perforation

to surgery interval is taken. Preoperative shock, renal parameters & lung condition are assessed. Oral intake of diagnosed patients was discontinued, and urinary catheters and nasogastric tubes were placed. Immediate resuscitation is done with IV fluids. IV antibiotics were started. Patients were then operated. Perforation closure with omental patch was performed after noting site and size of perforation. Peritoneal contamination is evaluated & peritoneal lavage is done. The development of any post operative complication is noted. Postoperative complications like respiratory complications including reactive effusion, sepsis, wound infection, wound dehiscence, acute renal failure, multi organ failure, paralytic ileus, residual abscess, heart failure and leak from closed perforation site are assessed. After satisfactory improvement patients were discharged from the hospital and instructed to come for regular follow up at 1, 2, 4 and 6 months.

Post-operative morbidity spectrum includes surgical site infections, renal, cardiac, pulmonary complications, requirement of mechanical ventilation and duration of hospital stay of more than 2 weeks. Postoperative mortality is defined as death of the patient during the same hospital admission period.

**Observation**

In our study the highest incidence was observed in 4<sup>th</sup> decade of life (table 1, figure 1). Morbidity & mortality increased with age.

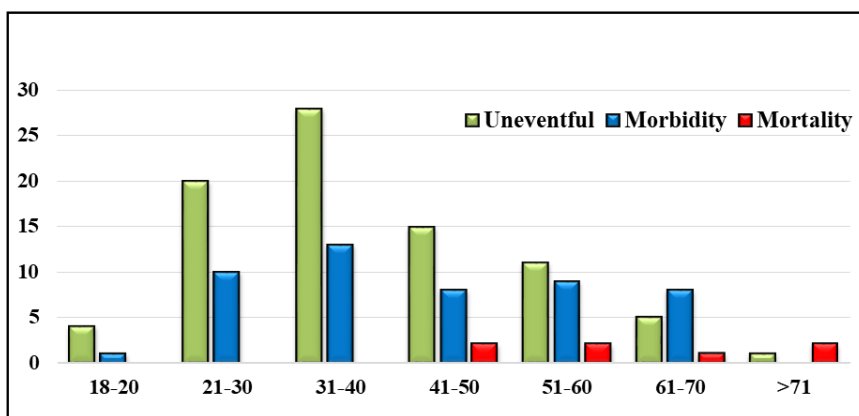


Fig 1: Mortality and Morbidity based on Age

Table 1.

	Total	Uneventful recovery	Morbidity	Mortality
<b>Age group</b>				
18-20	5	4	1	0
21-30	30	20	10	0
31-40	41	28	13	0
41-50	25	15	8	2
51-60	22	11	9	2
61-70	14	5	8	1
>71	3	1	0	2
<b>Associated factors</b>				
Smokers	87	49	33	5
Non-Smokers	53	35	16	2
Alcoholic	91	45	40	6
Non-Alcoholic	49	39	9	1
Associated illness	72	29	37	6
Preop shock	90	50	36	4
<b>Presentation</b>				
<24 hours	84	59	25	0
24-48 hours	31	20	9	2
48- 72 hours	19	5	11	3
>72 hours	6	0	4	2
<b>Contamination</b>				

Nil	20	15	5	0
Serous fluid	59	33	24	2
Turbid fluid	40	31	8	1
Frank pus	15	4	9	2
Plaques of pus	6	1	3	2
<b>Size of perforation</b>				
≤0.25 cm <sup>2</sup>	34	23	11	0
0.25 - 0.5 cm <sup>2</sup>	81	51	27	3
0.5 - 0.75 cm <sup>2</sup>	24	10	11	3
>0.75 cm <sup>2</sup>	1	0	0	1

Association of smoking and alcohol intake with PPU is observed (table 1, figure 2). 38% (33) smokers had morbidity & 5.7% (5) had mortality among 62.1% (87) smokers, while 30.2% (16) non-smokers showed morbidity and 3.8% (2) had mortality among 37.9% (53) non-smokers. Out of 65% (91) alcoholics in our study, 44% (40) had morbidity and 6.6% (6) had mortality. Among 49 non-alcoholics, 18.4% (9) had morbidity and 2% (1) had mortality.

In our study, 72 patients (51.4%) have medical comorbidities among which 30 patients have hypertension, 22 are diabetics, 15 have COPD / bronchial asthma & 5 have coronary artery disease. Among them, 51.4% (37) developed post-operative complications and 8.3% (6) expired post operatively. Upon presenting to hospital, 64.3% patients (90) had shock (SBP< 90mm Hg, PR: >100) of which 40% of patients (36) had morbidity and 4.4% (4) had mortality.

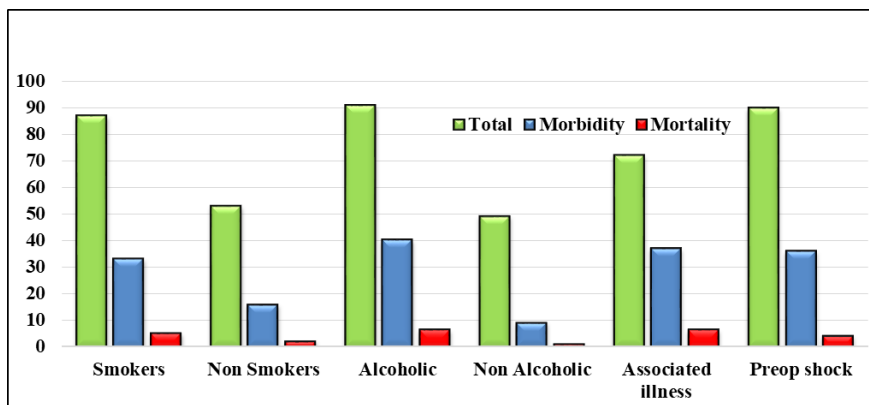


Fig 2: Morbidity & Mortality Based on Associated Factors

Based on duration of perforation to surgery interval (table 1, figure 3), 56 cases (40%) presented after 24 hours of which 42.9% (24) had morbidity 12.5% (7) had mortality. 17 cases

presented to the hospital between 36-48 hours out of which, 1 patient expired & 6 patients had morbidity.

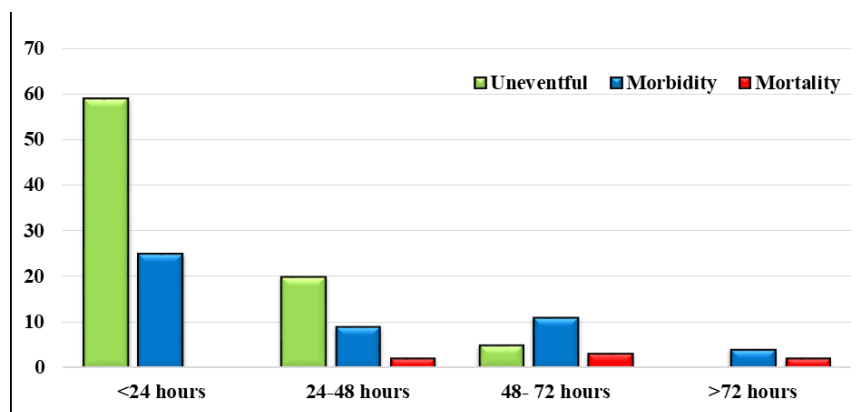


Fig 3: Perforation to Surgery Interval

In our study 59.3% (99) of patients had either serous or turbid peritoneal contamination & majority of patients with purulent

contamination had either morbidity or mortality. (Table 1, figure 4).

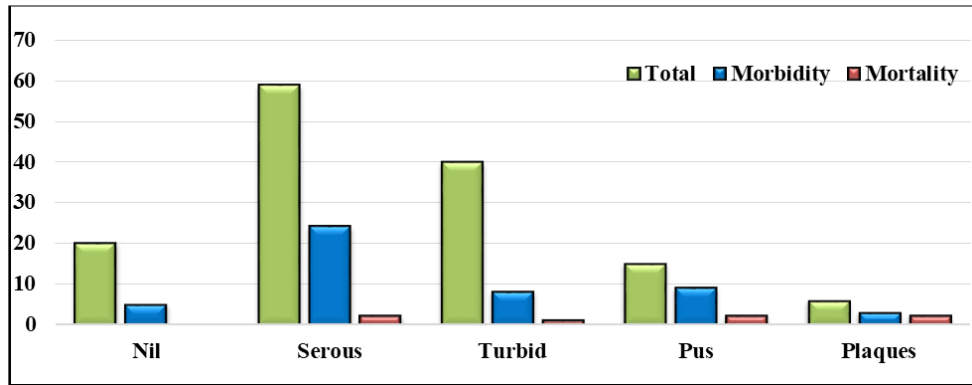


Fig 4: Morbidity & Mortality based on Peritoneal Contamination

In 57.9% (81) of patients the size of perforation, was between 0.25-0.5cm<sup>2</sup>, of which 33.3% (27) had morbidity & 3.7% (3) had mortality. Size of perforation was >0.5cm<sup>2</sup> in 17.86% (25) of

patients and among them 44% (11) suffered from post op complications and 16% (4) had mortality. (Table 1, figure 5)

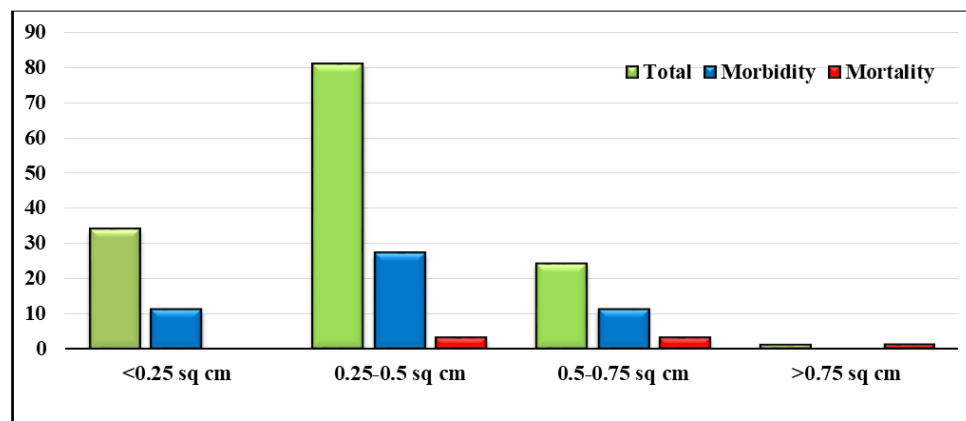


Fig 5: Perforation Size predicting Morbidity and Mortality

45% (63) of the patients under study had postoperative complications (figure 6), most common of which are respiratory associated including reactive effusion in about 28.6% (16) patients followed by sepsis in 11 (19.6%), wound infection in 09

(16.1%), wound dehiscence in 05 (8.9%), acute renal failure in 5 (8.9%), multi organ failure in 4 (7.1%), paralytic ileus in 2 (3.6%), residual abscess in 1 (3.6%), heart failure in 1 (1.8%) and post-operative leakage in 1 (1.8%).

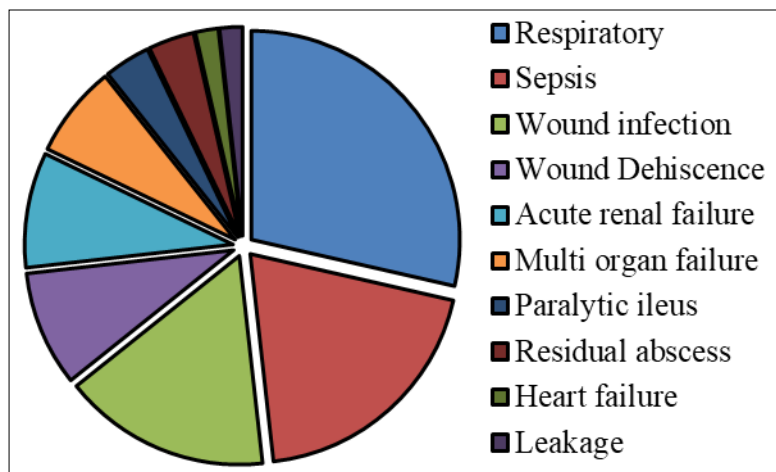


Fig 6: Post Operative Complications in PPU

**Discussion**

Perforation occurs in 2-10% of patients with peptic ulcer & accounts for >70% of deaths associated with peptic ulcer disease. Relevant history and examination findings of patients presenting with perforation were recorded, blood samples were collected. Following adequate fluid resuscitation & ensuring

satisfactory urine output of >500 ml, the patients were taken for surgery.

In our study of 140 cases, PPU was common in the age group of 30-40 years with mean age of 36 years. Older patients with multiple comorbidities were found to succumb easily to the stress of postoperative complications. The mean age of the

group with mortality was significantly higher than that of the morbidity, and the mean age of the morbidity group was significantly higher than that of the no complication group. Sivaram P *et al.* [3], Bojananpu S *et al.* [5] and several other studies have reported that patients aged 65 years or more have significantly higher rates of mortality compared with younger patients [7, 8, 12, 13], similar to our study and this finding is believed to be due to the increased incidence of accompanying diseases in the elderly patients.

Association of smoking and alcohol intake with PPU is observed. 38% smokers had morbidity and 5.7% had mortality while 30.2% non-smokers showed morbidity and 3.8% had mortality. This increase in morbidity and mortality in smokers could be attributed to post-operative lung complications and complicated recovery from general anaesthesia. Out of 65% alcoholics in our study, 44% had morbidity and 6.6% had mortality indicating strong association between alcohol intake and PPU. This high incidence of perforation in alcoholics in our study, compared to other studies [9] could be due to consumption of local and low-quality alcohol in the study population.

Concomitant diseases, most commonly hypertension and diabetes resulted in increased post-operative morbidity by 62.5% and mortality of 8.3%. Tailoring the care of patients to their age-specific needs and adequately managing other comorbid conditions is crucial in providing patient-centred care and has been beneficial in ultimately improving surgical and long-term outcomes of complicated peptic ulcer disease. In our study, 90 patients had shock at presentation (defined as persistent hypotension: systolic blood pressure <90 mmHg, mean arterial pressure <60 mmHg, or a reduction in systolic blood pressure 40 mmHg from baseline) of which, 40% had morbidity & 4.4% had mortality.

There are studies in literature indicating that the time to presentation at hospital being over 24 hours had a negative effect on progress of disease with increased morbidity and mortality [3, 8, 11], further accentuated if duration of presentation exceeds 36 hours. In our study, 30% of cases presented after 36 hours and 34% mortality is noticed in patients presenting after 3 days. 2 patients aged  $\geq 70$  years, who had undergone surgery after 36 hours from the time of onset of symptoms expired. Duration of delay in presentation has been observed to be directly proportional to increasing grades of peritoneal contamination.

Based on contamination of peritoneum, 59.3% of patients had either serous fluid or serous fluid contamination and 76% patients of purulent contamination (frank pus or pus plaques) had either morbidity or mortality indicating pus as a major risk factor. All patients were operated with the open technique. After the aspiration of the intraabdominal free fluid, the peritoneal cavity was irrigated with 5-6 litres of warm isotonic saline and aspirated.

There are many studies which consider size of perforation an important predicting factor. In our study size of perforation was  $>0.5\text{cm}^2$  in 17.86% and among them 44% suffered from post op complications and 16% had mortality implying larger the perforation; more the morbidity & mortality.

The nasogastric tubes were withdrawn after 3–4 days. On postoperative day 4 or 5, after return of bowel sounds and passage of flatus, oral alimentation is begun and is advanced as tolerated. Postoperative antibiotic treatment was maintained for 7–10 days, *Helicobacter pylori* regimen was prescribed for 2 weeks & proton pump inhibitors were continued for further 4 weeks.

Age > 60 years, comorbidities - diabetes, alcoholism,

preoperative serum creatinine level > 1.5 mg/dl, perforation to surgery interval > 36 hours, and size of perforation >  $0.5\text{cm}^2$  had significant association with postoperative morbidity especially since majority of our study population are poorly nourished and emaciated. 40% of the patients under study had postoperative complications, most common of which is respiratory complications including reactive effusion in about 28.6% patients which resolved on improvement of peritonitis, followed by sepsis, wound infection, wound dehiscence, acute renal failure in patients with uncontrolled diabetes and hypertension, multi organ failure, paralytic ileus, residual abscess, heart failure and post-operative leakage. 2 patients were known cases of peptic ulcer disease & developed septicaemia and multi organ failure in post-operative period. Careful and holistic consideration of the unique circumstances of each surgical patient has drastically decreased the mortality rate in perforation patients.

Spinal anaesthesia with sedation is preferred in our setup as majority of the patients were smokers and alcoholics. Recovery was better with spinal anaesthesia after complete resuscitation and urine output of > 500 ml. Patients who underwent surgery under general anaesthesia had respiratory complications and their recovery was delayed. Few patients could not be revived even after ventilatory support. Adequate fluid resuscitation & ensuring satisfactory urine output before shifting the patient to surgery especially in patients with raised serum creatinine levels has cut down mortality from 9.8% in study conducted by Hut A *et al.* [7], and 9% in Lohsiriwat V [9] study to 5% in our study.

Therefore, giving considerable attention to age and concomitant diseases, an aggressive pre operative resuscitation from shock, satisfactory urine output, avoiding delay in surgery, good surgical technique, thorough peritoneal lavage and meticulous post-operative care including chest physiotherapy is needed to improve overall results.

## Conclusion

Risk factors for morbidity & mortality in PPU are age >65 years, alcoholism, associated medical illness, presence of preoperative shock, improper fluid resuscitation, perforation to surgery interval >36 hours, size of perforation  $>0.5\text{cm}^2$  & purulent peritoneal collection. Post-operative complications were seen in 40% of study subjects, most common of which is respiratory complications including reactive effusion in about 28.6% patients followed by sepsis (19.6%), wound infection (16.1%), wound dehiscence (8.9%), acute renal failure in 5 (8.9%), multi organ failure in 4 (7.1%), paralytic ileus in 2 (3.6%), residual abscess in 1 (3.6%), heart failure in 1 (1.8%) and post-operative leakage in 1 (1.8%).

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