

Accuracy of prognostic factors in detecting one month mortality for perforated peptic ulcer disease

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Abstract

Background: Perforated peptic ulcer is a serious condition with an overall reported mortality of 5%–25%, rising to as high as 50% with age. Being closely related to advanced age, increased burden of co morbidity may partially explain the higher mortality among elderly patients.

Objective: To determine the accuracy of prognostic factors in detecting one month mortality after surgery for perforated peptic ulcer disease.

Material and methods: This study was conducted after approval from hospitals ethical and research committee. All the patients presenting with perforated peptic ulcer disease and prognostic factors (mentioned below) were included in the study through OPD/ER department and immediately admitted in the surgical ward for further evaluation. The standard guidelines for surgery were followed for all patients including perforation closure with Graham's patch omentoplasty. All patients were kept in ward for 5 post operative days and discharged on 6th post operative day if indicated. All patients were regularly followed till one month after surgery to detect accuracy of the prognostic factors in terms of 30 day mortality.

Results: In this study, 167 patients with perforated peptic ulcer disease had observed. Male to female ratio was 1.49:1. The study included age ranged from 19 up to 72 years. Average age was 40.89 years + 15.3SD. Accuracy of prognostic factors to detect in hospital mortality in the peptic ulcer disease was 118(70.66%).

Conclusion: Age, delayed surgery, presence of shock, ASA risk and definitive surgery are factors significantly associated with fatal outcomes in patients undergoing emergency surgery for perforated PU. Therefore, proper resuscitation from shock, improving ASA grade, decreasing delay and reserving definitive surgery for selected patients is needed to improve overall results.

Keywords: perforated peptic ulcer disease, Persistent Fever, Shock, omentoplasty

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Introduction:

The incidence of complicated peptic ulcer disease (PUD) including perforated and bleeding peptic ulcer increases with advanced age^{1,2}. This increase has been attributed to the high frequency of risk factors for PUD among elderly patients, e.g., *Helicobacter pylori* (HP) colonization or use of non-steroidal anti-inflammatory drugs (NSAIDs)¹. Peptic ulcer perforation is one of the commonest gastrointestinal perforations in Pakistan. Due to rapidly spreading peritonitis, it is a life threatening complication of PUD³.

Perforated peptic ulcer is a serious condition with an overall reported mortality of 5%–25%, rising to as high as 50% with age⁴. Being closely

related to advanced age, increased burden of co-morbidity may partially explain the higher mortality among elderly patients. Nevertheless, virtually no data exist on the influence of co morbidity on age-related increase in mortality of perforated peptic ulcer^{4,5}.

Perforated peptic ulcer (PPU) is the most common indication for emergency gastric operation. Perforation occurs in about 2–10% of peptic ulcers⁶. The vast majority of PPU patients require emergency operation. The incidence of recurrent ulcer after simple closure could be very low if patients receive appropriate treatment of *Helicobacter pylori* (HP) infection. However, patients with PPU still have a high rate of morbidity and mortality and surgical outcomes could

vary among hospitals^{6,7}.

Though significant progress in peri-operative care in PPU patients has been made recently, the morbidity and mortality still remains an important issue. Different studies have described risk factors predicting mortality and morbidity in PPU patients. Among the most pronounced of these were increased age, concomitant diseases, delay in treatment, the presence of shock at admission the size of perforation, a leukocyte count of less than 9500, ulcer location, the use of steroids and reperforation⁹.

To facilitate management of PPU patients and to improve the outcomes, it is important to stratify patients into different categories based on the likelihood of morbidity and mortality, so that high-risk patients can receive more appropriate treatment and greater intensive care. Several risk scores for the prediction of outcomes in PPU patients have been developed. However, their accuracy in predicting mortality and morbidity is still questionable^{7,10,11}.

In a study by Kocer B, et al showed that only age, ASA score, treatment delay, presence of shock and definitive operation were independent predictors of mortality and the overall accuracy of these predictors was 8.55%¹², 27%¹³ and 33%⁷. The mortality was as high as 44.6% for patients aged above 80 years⁵ and for ASA class IV and above the mortality was 54.5%¹⁴.

James Y, et al concluded that older age, co morbidity, shock and delayed treatment were associated with increased mortality after peptic ulcer perforation and total mortality in their study was 23.5%¹⁵.

The purpose behind doing this study was to determine the accuracy of prognostic factors in detecting post operative mortality for peptic ulcer perforation. This study was designed owing to variation present in literature regarding accuracy of prognostic factors and to provide us with statistics of accuracy in our local population presenting with perforated peptic ulcer disease.

Prognostic factors, including any 3 of the following features at presentation:

Age: of the patient greater than 65 years.

Shock at Presentation: was diagnosed at presentation on the basis of cold clammy skin, absent/weak pulse, systolic blood pressure of < 90mmHg and mean arterial pressure of < 60mmHg (clinical examination)

Delay in Presentation: was considered if the time interval between onset of acute abdominal pain and presentation to the hospital is > 24 hours as detected by history.

Leukocyte count of < 9500 measured in the laboratory at the time of presentation.

Size of the ulcer: was considered significant if the size of the ulcer is >5 cm diagnosed preoperatively.

Accuracy was determined in terms of number of patients presenting with above mentioned prognostic factors with PPU and die within 30 days of surgery for PPU despite of standard operative and post operative treatment.

Material and Method:

This study was conducted after approval from hospitals ethical and research committee. All the patients presenting with perforated peptic ulcer disease and prognostic factors (as per criteria mentioned in operational definition above) was included in the study through OPD/ER department and immediately admitted in the surgical ward for further evaluation. After resuscitation, the standard guidelines for surgery was followed for all patients including perforation closure with Graham's patch omentoplasty, post operative antibiotic cover and fluid diet once the bowel sounds return All patients were kept in ward for 5 post operative days and discharged on 6th post operative day if indicated. All patients were regularly followed till one month after surgery to detect accuracy of the prognostic factors in terms of 30 day mortality.

The inclusion criteria were all patients presenting with perforated peptic ulcer, patients with prognostic factors as per operational definitions and age group above 18 years and of either gender. The patients with history of steroid intake in the last one month, patients with Diabetes Mel-

litus with (Fasting Blood Glucose of $> 126\text{mg/dl}$ and history of intake of anti diabetic drugs), patients with history of abdominal surgery in the last one month for any indication, patients with gastric cancer diagnosed on the basis of medical records, patients with American society of Anesthesia class IV and V and patients with re perforation on history and medical records were excluded from the study.

All the above mentioned information including name, age, gender and address were recorded in a pre designed proforma. Bias and confounding variables were controlled by strictly following exclusion criteria.

All the data were entered and analyzed through SPSS version 10. Frequency and percentages were calculated for categorical variables like gender and accuracy. Mean + SD will be calculated for categorical variables like age, presentation time and per operative size of the ulcer. Accuracy was stratified among the age, gender and baseline prognostic factor at presentation to see the effect modifiers. All the results were presented as tables and charts.

Results:

In this study, 167 patients with perforated peptic ulcer disease had observed, in which 100(59.88%) were male and 67(40.12%) were female patients. Male to female ratio was 1.49:1 (Figure 1).

Patients age was divided in four categories, out of which most presented in younger age i.e. less than or equal to 30 years which were 56(33.5%) while 49(29.3%) patients were in the age range of 31-45 years, 38(22.8%) were of age range 46-60 years and 24(14.4%) presented at age more than 61 years. The study included age ranged from 19 up to 72 years. Average age was 40.89 years + 15.3SD (Table 1).

Accuracy of prognostic factors to detect in hospital mortality in the peptic ulcer disease was 118(70.66%) while 49(29.34%) were found non-accurate results (Figure 2).

Age wise distribution of accuracy shows that high accuracy was found in young age group. Accuracy was 36(73.5%) in 31-45 years of age while 13(26.5%) was not accurate, 38(67.9%) patients were correctly diagnose as malignant in age groups of less than or equal to 30 years while 18(32.1%) were not accurate, 28(73.7%) accuracy was observed in the age range of 46-60 years while 10(26.3%) were not accurate and 16(66.7%) cases have accurate diagnosis in age range of more than 60 years of age while 8(33.3%) were not accurate (Table 2).

The majority of females i.e. 73.1% presented with perforated peptic ulcer disease were accurately diagnosed while 26.9% were not accurate and 69% accuracy was noted in male patients while 31% were not accurate, showed some role of gender over the accuracy of prognostic factors in diagnoses of mortality in perforated peptic ulcer disease (Table 3).

Table 1: Age wise distribution of the patients

	Frequency	Percent	Cumulative percent
≤ 30	56	33.5	33.5
31 - 45	49	29.3	62.9
46 - 60	38	22.8	85.6
61+	24	14.4	100.0
Total	167	100.0	

Table 2: Age wise distribution of accuracy

		Accuracy		Total
		Yes	No	
Age- (Binned)	<= 30	38	18	56
		67.9%	32.1%	100.0%
	31 - 45	36	13	49
		73.5%	26.5%	100.0%
	46 - 60	28	10	38
		73.7%	26.3%	100.0%
	61+	16	8	24
		66.7%	33.3%	100.0%
	Total	118	49	167
		70.7%	29.3%	100%

Discussion:

The characteristics of perforated PU disease

Table 3: Accuracy wise distribution of gender

		Accuracy		Total
		Yes	No	
Sex	Male	69	31	100
		69.0%	31.0%	100.0%
	Female	49	18	67
		73.1%	26.9%	100.0%
	Total	118	49	167
		70.7%	29.3%	100%

appear to be changing. Recently, it has been reported that there has been a relative increase in peptic ulcer perforation (PUP) in the elderly, especially in women¹⁶. History of using non-steroidal anti-inflammatory drugs (NSAIDs) among PU patients has increased¹⁷.

Surgical treatment of perforated PU has been changing in most hospitals over recent years. With the introduction of H2 blockers and proton pump inhibitors as an effective medical treatment after surgery, simple closure has become the preferred option for many surgeons¹⁸. The rate of complications and mortality has not declined during recent decades. Mortality was reported to vary between 4 and 30%^{18,19}. American Society of Anesthesiologist (ASA) status have been cited delayed treatment, older age, presence of shock on admission, concomitant diseases as the main risk factors for complication and mortality^{17,19,20}. A delay of more than 24 h increased lethality seven- to eight-fold and the complication rate three-fold.

Ulcer perforation was a lethal disease until the turn of the twentieth century when surgical treatment was introduced. A study from western Norway, covering the period 1935–1990, reported a decrease in lethality from 1935 to 1950 after which time lethality was stable until it increased slightly during the last decade²¹. Thus surgical treatment and treatment with antibiotics revolutionized the prognosis of ulcer perforation. The prognosis of ulcer perforation today given surgical treatment accompanied by use of antibiotics is determined by the patient's age, the site of the perforation, and the delay in

treatment^{21,22}. The last factor is the only one that can be modulated by good clinical practice and is thus of particular interest.

Risk for postoperative death and complications is closely related to duration of perforation, as demonstrated in several studies^{22,23}. Adverse effects seem to increase particularly when the delay exceeds 12 hours²¹. Delay of more than 24 hours increased lethality seven- to eightfold, the complication rate threefold, and the length of hospital stay twofold in a study from western Norway²¹. The prognosis after ulcer perforation is reported to be poorer in women than in men owing to a longer delay in treatment²⁴. The increase in treatment delay that appear to take place in the Western world is thus of great concern. Surgical emergencies other than ulcer perforation may be affected as well, and the efficiency of modern emergency care needs attention.

During the past few decades the incidence of perforations has declined in the young age groups and among men, but has risen among elderly people^{25,26}. In our study, PUP was still common in younger patients. Smoking among young people is common in Pakistan, which may explain our higher incidence of perforation in young males. Male patients had PUP frequently at younger ages, while female patients had PUP most commonly in the fourth to sixth decades. In fact, an absolute increase has been reported in elderly women in different studies²⁷. We found that female sex was associated with a higher mortality rate than males. The higher mortality rate among women might be due to the older age of women than men. The mortality rate among the elderly patients undergoing surgery for perforated PU is as high as 12–47%^{27,28,29}. Associated medical diseases and diagnostic delay may account for the higher mortality rates in the elderly patients in our study.

In a study by Kocer B et al showed that only age, ASA score, treatment delay, presence of shock and definitive operation were independent predictors of mortality and the overall accuracy of these predictors was 8.55%¹², 27%¹³ and 33%⁷. The mortality was as high as 44.6% for patients

aged above 80 years⁵ and for ASA class IV and above the mortality was 54.5%¹⁴. James Y et al concluded that older age, comorbidity, shock and delayed treatment were associated with increased mortality after peptic ulcer perforation and total mortality in their study was 23.5%¹⁵.

Risks of postoperative death are closely related to the duration of perforation^{17,19,27}. Thirty percent of patients were admitted to our surgical department with a perforated ulcer that had been present for more than 12 hours. Elderly patients were commonly admitted to the hospital more than 24 h after the perforation had occurred. A delay of more than 24 h increased mortality 6.5 times. Delay of more than 24 h increased mortality 7 - 8 fold, the complication rate 3 fold in the study of western Norway²¹. The prognosis after ulcer perforation is reported to be poorer in women than in men owing to a longer delay in treatment²⁴. The increase in treatment delay that appear to take place in Western world is thus of great concern. Surgical emergencies other than ulcer perforations may be affected as well and the efficiency of modern care needs attention. Most of our patients came from rural areas and they were referred to us from smaller hospitals. The present study is in agreement with previous ones and reveals the importance of early surgical intervention to improve survival rates³⁰.

During the past few decades the incidence of perforation has declined in the younger age group and among men but has risen among elderly people^{25,26}. In our study PUP was still in common in younger patients. Smoking among younger people is common in Pakistan which may explain our higher incidence of perforation in young males. Male patients have PUP frequently at young age, while female patients had PUP most commonly in the fourth to sixth decades. In fact, an absolute increase has been reported in elderly women in different studies²⁷. We found that female sex was associated with a higher mortality rate than males. The higher mortality rate among women might be due to the older age of women than men. The mortality rate among the elderly patients undergoing surgery for perforated PU is as high as 12-47%^{27,28,29}. As-

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The mortality of PU disease has not decreased after the introduction of H₂ receptor antagonists and despite many advances in pre- and postoperative care³¹. During the past few decades, patients have become older and had more coexisting medical diseases and use of NSAIDs has increased. Mortality rates varied between 4 and 30% in different studies^{18,19,31}. Our mortality rate was 8.6% (n = 23). We believe that such low mortality rates in our series could be explained by the low mean age of the patients which were treated with the preferred simple closure.

The finding of a higher mortality rate from perforated gastric ulcers in women, while previously reported for perforated peptic ulcers in general, is unexplained. Neither ulcer sizes nor delay in operative interventions were significantly different in men and women³².

Conclusion:

We conclude that delay of more than 24 h, presence of shock, age, Leukocyte count of < 9500 and size of ulcer play a key role in predicting the one month hospital mortality after the surgery of perforated ulcer disease. In order to improve prognosis of patients with PUP, diagnosis and treatment should not be delayed and the associated medical diseases should be treated. Elderly patients have obscure clinical symptoms, often leading to an initial wrong diagnosis. Therefore, the possibility of PUP in elderly patients with

abdominal pain should be kept in mind.

Conflict of Interest: None

References:

- Christensen S, Ris A, Nørgaard M, Sørensen HR, Thomsen RW. Short-term mortality after perforated or bleeding peptic ulcer among elderly patients: a population-based cohort study. *BMC Geriatrics*. 2007; 7:8
- Testini M, Portincasa P, Piccinni G, Lissidini G, Pellegrini F, Greco L. Significant factors associated with fatal outcome in emergency open surgery for perforated peptic ulcer. *World J Gastroenterol*. 2007; 9(10):2338-40.
- Khan SH, Aziz SA, Haq II. Perforated peptic ulcer: A review of 36 cases. *Prof Med J*. 2011; 18(1):124-7.
- Nogueira C, Silva AS, Santos JN, Silva AG, Ferreira J, Matos E, et al. Perforated peptic ulcer: main factors of morbidity and mortality. *World J Surg*. 2005; 27(7):782-7.
- Christensen S, Riis A, Norgaard M, Thomsen RW, Tonnesen EM, Larsson A, et al. Perforated peptic ulcer: use of pre-admission oral glucocorticoids and 30-day mortality. *Aliment Pharmacol Ther*. 2006; 23(1):45-52.
- Behrman SW. Management of complicated peptic ulcer disease. *Arch Surg*. 2005; 140:201-8.
- Lohsiriwat V, Prapasrivorakul S, Lohsiriwat D. Perforated Peptic Ulcer: Clinical presentation, surgical outcomes, and the accuracy of the boey scoring system in predicting postoperative morbidity and mortality. *World J Surg*. 2009; 33:80-5
- Lunevicius R, Morkevicius M. A comparison of laparoscopic versus open repair for perforated duodenal ulcers. *Surg Endosc*. 2005; 19:1565-71.
- Bas G, Eryilmaz R, Okan I, Sahin M. Risk factors of morbidity and mortality in patients with perforated peptic ulcer. *Acta Chir Belg*. 2008; 108:424-7
- Rix TE, Bates T. Pre-operative risk scores for the prediction of outcome in elderly people who require emergency surgery. *World J Emerg Surg*. 2007; 2:16
- Notash AY, Salimi J, Rahimian H. Evaluation of Mannheim Peritonitis Index and multiple organ failure score in patients with peritonitis. *Indian J Gastroenterol*. 2005; 24:197-200
- Kocer B, Surmeli S, Solak C, Unal B, Bozkurt B, Yildirim O. Factors affecting mortality and morbidity in patients with peptic ulcer perforation. *J Gastroenterol Hepatol*. 2007; 22(4):565-70
- Møller MH, Shah K, Bendix J, Jensen AG, Nielsen EZ, Sand A et al. Risk factors in patients surgically treated for peptic ulcer perforation. *Scand J Gastroenterol*. 2009; 44(2):145-52.
- Larkin JO, Bourke MG, Muhammed A, Waldron R, Barry K, Eustace PW. Mortality in perforated duodenal ulcer depends upon pre-operative risk: a retrospective 10-year study. *Irish J Med Sci*. 2009; 179(4):545-9.
- Lau JY, Sung J, Hill C, Henderson C, Howden CW, Metz DC. Systematic review of the epidemiology of complicated peptic ulcer disease: incidence, recurrence, risk factors and mortality. *Digestion*. 2011; 84:102-13.
- Chey WD, Wong BC. American College of Gastroenterology guideline on the management of *Helicobacter pylori* infection. *Am J Gastroenterol*. 2007; 102(8):1808-25.
- Nogueira C, Silva AS, Santos JN et al. Perforated peptic ulcer. Main factors of morbidity and mortality. *World J Surg*. 2003; 27:782-7.
- Hermansson M, Von-Holstein CS, Zilling T. Surgical approach and prognostic factors after peptic ulcer perforation. *Eur J Surg*. 1999; 165:566-72.
- Testini M, Portincasa P, Piccinni G, Lissidini G, Pellegrini F, Greco L. Significant factors associated with fatal outcome in emergency open surgery for perforated peptic ulcer. *World J Gastroenterol*. 2003; 9:2338-40.
- Makela JT, Kiviniemi H, Ohtonen P, Laitinen SO. Factors that predict morbidity and mortality in patients with perforated peptic ulcers. *Eur J Surg*. 2002; 168:446-51.
- Svanes C, Espehaug B, Salvesen H, SØreide O, Svanes K. A multifactorial analysis of factors related to lethality following treatment of perforated gastroduodenal ulcer 1935-85. *Ann. Surg.* 1989; 209:418.
- Svanes C, Lie RT, Svanes K, Lie SA, Søreide O. Adverse effects of delayed treatment for perforated peptic ulcer. *Ann Surg*. 1994; 220:168.
- Graves AM. Perforated peptic ulcer in German clinics: an analysis of 4402 cases. *Ann Surg*. 1933; 98:197.
- Svanes C, Lie RT, Kvåle G, Svanes K, Søreide O. Survival after peptic ulcer perforation: a time trend analysis. *J Clin Epidemiol*. 1996; 49:1363.
- Walt R, Katschinski B, Logan R, Ashley J, Langman M. Rising frequency of ulcer perforation in elderly people in the United Kingdom. *Lancet* 1986; 3:489.
- Agrez MV, Henry DA, Senthiselvan S, Duggan JM. Changing trends in perforated peptic ulcer during the past 45 years. *ANZ J Surg*. 1992; 62:729.
- Bulut O, Rasmussen C, Fischer A. Acute surgical treatment of complicated peptic ulcer with special reference to elderly. *World J Surg*. 1996; 20:574-7.
- O'Riordain DS, O'Dwyer PJ, O'Higgins NJ. Perforated duodenal ulcer in the elderly patients. *J R Coll Surg Edinb*. 1990; 35:93.
- Kulber DA, Hartunian S, Schiller D, Morgenstern L. The current spectrum of peptic ulcer disease in the older age groups. *Am Surg*. 1990; 1087:737.
- Svanes C. Trends in perforated peptic ulcer: incidence, etiology, treatment, prognosis. *World J Surg*. 2000; 24:277-83.
- Paimela H, Oksala NKJ, Kivilaakso E. Surgery for peptic ulcer today. *Dig Surg*. 2004; 21:185-91.
- Sirinek K, Levine B, Swesinger W. Simple closure of perforated peptic ulcer: Still an effective procedure for patients with delay in treatment. *Arch Surg*. 1981; 116:591-6.