

RESEARCH ARTICLE

Prognostic Scoring and Risk Factor Analysis in Perforated Peptic Ulcer Disease: A Tertiary Centre Study

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ABSTRACT

Background: Perforated peptic ulcer disease (PPUD) is a global health issue with significant morbidity and mortality. This study aims to investigate predisposing factors for PPUD and evaluate the efficacy of the Peptic Ulcer Perforation (PULP) score in predicting patient outcomes at a tertiary care center in Uttar Pradesh.

Methods: This prospective cross-sectional study was conducted over one year and included 53 patients diagnosed with a perforated peptic ulcer. Data on demographics, clinical presentation, comorbidities, laboratory results, and intraoperative findings were collected. The PULP and American Society of Anesthesiologists (ASA) scores were calculated for each patient. Outcomes, including postoperative complications and mortality, were analyzed. Statistical analysis was performed using chi-square and independent t-tests, with a p-value of <0.05 considered significant.

Results: The study population was predominantly male. Mortality was significantly associated with advanced age ($p = 0.027$), with 57.14% of non-survivors being over 60 years old. Comorbidities such as diabetes mellitus and hypertension were significantly more common in non-survivors ($p = 0.029$). Non-survivors had significantly higher heart and respiratory rates and lower systolic blood pressure. Laboratory findings revealed that non-survivors had significantly higher total leukocyte counts, urea, creatinine, and INR levels ($p < 0.05$). Postoperative complications like ARDS, leak, and sepsis were significantly more frequent in the non-survivor group ($p < 0.001$). Higher PULP and ASA scores were strongly correlated with increased mortality ($p < 0.001$).

Conclusion: Advanced age, comorbidities, physiological instability, renal dysfunction, and coagulopathy are key predictors of mortality in PPUD. The PULP score is a reliable and effective prognostic tool for risk stratification. Early identification of these risk factors and prompt intervention are crucial for improving clinical outcomes.

Keywords: Perforated Peptic Ulcer, PULP score, ASA Score, Risk Factors, Mortality

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INTRODUCTION

Peptic ulcer disease (PUD) is a major worldwide health issue, with complications including hemorrhage and perforation that may result in fatal consequences.¹ Perforation is the second most common complication after hemorrhage, contributing significantly to morbidity and mortality.²⁻⁴ Despite advances in medical and surgical management, perforated peptic ulcer (PPU) remains a life-threatening emergency that places a substantial burden on healthcare systems, especially in resource-limited settings.^{3,5} The incidence of PPU is influenced by factors like *Helicobacter pylori* infection, use of non-steroidal anti-inflammatory drugs (NSAIDs), smoking, and socioeconomic status.^{4,5}

Outcomes in PPU are affected by multiple predisposing factors, including advanced age, delayed presentation,

preoperative shock, and existing comorbidities.⁶ Several scoring systems have been developed to predict these outcomes. The Boey score considers preoperative shock, presentation delay (>24 hours), and significant medical illness.^{7,8} The American Society of Anesthesiologists (ASA) physical status classification is a general surgical risk assessment tool also used in PPU patients.⁸ More recently, the peptic ulcer perforation (PULP) score was developed to provide a more comprehensive assessment by including factors like age, shock, comorbidities, and organ failure.⁹

This study was conducted to investigate the predisposing factors for PPUD and evaluate the efficacy of the PULP score in predicting patient outcomes at a tertiary care center in Uttar Pradesh, India.

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Table 1: Distribution of demographic and clinical factors among survivors and non-survivors

Demographic and clinical characteristics	Survivors (n=46)	Non-survivors (n=7)	p-value
Age			0.027
<50	29 (63.04%)	0 (0.00%)	
51–60	12 (26.09%)	3 (42.86%)	
>60	5 (10.87%)	4 (57.14%)	
Gender			1.00
Male	41 (89.13%)	6 (85.71%)	
Female	5 (10.87%)	1 (14.29%)	
Socioeconomic Status			0.876
Lower/Lower Middle	32 (69.57%)	6 (85.71%)	
Middle/Upper	14 (30.43%)	1 (14.29%)	
Comorbidities			
Diabetes	3 (6.52%)	3 (42.86%)	0.029
Hypertension	3 (6.52%)	3 (42.86%)	0.029

Patients and Methods

This prospective cross-sectional study was conducted over one year in the P. G. Department of Surgery at MLN Medical College, Prayagraj, after obtaining ethical clearance from the Institutional Ethics Committee. A total of 53 patients aged 18 to 75 years with a diagnosis of peritonitis secondary to perforated peptic ulcer disease were included after providing informed consent. Patients with malignant perforations, those who died before surgery, or those managed conservatively were excluded.

Upon admission, all patients underwent resuscitation with intravenous fluids and antibiotics. A detailed history was taken, and a clinical examination was performed. Data on demographics, comorbidities, presenting symptoms, preoperative shock, laboratory parameters (hemoglobin,

albumin, total leukocyte count, serum creatinine, INR), and outcomes were collected. The PULP and ASA scores were calculated for all patients.

RESULTS

A total of 53 patients were included, of whom 46 (86.8%) survived and 7 (13.2%) expired.

Patient Demographics and Clinical Factors

The demographic and clinical characteristics of the study population are detailed in Table 1. There was a significant increase in patient mortality with increasing age ($p = 0.027$). The majority of patients were male, but gender did not significantly influence the outcome ($p = 1.00$). Socioeconomic status and occupation also showed no significant impact on survival.

Physiological and Laboratory Parameters

The mean heart rates and respiratory rates were higher in the non-survivor group. Even the mean systolic blood pressure was found to be lower in the non-survivor group. Laboratory findings showed that non-survivors had significantly higher total leukocyte count, urea, serum creatinine, and INR. These findings are summarized in Table 2.

Scoring Systems and Prognostic Predictors

The PULP score and ASA score were strong predictors of mortality ($p < 0.001$). A total of 42.86% of non-survivors had a PULP score of ≥ 7 , compared to only 4.35% of survivors. Similarly, 71.43% of non-survivors had an ASA score of 3, compared to 13.04% of survivors. Preoperative shock and elevated serum creatinine were also significant predictors of mortality (Table 3).

DISCUSSION

Our study identified the key factors which influence the outcomes in patients with PPUD. Our finding that advanced age is a significant risk factor for mortality is consistent with previous research.^{10,11} The higher mortality in elderly patients is likely due to diminished physiological reserves and a higher burden of coexisting comorbidities.

Table 2: Comparison of physiological, laboratory, and outcome parameters.

Parameter	Survivors (Mean $\pm$ SD)	Non-survivors (Mean $\pm$ SD)	p-value
<i>Vital signs</i>			
Heart rate (bpm)	94.54 $\pm$ 11.24	104.26 $\pm$ 14.66	0.046
Systolic blood pressure (mmHg)	112.83 $\pm$ 12.87	96.42 $\pm$ 15.97	0.004
Respiratory rate (breaths/min)	18.80 $\pm$ 2.71	22.10 $\pm$ 3.51	0.006
<i>Laboratory findings</i>			
Total leukocyte count (cells/mm ³)	10123.91 $\pm$ 4150.24	12345.71 $\pm$ 6224.20	<0.001
Urea (mg/dL)	61.11 $\pm$ 31.37	86.86 $\pm$ 27.78	0.046
Serum creatinine (mg/dL)	1.12 $\pm$ 0.69	1.92 $\pm$ 1.05	0.010
INR	1.32 $\pm$ 0.32	1.78 $\pm$ 0.69	0.005
<i>Hospital stay</i>			
Duration of stay (days)	9.76 $\pm$ 2.69	15.14 $\pm$ 5.18	<0.001

Table 3: Comparison of scoring systems and prognostic predictors.

Predictor	Survivors (n=46)	Non-survivors (n=7)	p-value
PULP score			<0.001
< 7	44 (95.65%)	4 (57.14%)	
≥ 7	2 (4.35%)	3 (42.86%)	
ASA Score			<0.001
1 or 2	40 (86.95%)	2 (28.57%)	
3	6 (13.04%)	5 (71.43%)	
Preoperative Shock	3 (6.52%)	3 (42.86%)	0.029
Serum Creatinine >1.47 mg/dL	7 (15.22%)	4 (57.14%)	0.041

The presence of comorbidities, particularly diabetes and hypertension, was strongly associated with mortality, aligning with findings from other studies that identified pre-existing medical conditions as a key determinant of poor outcomes.¹² The physiological stress of sepsis and major surgery is not well tolerated in patients with underlying systemic diseases.

Physiological instability at presentation was a clear marker of poor prognosis, a finding supported by other researchers.¹³ Laboratory markers of organ dysfunction, such as elevated leukocyte count, creatinine, and INR, were also significantly associated with mortality. Renal dysfunction, in particular, is a well-established predictor of adverse outcomes.^{12,13}

The PULP score demonstrated excellent prognostic accuracy in our study, reinforcing findings that have validated it as a superior predictive tool compared to other systems.¹⁴ The components of the PULP score align with the individual risk factors identified in our analysis, confirming its clinical utility for risk stratification. The ASA score also proved to be a valuable predictor in patient outcomes.¹⁴

LIMITATIONS

In this study, we did not factor in the size of perforation. This study was conducted at a single center with a relatively small sample size, which may limit the generalizability of the findings. Further multicenter studies with larger patient cohorts are needed to validate these findings.

CONCLUSION

In patients with PPUD, advanced age, comorbidities like diabetes and hypertension, physiological instability, renal dysfunction, and coagulopathy are significant predictors of mortality. This study confirms the utility and prognostic accuracy of the PULP score as an effective, evidence-based tool for risk stratification. Early recognition of high-risk patients is essential for timely intervention to improve clinical outcomes.

ETHICAL APPROVAL

The study was done after obtaining the ethical clearance from the Institutional Ethics Committee, IEC/MLNMC/2024/TP-26.

Due consent was taken from the patients for participation in the study and for publication of study data.

AVAILABILITY OF SUPPORTING DATA

All the supporting data regarding the study is available to the Authors.

AUTHORS' CONTRIBUTIONS

- Harshit Sharma: Conceptualization, methodology, writing - original draft, Data Compilation, investigation, draft editing.
- Dinesh Kumar: Supervision, critical revisions, validation.
- Ravi Raj Patil: Formal analysis of findings. Oversight of the manuscript submission and compliance with journal guidelines

CONFLICT OF INTERESTS

The authors declare that they do not have any competing interests.

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