

Risk Stratification in Perforated Peptic Ulcer: The Peptic Ulcer Perforation Score

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ABSTRACT

Background: Peptic ulcer is one of the most common diseases among Indian population. It can lead to several complications such as perforation, bleeding, etc., which require prompt diagnosis and treatment to reduce mortality and morbidity. This study aims to stratify the risk in patients with peptic ulcer perforation (PULP) using the PULP score.

Materials and methods: It is a single-center prospective observational study conducted for a period of 1½ years with data collection for 1 year and analysis and write-up for 6 months (June 2017–November 2018). The study involved patients who underwent emergency surgery for perforated peptic ulcer (PPU). The PULP score and the perforation operation time interval are applied to all patients and their outcome is studied.

Results: A total of 71 patients were included in the study; 6 patients died with a mortality rate of 8.5%. The mean PULP score in patients who expired was found to be 9. Complications occurred in 21 patients and the most common complication being the postoperative wound-site infection and acute respiratory distress syndrome (ARDS), which were significantly found in patients with the perforation operation time interval more than 24 hours.

Conclusion: The PULP score is a reliable predictor of morbidity and mortality in patients who were operated for PULPs. The perforation operation time interval is a significant factor in predicting the mortality, complications, and the duration of hospital stay.

Keywords: Mortality, Peptic ulcer, Perforation operation time interval, Risk assessment.

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INTRODUCTION

Peptic ulcer is one of the very common diseases affecting the Indian population. Though generally benign in its course, it can cause dangerous complications like perforation (most common) and bleeding.¹ Perforation occurs in 2–10% of patients suffering from peptic ulcer disease.² Perforation is a life-threatening complication of the peptic ulcer with morbidity rates of 20–50% and mortality rates of 3–40% in surgically treated perforated peptic ulcer (PPU) patients.³ Delay in seeking hospital care or a delay in diagnosis due to atypical presentation can cause sudden deterioration in patients' condition.

Severity grading can help assess the expected postoperative course of a patient and help in readiness to address such needs. Various prognostic factors have been reported for assessing morbidity and mortality of peptic ulcer perforations (PULPs). A few include the Boey score, the American Society of Anesthesiologists (ASA) score, the acute physiology and chronic health evaluation (APACHE) II score, the sepsis score, and the Mannheim's peritoneal index (MPI).^{4–7} However, these scores are not very effective in morbidity and mortality assessment in PULPs.

The PULP score can help in accurate and early identification of high-risk patients with PULPs and thus assist in risk stratification and triage. The prognostic predictors that are included in the PULP score can be identified prior to surgery.^{8,9} The study mainly aims to validate the PULP scoring system in predicting the outcome in patients who are operated for PPU and also to assess the validity of perforation operation interval (POI).

MATERIALS AND METHODS

It is a single-center prospective observational study conducted for a period of 1½ years with data collection for 1 year and analysis and write up for 6 months (June 2017–November 2018). The study

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involved 71 patients who underwent emergency surgery for PPU (Table 1). The PULP score and the perforation operation time interval are applied to all patients and their outcome is studied (Table 2). Any perforations other than PULPs were excluded from the study. Proper institutional and ethical clearance and appropriate consent were obtained from all participants of the study (Table 3). Detailed clinical history and additional history like age, sex, and history of NSAID or steroid drug intake/comorbid illness/malignancy/immunosuppressive illness were obtained (Table 4). Several investigations, namely, complete blood count, liver function tests, serum urea, serum creatinine, and chest X-ray, ECG and viral markers, abdomen X-ray erect, and ultrasound abdomen were done. Patients were assessed for the duration of hospital stay, postoperative course, complications, and mortality (Table 5).

RESULTS

Among 71 patients, 21 (29%) developed postoperative complications with wound infection having the highest incidence (15 patients) followed by septicemia. The PULP score of >7 was associated

with higher morbidity and mortality rates in our study (mortality risk > 25%). Factors like the POI (>24 hours) and severe comorbid illnesses (ASA > 4) were found to be statically significant predictors

of mortality in patients with PULP ($p < 0.05$). Septic shock was the leading cause of mortality (three of six patients). Prolonged hospital stay was also statistically significant in patients with the POI > 24 hours ($p = 0.001$). However, the PULP score did not reach statistical significance in determining hospital stay.

Table 1: Peptic ulcer perforation score

Variables	Points
Age > 65 years	3
Comorbid active malignant disease or AIDS	1
Comorbid liver cirrhosis	2
Concomitant use of steroids	1
Shock on admission	1
Systolic BP < 100 mm Hg	
Heart rate > 100/minute	
Time from perforation to admission > 24 hours	1
Serum creatinine >1.4 or >130 μmol/L	2
ASA scores	
2	1
3	3
4	5
5	7

AIDS, acquired immunodeficiency syndrome; ASA, American Society of Anesthesiologists

DISCUSSION

Peptic ulcer perforation is a surgical emergency that needs immediate intervention. It causes various complications and can cause even death if left untreated. Though several risk factor assessment scores have been used, it's the authors opinion that the PULP score and POI are very good predictors of morbidity and mortality in these situations. Our study had 71 participants with the majority being males and age group 40–60 years. This could be the result of prolonged NSAID usage, chronic smoking, and in some cases drug abuse seen in males in our study population.

The authors want to stress that the general clinical use of the clinical prediction scores is poorly documented in various literature and especially this scenario is also observed in patients with PULP.

The Boey score was used in some studies to assess the mortality risk among patients. However, this score was associated with false-positive prediction reaching 50% and performed less than other available scores. This could be explained because of the lack of prognostic factors on the Boey score.⁹

Table 2: Perforation operation interval vs hospital stay

		Perforation operation interval			Total	p value
		<24 hours	>24–48 hours	>48 hours		
Duration of hospital stay	7–9 days	24	2	0	26	<0.001
	10–13 days	2	29	0	31	
	>13 days	0	4	4	8	
	Total	26	35	4	65	

Table 3: Effect of age on mortality

Outcome	<40 years	41–65 years	>65 years	Total	p value
Expired	0	2	4	6	0.01
Survived	33	28	4	65	
Total	33	30	8	71	

Table 4: Effect of perforation operation interval (POI) on survivability

Outcome	POI			Total	p value
	<24 hours	24–48 hours	>48 hours		
Expired	26	35	4	65	<0.001
Survived	0	2	4	6	
Total	26	37	8	71	

Table 5: Effect of perforation site on survivability

Outcome	Site of perforation			Total	p value
	Duodenal	Gastric	Sealed		
Survived	56	8	1	65	0.621
Expired	6	0	0	6	
Total	62	8	1	71	

The ASA score on the other hand didn't include markers to assess acute disease severity. Markers of sepsis have also not clearly outlined in ASA scores, though the ASA score can play a big role in assessing long-term morbidity and mortality in these patients; the immediate postoperative outcome may not be clearly and accurately predicted by this score.^{10,11}

The authors feel that the PULP score has the most validity among its peers as it includes readily available objective parameters about patient's health status and also adds the performance status of the ASA scoring system. The PULP score can predict and help in risk stratification giving the treating surgeons a window to initiate circulatory and respiratory preoperative stabilization, need for ICU care, and prognosticating the outcome with reasonable accuracy.^{12,13}

In our study we found that 89% of the patients have PULP scores ranging between 0 and 7 and maximum being 10 points with the mean PULP score of 5. None of the patients had score above 10 points.⁵ Around 29% of the patients developed complications with the bulk suffering from surgical-site infections (15%). The next common complication being respiratory complications (10%) in the form of basal atelectasis and pneumonic consolidation. Death occurred in six patients with a mortality rate of 8.5%. The causes of death were acute respiratory distress syndrome (ARDS)/pneumonia, septicemia, and multiorgan dysfunction syndrome (MODS). Most patients died due to septicemia and MODS, and death had direct relationship with their PULP scores and the perforation operation time interval. Most of the patients died within the 6th postoperative day.

The POI had a profound influence on hospital stay in our study. The hospital stay for patients with POI < 24 hours was mostly between 7 days and 9 days, mostly between 10 days and 12 days for patients with POI between 24 hours and 48 hours, and more than 13 days for POI > 48 hours. This can be explained as a result of preoperative decompensation and onset of sepsis in such patients due to delay in seeking health care or a delayed diagnosis. We hope that this correlation helps us make rapid decision making and initiate supportive care as early as possible. The POI > 48 hours also has a statistically significant relationship with increased mortality.

A PULP score of greater than 7 was also found to be associated with higher mortality rates with a mortality risk of 25% and above. This observation is similar to other studies.¹³⁻¹⁶

This study has several limitations. This was a single-center study catering to a single demographic outlet. The sample size was small. The mean age group was greater than 40 years, adding comorbid illness as an important parameter in influencing the outcome of these patients. Long-term follow-up was not done.

CONCLUSION

The perforation operation time interval is a significant factor in predicting the mortality and morbidity in patients with PPU. The hospital stay can be better anticipated with the perforation operation time interval and the PULP score is an accurate and significant predictor of mortality and morbidity in patients with PPU. The POI more than 48 hours and PULP scores more than 7 points have increased mortality and morbidity rates.

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