A STUDY TO COMPARE PULP SCORE, ASA SCORE AND BOEY SCORE FOR PREDICTING MORTALITY IN PATIENTS WITH PERFORATED PEPTIC ULCER

Surgery

Dr Asif Meman*	Resident doctor, Department of surgery, SMIMER Hospital-Surat *Corresponding Author
Dr Harish Chauhan	Additional prof., Department of surgery, SMIMER Hospital-Surat
Dr Birju Patel	Resident doctor, Department of surgery, SMIMER Hospital-Surat

ABSTRACT

BACKGROUND: Peptic ulcer disease is the most common disease among the Asian population. Perforation of the peptic ulcer being the second most common complication next to bleeding, continues to be real emergencies in surgery, which requires prompt diagnosis and immediate surgical management to save the patients life. A large number of prognostic factors for morbidity and mortality following PPU have been characterized and a number of clinical prediction scoring systems proposed, yet none has appeared to be superior and most have been investigated in isolation

AIMS: To compare PULP score, ASA score and Boey score for predicting the 30 day mortality in patients with perforated peptic ulcer based on several clinical parameters

METHODOLOGY: A prospective observational study was conducted at the Department of General Surgery, SMIMER Hospital-surat during the period from January 2018 to December 2018. 102 patients were operated for perforated peptic ulcer in the given time interval and total 95 patients were evaluated in the study . All patients underwent emergency exploratory laparotomy with primary closure of peptic perforation along with omentopexy. Risk stratification using PULP Score, ASA score, Boey score noted.

RESULTS: A total of 102 patients were operated for perforated peptic ulcer disease and 95 were selected for the study. 18 (18.95%) out of total 95 postoperated patients died within 30 days of surgery. PULP score shows high odds ratio , AUC value and having both fair sensitivity and specificity to predict mortality risk in perforated peptic ulcer(PPU) compare to ASA score and Boey score.

CONCLUSION: The PULP score predicted mortality risk better than the ASA score and the Boey score

KEYWORDS

perforated peptic ulcer (PPU), PULP score, ASA score, Boey score

INTRODUCTION

Perforation of a peptic (gastric or duodenal) ulcer is a potentially fatal surgical emergency that remains a formidable health burden worldwide(1). The global prevalence of peptic ulcer disease has decreased in recent decades(2). The estimated prevalence of peptic ulcer disease ranges from 5 to 15% in western populations(6). With the introduction of anti–bacterial therapy to eradicate *Helicobacter pylori* and proton pump inhibitors (PPIs), the role of elective surgery for peptic ulcer (PU) disease has decreased, although complications of peptic ulcer disease such as perforation and bleeding have remained fairly constant(2). Perforation is the most frequent complication after bleeding but has the highest mortality rate of any complication of ulcer disease(10). Variations in the clinical presentation as well as delay in diagnosis and work-up at admission to the hospital may potentially cause a worsening of symptoms and a deterioration of the clinical condition of the patient, with a detrimental outcome. Accurate and early identification of such patients can assist in risk stratification and triage to determine the timing and extent of pre-operative respiratory and circulatory stabilization, post operative admission to a high dependency unit (HDU), the level and extent of monitoring and inclusion in specific perioperative care protocols(11). A large number of prognostic factors for morbidity and mortality following PPU have been characterized and a number of clinical prediction scoring systems proposed, yet none has appeared to be superior and most have been investigated in isolation(9). Among the scoring systems used for predicting the 30 day mortality in patients with perforated peptic ulcer, the most frequently used are the Boey score and The American Society of anaesthesiologists (ASA) physical status classification system(3). PULP scoring system has been recently introduced for prediction of outcome of peptic ulcer perforation patients. The contemporary risk prediction in Peptic ulcer perforation (PPU) patients is less well investigated with no universally agreed 2 standard by other scoring systems like ASA score and Boey score and an optimal way of outcome prediction in this patient group is not known(3). The present study was conducted to compare the efficacy of PULP score with these more frequently used scoring systems (ASA and Boey score) to compare 30 day mortality in patients with perforated peptic ulcer(PPU).

AIMS AND OBJECTIVES

1. To compare PULP score, ASA score and Boey score for predicting the 30 day mortality in patients with perforated peptic ulcer based on several clinical parameters like-Age, Comorbid systemic illness,Time delay to surgery, Preoperative shock, Concomitant use of steroids, Serum creatinine levels
2. Mortality risk stratification among patients following surgical treatment for perforated peptic ulcer
3. 30day mortality rate after surgical intervention of PPU at our institution

MATERIAL AND METHODS

A prospective observational study was conducted at the Department of General Surgery, SMIMER Hospital-surat during the period from January 2018 to December 2018**.** All the patients admitted and satisfying the inclusion criteria with the diagnosis of perforated peptic ulcer were included in the study. 102 patients were operated for perforated peptic ulcer in the given time interval. 7 patients were excluded from the study due to missing data from the records and inadequate history. Ultimately, a total of 95 patients were evaluated in the study. A detailed history of dyspepsia, epigastric pain, drug intake of NSAIDS, waxing and waning of symptoms with smoking and alcohol intake were all taken into consideration. Any existing co morbid condition as diabetes, tuberculosis, respiratory, cardiovascular or renal diseases were taken for prediction of outcome. Detailed physical examination and hydration status were given due cosideration and per abdominal examination including tenderness guarding rigidity and rebound tenderness were recorded at the time of admission. Emergency investigations included complete haemogram, random blood sugar, Serum electrolytes, blood urea and serum creatinine and radiological investigation of X ray Chest, X ray abdomen along with USG abdomen and ECG were recorded prior to patient taken up for definitive surgical procedure. Risk stratification using PULP Score, ASA score, Boey score noted. Postoperative period is observed for any complications and follow up done. The preferred surgical procedure in our institution is an open primary closure of the perforation by interrupted sutures covered with a pedicled omentoplasty

INCLUSION-CRITERIA

1. All patients more than 18 years of age diagnosed and operated for benign gastric or duodenal ulcer.
2. All Patients who were ready to give informed consent for the study.

EXCLUSION-CRITERIA

1. All operated patients in which histopathology of perforation

margin was suggestive of malignant ulcer
2. All patients who were conservatively treated for peptic ulcer perforation.
3. Patients who died before any surgical intervention was done.

RESULTS
A total of 102 patients were operated for perforated peptic ulcer disease. 7 patients were excluded due to missing data and 95 were selected for the study. All patients underwent emergency exploratory laparo-tomy with primary closure of peptic perforation along with omentopexy. Histopathological exam-ination of the resected perforation margin did not show any evidence of malignancy in any of the patients. 18 (18.95%) out of total 95 post-operated patients died within 30 days of surgery.

American Society of Anaesthesiologists (ASA) Physical status: The 30 day mortality rate for ASA physical status > 3 group (ASA 4 and 5) was 22.29 % and for ASA physical status ≤ 3 was 03.03 % .Odds Ratio for ASA physical status: Risk of death within 30 days of surgery for ASA physical status > 3 group (ASA 4 and 5) was 9.180 times more than that for ASA physical status ≤3 group. ROC curve showed AUC of 0.590 with a sensitivity and specificity of 97.22% and 20.78% respectively.

BOEY physical status: The 30day mortality rate for patients in high risk category of Boey score (>1) was seen to be 68.97% as well as for low risk (< 1) category it was 09.94%.Odds Ratio for BOEY Score**:** The risk of mortality within 30 days of operation in patients with high risk group of Boey score is 20.139 times than the patients in low risk group. ROC curve**:** Area under curve for Boey score showed values of 0.747 with a sensitivity of 55.56% and specificity of 93.51%.

PULP Score : A total of 24 patients were noted in PULP score high risk group (score 8-18), with a 30 day mortality rate of 54.17% (13 patients) and 71 patients in low risk group (score 0-7) with a 30 day mortality rate of 07.04% (5 patients) Odds Ratio for PULP Score**:** Patients in high risk group of PULP score had a 15.600 times more risk of 30 day mort-ality than the patients in low risk group. ROC curve**:** An AUC of 0.804 was indicated by the ROC curve analysis with sensitivity 75.00% and specificity 85.71%.

30 Day mortality: Out of a total of 95 patients taken in present study, 18 died within 30 days of surgery done for perforated peptic ulcer. So a 30 day mortality rate of surgically intervened patients with PPU at this institution was calculated to be 18.95%

Comparison of mortality risk prediction scores:

Score	Odds ratio	Sensitivity (%)	Specificity (%)	AUC value
PULP	8.299	75.00	85.71	0.804
Boey	4.840	55.56	93.51	0.747
ASA	-	97.22	20.78	0.590

PULP score had more odds ratio (8.299), than the Boey score (4.840) on multivariate analysis.ASA score did not show any significant association to 30 day mortality on multivariate analysis. PULP score showed both fair sensitivity and specificity, Boey score had good specificity but low sensitivity and ASA score had good sensitivity but poor specificity. Based on these observations PULP score was found to perform better than the Boey score and ASA score in the present study.

DISCUSSION
Comparison of Association between PULP score and Mortality in different Studies: The odds ratio for PULP score in the present study was calculated to be 15.6 which is similar to the results of the studies by Thorsen et al(3) and Anbalakan et al(4),their ratios being 18.6 and 11.5 respectively. The AUC value for PULP score was also found to be 0.804 and was considerably similar in the comparison studies by Thorsen et al(3), Moller et al(5), Anbalakan et al(4), Nichakankitti et al(8), their values being 0.79, 0.75, 0.83, 0.78. The sensitivity and specificity of the PULP score in the present study was 75% and 85.71% respectively. The sensitivity and specificity of the PULP score in the study by Thorsen et al(3) was 92.9% and 58.3%. The better sensitivity in the latter was explained by the use of lower cut off value for high risk (>6 high risk)

Comparison of Association between BOEY score and Mortality in different Studies: The odds ratio for Boey score in the present study was calculated to be 20.139 ,which is quite high than the other comp-

arison studies of Thorsen et al(3) and Moller et al(5) , with score values5 and 8.63 respectively. Comparison of AUC values of present study (0.747) to the studies of Thorsen et al(3) AUC(0.75), Anbalakan et al(4) AUC(0.72), Moller et al(5) AUC(0.70), Nichakankitti et al(8) AUC(0.728), revealed comparable results. The sensitivity and specificity of the Boey score in the present study was 55.56% and 93.51% respect-tively. This was similar to the sensitivity and speci-ficity of the Boey score in study by Thorsen et al(3) that were 64.3% and 94.3%.The Boey score does not comprise any prognostic factors related to patient age or concomitant medication use that are otherwise well-established prognostic factors in PPU, which could be one explanation for the lower accuracy of the Boey score

Comparison of Association between ASA score and Mortality in different Studies: In the present audit the odds of mortality were 9.180 times higher with ASA physical status class 4 and 5.The Interpr-etation of Odds Ratio (10) and (11.6) for ASA physical status 3, 4 and 5, by Anbalakan et al(4) and Thorsen et al(3) showed similar results. In the present study, 82.63 % patients were stratified as high risk (ASA class 4 and 5) in contrast to 42.44% patients who were classified as high risk (ASA Class 3,4 and 5).This explains the sensitivity of the ASA score calculated in the present study as 97.22% and specificity as low as 20.78% The sensitivity and specificity of ASA score in study by Thorsen et al were 64.3% and 94.4%, respectively

COMPARE SCORES: The result of the present study illustrated better performance of PULP score than the other two scores. Thorsen et al(3), Moller et al(5) , Nichakankitti et al(8,) Anbalakan et al(4), concluded that PULP score is better.

The Boey score consists of only three parameters. Consequently, it does not include many of the other existing and well-examined prognostic factors for adverse outcome in PPU, e.g. old age, tachycardia, and acute renal failure (7). The ASA score has been known for its subjectivity and the wide inter observer variability. The explanation for the inferior performa-nce of the ASA score could be due to the fact that ASA score is not specifically designed for PPU patients and only accounts for the pre-morbid status of the patient. Even though the PULP score achieved both higher OR and AUC values, the Boey score is a much simpler score with higher clinical usefulness than the more complex PULP score(3). The PULP score takes advantage of combining readily available objective predictors related to the patient's baseline health status and acute disease severity and combines these predictors with the performance of the ASA and Boey scoring systems(5)(9).

SUMMARY
The present study included 95 patients operated for perforated peptic ulcer at Department of General Surgery, SMIMER hospital-surat The overall male to female ratio was 3.5:1. Mortality rate for elder patie-nts was higher than the younger ones. High values of both ASA physical status, Boey score and PULP score surgical risk patients were identified as risk factors for poor outcomes. However, out of the three mortality risk prediction scores, the performance of PULP score was better than the Boey score and ASA score. PULP score also had both fair sensitivity and specificity in the present study. Old age, High creatinine value, Time delay to surgery > 24 hours, Preoperative shock and presence of preoperative morbidities were identified as significant risk factors for poor prognosis after surgery for PPU. No signific-ant association was found between Sex, use of NSAIDS or Steroids, active malignant disease/ HIV and mortality.

CONCLUSIONS
In conclusion, this study evaluated a limited number of mortality risk assessment tools used frequently in day to day practice. It confirmed the importance of mortality risk stratification models in judging the prognosis of postoperative patients of PPU.

The PULP score, although being more complex, predicted mortality risk better than the ASA score and the Boey score. Elderly population, high creatinine, time delay to surgery > 24 hours, preoperative shock and pre-existing medical illness can predict the risk of postoperative 30 day mortality. Sex, use of NSAIDS or Steroids, active malignant disease/ HIV have no role in risk prediction of mortality.

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