

Original Research Article

DOI: <https://dx.doi.org/10.18203/2349-2902.ijssj20210054>

Comparative study between POMPP score versus Boey score to predict morbidity and mortality in peptic perforation peritonitis

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Received: 24 December 2020

Revised: 05 January 2021

Accepted: 06 January 2021

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ABSTRACT

Background: Peptic ulcer disease (PUD) results from an imbalance between stomach acid-pepsin and mucosal defense barriers. It affects 4 million people worldwide annually. Peptic ulcer perforation is one of the most common surgical emergencies and is associated with a high rate of morbidity and mortality. This is due to presence of various risk factors among the population like *H. pylori* infection, long term NSAID use, alcohol ingestion, smoking and steroid use. Peptic ulcer perforation peritonitis usually requires an emergency surgical intervention and hence the need for this study, to compare POMPP and Boey scores as predictors of morbidity and mortality in patients with peptic perforation peritonitis.

Methods: This prospective observational study was conducted in the hospitals attached to Bangalore Medical College and Research Institute from November 2018 to May 2020. All patients above 18 years with features of hollow viscus perforation with per-operative finding of perforated peptic ulcer were included in the study. Patients with histopathology suggestive of malignancy were excluded.

Results: A total of 65 patients were included in the study. On analysis of the data by Chi-square test, P value of both POMPP and Boey scores was found to be <0.05 which is statistically significant. The most important predictive factors of mortality and morbidity were duration of perforation >24 hours, age >65 years and pre-operative shock.

Conclusions: Both scoring systems are easy to use and can assist in accurate and early identification of high-risk patients and are important in predicting mortality and morbidity in patients with peptic ulcer perforation.

Keywords: Peptic ulcer perforation, Perforation peritonitis, POMPP and Boey scores

INTRODUCTION

Peptic ulcer disease results from an imbalance between stomach acid-pepsin and mucosal defense barriers. It affects 4 million people worldwide annually. The incidence of Peptic ulcer disease has been estimated at around 1.5-3%. Although 10-20% of patients with Peptic ulcer disease will experience complications, only 2-14% of the ulcers will perforate causing an acute illness.¹

Peptic ulcers are erosions in the gastric or duodenal mucosa that extend through the muscularis mucosae. They may be acute or chronic and are caused by an

imbalance between mucosal defenses and acid/peptic injury. Peritonitis due to peptic ulcer perforation constitutes one of the most common surgical emergencies worldwide and is associated with a high rate of morbidity and mortality.⁶

This is due to the persistence of various risk factors among the general population like *Helicobacter pylori* infection, long term NSAID use, excessive alcohol ingestion, smoking and steroid use. Protective factors include mucosal bicarbonate secretion, mucus production, good blood flow, growth factors, cell renewal, and endogenous prostaglandins.¹⁰

The BOEY score was one of the first scores directly aimed at mortality prediction for perforated peptic ulcer. This study reaffirms the value of three independent variables-severe medical illness, preoperative shock and long-standing perforations-in identifying high risk patients with perforated ulcers.²

Boey score⁸

Boey's score is simple and easy to apply but does not take into account other physiological factors which have a significant role in predicting the patient's condition and is less accurate.

Table 1: Boey's score.

Variables	Points
Concomitant medical illness	1
Pre-operative shock	1
Duration of perforation >24 hours	1

Total score - 3; High score - >1.

Table 2: Risk of mortality in Boey's score.

Risk factors	No. of risk factors	Risk of mortality (%)
Pre-operative BP <90 mmHg	0	0
	1	10
Delayed presentation >24 hours	2	45.5
Major medical illness present	3	100

The POMPP (predictive score of mortality in perforated peptic ulcer) score is a new and easily applicable scoring system to predict mortality in PPU patients. They believed that three very clear parameters (age, albumin and BUN) can be easily adopted in the clinical practice to predict the surgical mortality of PPU patients.³

POMPP score⁹

The predictive score of mortality in perforated peptic ulcer (POMPP score) is a new and easily applicable scoring system to predict the postoperative mortality rate in patients with peptic ulcer perforation.

Table 3: POMPP score.

Variables	Points
Age >65	1
Bun >45 mg/dl	1
Albumin <1.5 g/dl	1

Total score - 3; High score - >1.

Hence the need for this study, to compare POMPP score and Boey score as predictors of morbidity and mortality in patients with peptic perforation peritonitis and to

stratify peptic ulcer patients into low and high-risk categories.

METHODS

A prospective observational study was conducted on patients presenting to the hospitals attached to Bangalore Medical College and Research Institute, Bengaluru with features suggestive of hollow viscous perforation and intraoperative findings suggestive of peptic ulcer perforation from November 2018 to May 2020.

All patients >18 years and willing to give informed consent presenting with features of hollow viscous perforation with per operative finding suggestive of perforated peptic ulcer were included in the study. Patients excluded were those whose histopathology reports were suggestive of malignant ulcer.

The patients who underwent surgical treatment for perforated peptic ulcer were allotted points according to the POMPP and Boey's scoring systems after history taking, physical examination, basic pre-operative investigations and radiological imaging. The patients were classified into high risk or low risk categories and followed up accurately to predict the mortality and morbidity within 30 days post operatively.

Statistical Analysis – the data was analyzed by descriptive statistical principles and all the data is expressed as Mean, Median, SD, Interquartile Range, Percentages, Tables and Graphs wherever necessary. Risk stratification was done using POMPP score and Boey score into high and low risk groups. Chi square test was used to measure the association between the POMPP and Boey score with mortality and morbidity and these are expressed as frequency and percentage and it is used to see the significant difference between groups. P<0.05 was considered statistically significant.

Estimation of sample size:

The sample size calculation is given by the formula:

$$n = Z_{\alpha/2}^2 \times Sn / (100-Sn)$$

$$L^2 \times \text{Prevalence}$$

Where $Z_{\alpha/2}$ = Standard table value for 95% CI = 1.96

Sn = Sensitivity

L = 5% of P = Precision

Prevalence

Based on a previous study by Ebru et al, 82.6% has sensitivity for mortality in POMPP score >1 and lifetime prevalence of perforation in peptic ulcer patients is 5%.⁶

Therefore, $n = \frac{1.96^2 \times 82.6 \times (100-82.6)}{4.13^2 \times 5} = 64.73$

$$4.13^2 \times 5$$

Therefore, $n = 65$.

RESULTS

A total of 65 patients were included in the study. Peptic ulcer perforation was found to be most common in the age group of 20-40 years with a mean age of 43.5. It was more common in males than females. A total of 4 patients died and the mortality rate in this study was 6.2%.

The common complications encountered in the study are elucidated below.

Table 4: Distribution of complications in the study population.

Complications	No. of patients	Percentage
Yes	28	43.1
No	37	56.9
Total	65	100.0

Table 5: Complications encountered in the study population.

Complications	No. of patients	Percentage
Wound infection	25	38.5
Pulmonary infection	3	4.6
ICU care	9	13.8
Wound dehiscence	1	1.5
Anastomotic leak	1	1.5

All patients were allotted points based on the two scoring systems. On analysis of the data by Chi-square test, P value of both POMPP and Boey scores was found to be <0.05 which is statistically significant. The most important predictive factors of mortality and morbidity were duration of perforation >24 hours, age >65 years and pre-operative shock and hypoalbuminemia, concomitant medical illness and a serum albumin level <1.5 g/dl.

Table 6: Correlation of Boey's score and outcome.

Outcome	Boey's score		Total	P value
	Low risk	High risk		
Death	1	3	4	
Discharge	45	16	61	0.03775
Total	46	19	65	

Table 7: Correlation of POMPP score and outcome.

Outcome	POMPP		Total	P value
	Low risk	High risk		
Death	1	3	4	
Discharged	59	2	61	<0.00001
Total	60	5	65	

DISCUSSION

Peptic ulcer disease had a tremendous effect on morbidity and mortality until the last decades of the 20th century, following which there was a fall in its incidence. This is due to two main reasons: the discovery of effective and potent acid suppressants, and of *Helicobacter pylori*. The role of surgery in the treatment of peptic ulcer disease has also shown a decreasing trend, primarily caused by marked decline in elective surgical therapy for chronic disease because of the advent of proton pump inhibitors and the treatment for *H. pylori*, though the percentage of patients who require emergency surgery for complicated diseases still remains constant. Mortality and morbidity following perforated peptic ulcer is substantial and mortality proportions of 25-30% have been reported in population-based studies.⁷

In our study, we found that peptic ulcer perforation was more common in the third and fourth decade and the mean age was found to be 43.5 which is comparable to studies by Kocer et al and Dakubo et al.^{4,5}

In our study 45 patients had undergone surgery 24 hours after the onset of the symptoms and 9 patients were in shock at the time of surgery, out of these 4 patients expired.

Mortality was 6.7% in patients who underwent surgery 24 hours after the onset of the symptoms and 44.4% in patients with shock at the time of admission. Time of surgery and shock at the time of presentation/admission significantly affects post-operative mortality as most of the patients who expired had undergone surgery 24 hours after the onset of the symptoms and 9 of the patients had shock on admission. All of the patients that expired presented in shock. Delay in surgery caused increased bacterial peritonitis and led to septicaemia.

The Boey and POMPP scoring systems both had a P value <0.05 which is considered to be statistically significant. In our study, both these scores showed almost equal effectiveness in predicting mortality and morbidity in patients with peptic ulcer perforation.

The prognostic predictors included in the Boey score and POMPP score can be easily obtained and applied and it is feasible to apply this in the Indian healthcare system. Both POMPP and Boey's score can assist in accurate and early identification of high-risk patients and thus assist in

risk stratification and triage of patients with peptic ulcer perforation and also in timely referral of high-risk cases from peripheral centres with limited resources, admission to the ICU, the level and extent of monitoring and inclusion in specific peri-operative care protocols.

Limitations of the study

The major limitation of the study is the sample size of 65 patients due to time constraints and difficulties in patients' follow up. Also, patient nutritional status and BMI are not taken into account which might influence postoperative complications.

CONCLUSION

Peptic ulcer perforation is one of the most common surgical emergencies associated with a high mortality and morbidity rate. Peptic ulcer perforation was found to be most common in the age group of 20 to 40 years with a mean age of 43.5. Peptic ulcer perforation was more common in males than females in the ratio 8.3:1. It was observed that the post-operative mortality was 6.2%. On further analysis of the data, it was found that the most important predictors of morbidity and mortality were all 3 predictive factors of the Boey score and 2 of the predictive factors of POMPP score, namely: duration of perforation >24 hours, age >65 years, pre-operative shock, concomitant medical illness and albumin <1.5 g/dl. Out of these, the most important predictive factor was found to be duration of perforation >24 hours when mortality and morbidity were considered. Shock at the time of admission was also found to be an important risk factor and all patients who died had preoperative shock. The mortality was more in patients aged >65 years. No deaths were seen in younger age group patients.

On analysis of the data by Chi-square test, P value of both POMPP and Boey scores was found to be <0.05 which is statistically significant. Thus, both these scoring systems can assist in accurate and early identification of high-risk patients and are important in risk stratification and predicting mortality and morbidity in patients with peptic ulcer perforation.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Bhanu Prakash KR, Patil S, Mohan M. Comparative study between POMPP score versus Boey score to predict morbidity and mortality in peptic perforation peritonitis. *Int Surg J* 2021;8:543-6.