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Validation of Pre-Operative BOEY's Score for Post-Operative Outcomes of Duodenal Ulcer Perforation: A Study at a Tertiary Care Hospital in Khyber Pukhtunkhwa

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Declaration
Authors' Contribution
SE: Conceptualization. **SE, KA, MT:** Methodology. **SE, SR, SS:** Data Collection. **SE, SZ, SR:** Formal Analysis. **SE, MK, SS:** Discussion. **SS:** Writing Review and Editing.

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ABSTRACT

Introduction: The lifetime prevalence of peptic ulcer disease, once estimated to be 5-10%, has steadily declined over the past three decades. This study will not only report recent data for local and international practitioners but also serve as a validation of Boey's score in our population. **Objective:** To assess the frequency of in-hospital morbidity and mortality following peptic ulcer perforation repair based on preoperative Boey's score. **Methods and Materials:** A Descriptive Case series was conducted in Surgical B unit, Lady Reading Hospital, Peshawar, from January 2022 to December 2024. We conducted this study on 71 patients aged between 18 and 60 years, of both genders, with peptic ulcer perforation. The frequency of morbidity and mortality was assessed based on Boey's score. **Results:** The mean age of the patients was 38.49 ± 11.59 years. The frequency of morbidity in patients with Boey's score 0 was 1 (1.9%), with score 1 was 2 (50%), with score 2 was 5 (83.2%), and with score 3 was 8 (88.9%). The frequency of mortality in patients with Boey's score 0 was 1 (1.9%), with score 1 was 1 (25%), with score 2 was 2 (33.3%), and score 3 was 4 (44.4%). **Conclusion:** From our study we conclude that based on preoperative Boey's score 0, 1, 2 and 3 the frequency of morbidity was 1 (1.9%), 2 (50%), 5 (83.2%) and 8 (88.9%) respectively while mortality was 1 (1.9%), 1 (25%), 2 (33.3%) and 4 (44.4%) respectively following peptic ulcer perforation.

INTRODUCTION

The lifetime prevalence of peptic ulcer disease, once estimated to be 5-10%, has steadily declined over the past three decades. This decline is more significant in developed countries compared to developing countries. [1]. The case fatality rate of common complications like bleeding and perforation remains constant. Overall, the mortality rate of 19.3% as a result of complications has been mentioned in one extensive study [2]. Other studies have cited rates as high as 30-40% [3, 4].

Duodenal ulcer perforation is a surgical emergency and a common complication of peptic ulcer disease. It presents as intense epigastric pain of recent onset, usually with a history of peptic ulcer. History and clinical examination, aided by erect X-ray abdomen and ultrasound, are utilized to diagnose the pathology [3, 5]. Early diagnosis, resuscitation, and urgent surgical intervention are of the utmost importance. Exploratory laparotomy and omental patch repair remain the gold standard, but there is a recent trend towards laparoscopic repair [4]. Outcomes of laparoscopic surgery remain comparable to open surgery up to this point [6].

Various prognostic factors have been identified to predict outcomes of perforated peptic ulcer disease. These have been used to formulate various scoring systems for prognostication [7]. Among these scoring systems, Boey's score is an easy and accurate tool for prognosis [8]. Boey's score utilizes three factors: concomitant medical illness, preoperative shock, and duration of perforation more than 24 hours. Each factor scores 1 point, [9].

Despite all developments, the mortality and morbidity of peptic ulcer perforation remain high. Overall, recent studies cite an in-hospital mortality rate of about 13.5%, as cited by Sazhin et al. in their study. In their comparison of various scores used for prognostication of perforated peptic ulcer disease, Boey's score performed the best (AUC = 0.932 (95% CI: 0.884–0.980), sensitivity + specificity = 1.773, and the accuracy = 88.9% with the cut-off value ≥ 2 points). They also reported an overall morbidity rate of 27.5% 10. Koirala et al found an overall mortality of 15%,

which correlated with increasing Boyer's score. Similar findings have been reported by other studies, which found increased Boey's score to be a strong predictor of morbidity and mortality [2, 11].

The rationale of our study is to fill the population gap, as no such study has been conducted in our locality. This study will not only report recent data for local and international practitioners but also serve as a validation of the Boey score in our population. This study aims to record the postoperative outcomes of duodenal ulcer perforation as a whole and its correlation with preoperative Boey's score.

MATERIALS AND METHODS

SETTING: Surgical Department, Lady Reading Hospital, Peshawar

STUDY DESIGN: Descriptive Prospective observational study.

DURATION: January 2022 to December 2024

SAMPLE SIZE: Sample size will be 71, keeping in view the results of Sazhin et al. with a 13.5% in-hospital mortality rate expected, keeping confidence level at 95% and margin of error at 8%. [10]

SAMPLING TECHNIQUE: The sampling technique is non-probability consecutive sampling.

Inclusion Criteria

The inclusion criteria include the following.

- 18- to 60-year-old
- Both genders
- Patients with peptic ulcer perforation

Exclusion Criteria

The exclusion criteria include the following

- Patients with a history of previous laparotomy.
- Patients with a duodenal perforation due to causes other than peptic ulcer disease.

Data Collection Procedure

After approval from the institutional ethical committee. All patients presenting to the general surgery emergency department at Lady Reading Hospital, Peshawar, with suspected perforated duodenal ulcers were evaluated by a senior consultant. A thorough history, physical examination, resuscitation, and investigations, as dictated by the patient's condition, will be performed. If suspected by the above, the patient was prepared for surgery. Informed written consent was taken from all the participants, both for the surgical procedure to be performed on them & their inclusion in the study. Patients' names, age, gender, and preoperative Boey's score were calculated. Prophylactic antibiotics were given before induction, and laparotomy via upper midline incision was made. An omental patch repair was performed. Postoperatively, the patient was shifted to the post-anesthesia care unit and then to the ICU/HDU or wards according to patient condition. Any post-surgical in-hospital complication, including death of the patient, was recorded.

Data Analysis

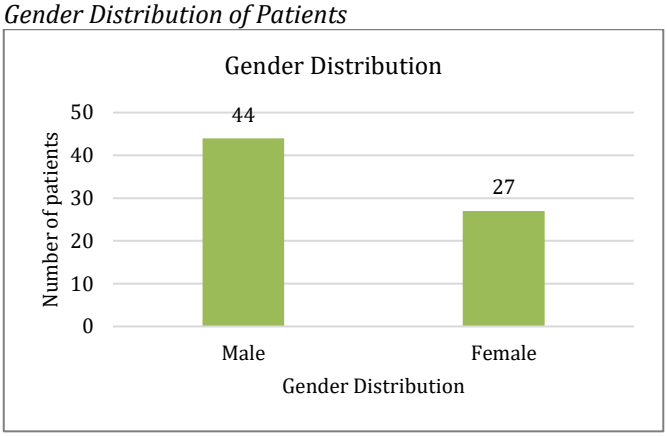
Data were stored and analysed in SPSS version 26. Mean + SD were calculated for continuous variables like age. Frequencies and percentages were calculated for categorical variables like gender, overall, in-hospital mortality, and morbidity. Frequency of mortality and morbidity was reported for each score (0, 1, 2, 3). An additional comparison of the score groups was done using the chi-squared test to look for statistically significant differences in mortality and morbidity among patients with different scores. All results were presented in the form of a table and graphs.

RESULTS

This study was conducted on 71 patients with peptic ulcer perforation. The mean age of the patients was 38.49±11.59 years. According to gender distribution, there were 44 (62%) male patients and 27 (38%) female patients in our study Figure 1.

Figure 1

Gender Distribution of Patients



The frequency of morbidity in patients with Boey's score 0 was 1 (1.9%), patients with score 1 were 2 (50%), patients with score 2 were 5 (83.2%), and score 3 were 8 (88.9%). There was a significant association between morbidity and Boey's score. The frequency of morbidity in our study was 16 (22.5%) (Table 4). The frequency of mortality in our study was 8 (11.3%) (Table 1).

Table 1

Comparison of Morbidity using Boey's Score

		Morbidity		Total	P value
		Yes	No		
Boey's score	0	1 1.9%	51 98.1%	52 100.0%	0.0001
	1	2 50.0%	2 50.0%	4 100.0%	
	2	5 83.3%	1 16.7%	6 100.0%	
	3	8 88.9%	1 11.1%	100.0%	
Total		16 22.5 %	55 77.5%	71 100.0%	

The frequency of mortality in patients with Boey's score 0 was 1 (1.9%), patients with score 1 were 1 (25%), patients with score 2 were 2 (33.3%), and score 3 were 4 (44.4%). There was a significant association between mortality and Boey's score (Table 2)

Table 2

Comparison of Mortality using Boey's Score

	Mortality		Total	P value
	Yes	No		
0	1	51	52	0.0001

		1.9%	98.1%	100.0%
Boey's score	1	1 25.0%	3 75.0%	4 100.0%
	2	2 33.3%	4 66.7%	6 100.0%
	3	4 44.4%	5 55.6%	9 100.0%
Total		8 11.3 %	63 88.7%	71 100.0%

DISCUSSION

This study assessed the post-operative results of duodenal ulcer perforation based on pre-operative Boey's score among patients at a tertiary care hospital in Khyber Pakhtunkhwa. The results show a strong link between elevated Boey's scores and negative post-operative outcomes, such as increased morbidity, extended hospital stays, and mortality.

Our findings reveal that, according to pre-operative Boey's scores of 0, 1, 2, and 3, morbidity rates were 1 (1.9%), 2 (50%), 5 (83.2%), and 8 (88.9%) respectively, while mortality rates were 1 (1.9%), 1 (25%), 2 (33.3%), and 4 (44.4%) respectively after peptic ulcer perforation. Agarwal et al. reported that the mortality rate increased progressively with the Boey score: 1.9%, 7.1%, 31.7%, and 40% for scores of 0, 1, 2, and 3, respectively ($p < 0.001$). Correspondingly, the morbidity rates for Boey scores of 0, 1, 2, and 3 were 13%, 45.7%, 70.7%, and 73.3% ($p < 0.001$). Another study by Losiriwat indicated that the mortality rate correspondingly rose with higher Boey scores: 1%, 8% (OR=2.4), 33% (OR=3.5), and 38% (OR=7.7) for scores of 0, 1, 2, and 3 ($p<0.001$). The morbidity rates for Boey scores 0–3 were 11%, 47% (OR=2.9), 75% (OR=4.3), and 77% (OR=4.9), respectively ($p<0.001$).

A study conducted by Thorsan et al. found that of ten scoring systems evaluated, only Boey's and the ASA scoring system were validated, while the Peptic ulcer perforation score requires further confirmation. Adverse outcomes in PPU are linked to factors such as older age, serious medical conditions, perioperative hypotension, and delays in diagnosis and treatment. Surgical interventions should not be postponed in patients experiencing general peritonitis, as each hour of delay heightens the mortality risk. It is vital to categorize patients based on their morbidity and mortality risk to enhance PPU management and outcomes, enabling high-risk patients to receive more tailored treatment and improved intensive care.

A prospective observational study by Dhruba found that morbidity stood at 64%, with a 30-day mortality rate of 18%. The ROC curve analysis showed that the area under the curve (AUC) for predicting death was 0.802, while the AUC for morbidity was 0.778. The mean ± S.D. of the Boey score was significantly higher in patients experiencing morbidity and mortality. Additionally, both the Peptic Ulcer Perforation (PULP) score and the Boey score proved to be notably accurate predictors. [16].

The Peptic Ulcer Perforation (PULP) score includes seven factors with weighted points applicable for each factor, with a maximum sum of 18 points being the highest possible. [17].

Our study is novel in our population, and Boey's score is a good predictor of post-operative outcome, but the limitations are that it is a single-center study. Additionally, there are other factors such as nutritional status, surgical timing, and intraoperative findings that affect operative outcome and are not included in the score.

Our results are similar to various studies, which reported that morbidity and mortality were significantly associated with increasing Boey's score. [10, 11]

CONCLUSION

We conducted this study on 71 patients presenting for peptic ulcer perforation. We found that the majority of the patients were male as compared to females. According to Boey's score, we evaluated the morbidity and mortality of peptic ulcer perforation. Regarding morbidity and mortality on Boey's score, we observed that morbidity and mortality were increasing with increasing Boey's score, which yielded a significant association between morbidity/mortality and Boey's score. Further multicenter studies are required and also to compare other scoring systems.

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