EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 9
Issue: 4
353-357
Year: 2022

ACCURACY OF SCORING SYSTEM IN PREDICTING PERFORATED DUODENAL ULCER MORTALITY

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Article Received on 02/02/2022 **Article Revised on 24/02/2022** **Article Accepted on 15/03/2022**

ABSTRACT

Background: Bleeding, perforation, penetration, and obstruction are all possible life-threatening problems related with PUD. Perforation is found in 2-10% of patients. The Boey's scores, PULP and ASA score are currently the most widely used prognostic grading systems in patients with PPU. **Materials and Methods:** This is retrospective study done at B P Koirala Institute of Health Science. All patients with a perforated duodenal ulcer who had surgery were included in the study. Exclusion criteria included ruptured other organs, such as the stomach and intestines, as well as inadequate data in the medical record. The PULP score, Boey score, and ASA score were calculated as anticipated scoring systems. **Results:** We used the retrospective data of 74 patients. 56.8% (42) of the patients had a PULP score of 0-6 and 43.2 percent (32) of the patients had a PULP score of 7-18. According to Boey's scoring system, 10.8 percent (8), 58.1 percent (43), 25.7 percent (19), and 5.4 percent (4) of the patients were marked with 0, 1, 2, and 3 points, respectively. Boey score had highest AUC of 0.85 with cut off value>1 with accuracy 72.97%. PULP score had AUC of 0.79 with cut off values>6 with accuracy of 60.81%. ASA score had AUC of 0.765 with cut off value>3. **Conclusion:** The Boey risk score is a simple and precise predictor for postoperative mortality than PULP score.

KEYWORDS: PDU, PULP score, Boey score, ASA score.

INTRODUCTION

Bleeding, perforation, penetration, and obstruction are all possible life-threatening problems related with PUD. After bleeding, perforation is the second most common consequence. Smoking, nonsteroidal anti-inflammatory drug use, chronic stress, Helicobacter pylori infection, and advanced age are the main risk factors for peptic ulcer perforation (60 years). Perforation is found in 2-10% of patients.[1] The pathophysiology of PPU is multifaceted, involving environmental, microbiological (Helicobacter pylori), pharmacological (NSAIDs and steroids), and genetic variables.[2] Perforated peptic ulcer (PPU) is the serious consequence with a mortality range 4–82.4 %. Many investigations have been undertaken to determine the elements that contribute to PPU mortality.[3]

Despite the fact that medical treatments like H2 receptor antagonists, proton pump inhibitors, and antibacterial drugs to eradicate Helicobacter pylori have reduced the number of surgeries in non-complicated peptic ulcer cases, the number of patients presenting to emergency clinics with peptic ulcer perforation has not decreased.[4] The ASA and Boey's scores are currently the most widely used prognostic grading systems in patients with PPU. The ASA score, on the other hand, is a generic surgical risk index that isn't designed for PPU patients in particular.[5]

The goal of this study was to compare the accuracy of Boey's Score, PULP and ASA scores in predicting mortality.

MATERIALS AND METHODS

This is a retrospective cross-sectional study undertaken in the Department of Surgery of B P Koirala Institute of Health Science, a tertiary level hospital in Eastern Nepal. Before beginning the study, the Institutional Ethical Review Board gave its approval. Patients with perforated duodenal ulcers treated surgically under the department of general surgery who arrived to the emergency department between April 14, 2018 and May 12, 2020 were included. All patients with a perforated duodenal ulcer who had surgery were included in the study.

Exclusion criteria included ruptured other organs, such as the stomach and intestines, as well as inadequate data in the medical record portion. From the medical record database, the demographic profile of the patients, clinical history, laboratory exams, and operation findings were noted.

The PULP score, Boey score, and ASA score were calculated as anticipated scoring systems. In Table 1, the definitions of PULP score, ASA score, and Boey score were discussed. The mortality was recorded.

Table 1: PULP, Boey and ASA score.

Score		Points
PULP score	Age>65	3
	Comorbid active malignant disease or AIDS	1
	Comorbid liver cirrhosis	2
	Concomitant use of steroids	1
	Shock	1
	Perforation time on admission >24 hr	1
	Serum creatinine >1.47mg/dl	2
	ASA 2	1
	ASA 3	3
	ASA 4	5
	ASA 5	7
	Total score	0-18
ASA score	Normal health	1
	Mild systemic disease	2
	Severe systemic disease	3
	Severe systemic disease with constant threat to life	4
	Not expected survival for patients without surgery	5
	Total score	1-5
Boey score	Medical illness	1
	Preoperative shock	1
	Duration of peptic ulcer perforation>24 hr	1
	Total score	0-3

DEFINITION

Shock on admission

PULP it was blood pressure<100mm Hg and heart rate>100 beats/ min.

Boey, it was only blood pressure<100mm Hg.

Perforation >24 h:

PULP, it was time interval from perforation (onset of symptoms) till admission to hospital.

Boey, it was the time interval from perforation till surgery.

Perforated peptic ulcer (PPU): both perforated gastric and perforated duodenal ulcers.

Perforated duodenal ulcer (PDU): only perforated duodenal ulcers

Schedule proforma was filled up according to medical record of the patient. Data were entered in Microsoft excel 2010 and converted it into SPSS for statistical analysis.

Statistical Analysis

Percentage, mean, median, SD, Interquartile range, and graphical and tabular presentation were all used to construct descriptive statistics. Inferential statistics were used to find a significant relationship between various cut off values and numerical values of the PULP Score, Boey Score, and ASA Score, as well as other selected variables, using chi square and independent t tests. The scale's predictive accuracy for each outcome was determined using a ROC curve analysis. Med Calc Software was used to calculate sensitivity, specificity, PPV, NPC, and accuracy.

RESULTS

We used the retrospective data of 74 patients, 63 of whom were men and 11 of whom were females, with a mean age of 46.4920. On clinical examination, all of the patients reported symptoms of peritonitis and had obliterated liver dullness, as well as pneumoperitoneum in their erect chest x-rays. 39.2 percent of these patients were admitted to the ER within 24 hours after beginning of symptoms, whereas the remaining 60.8 percent came later.

According to the various scoring systems, 56.8% (42) of the patients had a PULP score of 0-6 and 43.2 percent (32) of the patients had a PULP score of 7-18. According to Boey's scoring system, 10.8 percent (8), 58.1 percent (43), 25.7 percent[19], and 5.4 percent (4) of the patients were marked with 0, 1, 2, and 3 points, respectively. On the ASA scoring system, 10.8 percent (8), 28.4 percent (21), 28.4 percent (21) and 35.1 percent (26) received 1, 2, 3 and 4 points, respectively as illustrated in Table 2.

Table 2: PULP Score, Boey Score, ASA score.

Characteristics	Frequency(n)	Percentage(%)
PULP score		
0-6	42	56.8
7-18	32	43.2
ASA Score		
1	6	8.1
2	21	28.4
3	21	28.4
4	26	35.1
Boey Score		
0	8	10.8
1	43	58.1
2	19	25.7
3	4	5.4

4% (3) patients had mortality following complications within 30-day postoperative period.

In our study, mortality was significantly associated with Boeys score (P value 0.001) and PULP score(P value 0.001). Similarly mortality was significantly associated with preoperative comorbidity (P value 0.04) but not significant with perforation on admission> 24 hr. and shock on admission as illustrated in Table 3 and Table 4.

Table 3: Characteristics of PPU patients by Mortality (Continuous variable).

	Mortality	N	Mean	Std. Deviation	P value
AGE	No	71	45.70	20.247	0.108
	Yes	3	65.00	15.524	
Hb	No	71	12.361	2.4895	0.402
	Yes	3	11.133	1.4978	
TC	No	71	14450.14	24648.176	0.576
	Yes	3	6400.00	5819.794	
Cr	No	69	1.052	.6512	0.065
	Yes	3	1.767	.5033	
Boeys_Score	No	71	1.18	.639	**0.001**
	Yes	3	3.00	.000	
ASA_Score	No	71	2.87	.985	0.172
	Yes	3	3.67	.577	
PULP_Score	No	71	4.79	2.083	**0.01**
	Yes	3	8.00	1.000	

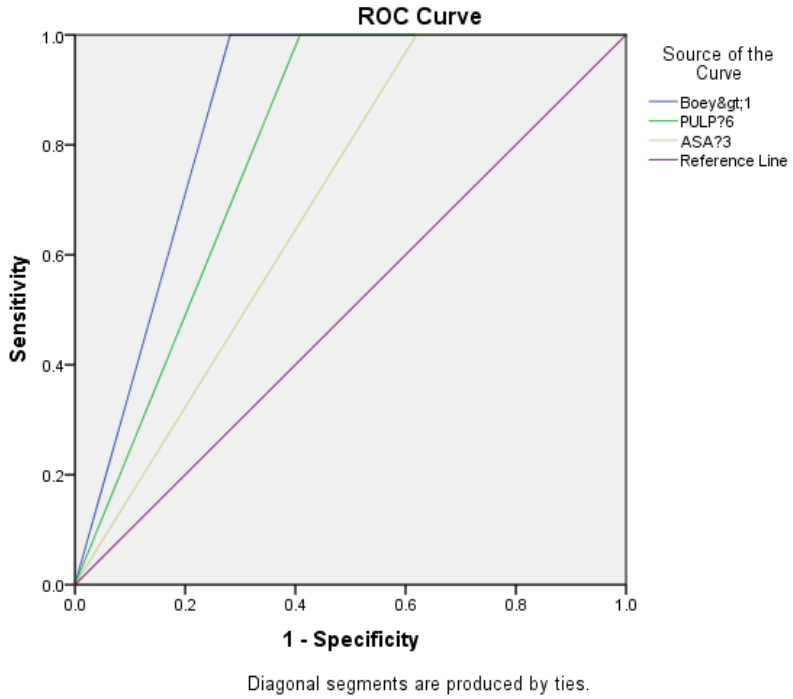
Table 4: Characteristics of PDU patients by 30 day Mortality (Categorical Variable).

Variable	N	Mortality		P value
		Yes	No	
Perforation on admission>24 hr.	45	2(4.4%)	43(95.6%)	0.832
Shock on admission	9	1(11.1%)	8(88.9%)	0.252
Preoperative comorbidity	15	13(86.7%)	2(13.3%)	**0.041**
Boey Score				
0	8	0(0%)	8(100%)	
1	43	0(0%)	43(100%)	**0.001**
2	19	0(0%)	19(100%)	
3	4	3(75%)	1(24%)	
ASA score				
1	6	0(0%)	6(100%)	0.562
2	21	0(0%)	21(100%)	
3	21	1(4.8%)	20(95.2%)	
4	26	2(7.7%)	24(92.3%)	
PULP score				
0-6	42	0(0%)	42(100%)	**0.043**
7-18	32	3(9.4%)	29(90.6%)	

Boey score had highest AUC of 0.85 with cut off value>1 with sensitivity 100%, specificity 71.83% with accuracy 72.97%. PULP score had AUC of 0.79 with cut off values>6 with sensitivity 75%, specificity 76.1%, PPV 65.63% and NPV 83.33% with accuracy 60.81%. ASA score had AUC of 0.765 with cut off value>3 with sensitivity 100%, specificity 59.15% with accuracy 40.54 as illustrated in Table 5 and Fig 1.

Table 5: Mortality optimal cut off and accuracy indices of three scoring system.

Variable	AUC	P value	Cut off	Sensitivity	Specificity	PPV	NPV	Accuracy
Boey	0.859	0.034	>1	100%	71.83%	13.04%	100%	72.97%
ASA	0.690	0.112	>3	100%	38.03%	6.38%	100%	40.54%
PULP	0.796	0.079	>6	100%	59.15%	9.38%	100%	60.81%



DISCUSSION

Any scoring system with the ability to predict the mortality of any patient with a relatively high sensitivity and specificity is a boon for any clinician and the patient as well. This helps us to predict, prepare and manage the unforeseen complications early and accurately. With the same aim we started this study to compare the various scoring system (i.e. PULP, Boey's and ASA) for their sensitivity and specificity in predicting a 30-day mortality in PDU patients.

The mortality in our study was 4% which was less in comparison to other study done by Fadhila et al(32.3%)[6] and Roy et al (26.3%) and more in comparison to study done by Saffan et al(0.7%).[7]

In the study done by Thorsen et al, raised creatinine >1.33 mg/dl regarded as independent risk factor for mortality which was similar to our study. Hypoalbuminemia and raised creatinine may reflect underlying pathologies as well as chronic severe disease and acute disease that might cause dehydration with infection and sepsis.[5]

The AUC of PULP predicting mortality was 0.83 in Moller et al[8], 0.79 in Thorsen et al[5] and 0.95 in Menekse et al[9] whereas we found it as 0.798. PULP scoring had multiple variables to calculate score so its not easy to use in clinical practice.

The other scoring system Boey is more practical than PULP. However the accuracy of predicting mortality varies in several studies as AUC value range from 0.63[10] to 0.92.[9] In our study we found it as 0.859.In our study mortality was more in advanced age. Boey score did not involve advanced age which is important parameter of mortality. In our study, mortality was significantly associated with Boey score and PULP score but not with ASA score.

In our study, AUC of ASA in predicting mortality was 0.69 which was less than other study done by Menkse et al(0.914)[9] and 0.91.[11] ASA is not specific scoring system for peptic ulcer perforation rather it is mainly based in comorbid disease and their severity. Beside all, the main problem of ASA is that calculation is performed subjectively.[9]

CONCLUSION

The Boey risk score is a simple and precise predictor for postoperative mortality than PULP score.

REFERENCES

1. Unver M, Firat Ö, Ünalp ÖV, Uğuz A, Gümüs T, Sezer TÖ, et al. Prognostic factors in peptic ulcer perforations: A retrospective 14-year study. Int Surg, 2015; 100(5): 942–8.
2. Patel S, Kalra D, Kacheriwala S, Shah M, Duttaroy D. Validation of prognostic scoring systems for predicting 30-day mortality in perforated Peptic Ulcer Disease. Turkish J Surg, 2019; 35(4): 252–8.
3. Rivai MI, Suchitra A, Janer A. Evaluation of clinical factors and three scoring systems for predicting mortality in perforated peptic ulcer patients, a retrospective study. Ann Med Surg [Internet], July, 2021; 69: 102735. Available from: https://doi.org/10.1016/j.amsu.2021.102735
4. Hut A, Tatar C, Yildirim D, Dönmez T, Ünal A, Kocakuşak A, et al. Is it possible to reduce the surgical mortality and morbidity of peptic ulcer perforations? Turkish J Surg, 2017; 33(4): 267–73.
5. Thorsen K, Søreide JA, Søreide K. What Is the Best Predictor of Mortality in Perforated Peptic Ulcer Disease? A Population-Based, Multivariable Regression Analysis Including Three Clinical Scoring Systems. J Gastrointest Surg, 2014; 18(7): 1261–8.
6. Fadhila H, Asrul, Muradi A. ACCURACY OF BOEY SCORE AND PEPTIC ULCER PERFORATION (PULP) SCORE AS A MORTALITY PREDICTIVE FACTOR IN PERFORATED PEPTIC ULCER PATIENTS IN H . ADAM MALIK MEDAN GENERAL HOSPITAL. Indian J Appl Res., 2019; 8(2): 146–8.
7. Saafan T, El Ansari W, Al-Yahri O, Eleter A, Eljohary H, Alfkey R, et al. Assessment of PULP score in predicting 30-day perforated duodenal ulcer morbidity, and comparison of its performance with Boey and ASA, a retrospective study. Ann Med Surg [Internet], April, 2019; 42: 23–8. Available from: https://doi.org/10.1016/j.amsu.2019.05.001
8. Møller MH, Engebjerg MC, Adamsen S, Bendix J, Thomsen RW. The peptic ulcer perforation (PULP) score: a predictor of mortality following peptic ulcer perforation. A cohort study. Acta Anaesthesiol Scand, 2012; 56(5): 655–62.
9. Menekse E, Kocer B, Topcu R, Olmez A, Tez M, Kayaalp C. A practical scoring system to predict mortality in patients with perforated peptic ulcer. World J Emerg Surg, 2015; 10(1): 1–6.
10. Buck DL, Vester-Andersen M, Møller MH. Accuracy of clinical prediction rules in peptic ulcer perforation: An observational study. Scand J Gastroenterol, 2012; 47(1): 28–35.
11. Lohsiriwat V, Prapasrivorakul S, Lohsiriwat D. Perforated Peptic Ulcer: Clinical Presentation, Surgical Outcomes, and the Accuracy of the Boey Scoring System in Predicting Postoperative Morbidity and Mortality. World J Surg [Internet], 2009; 33(1): 80–5. Available from: https://doi.org/10.1007/s00268-008-9796-1