

Original Research Article

Role of BOEY score in association with age in predicting mortality and morbidity in peptic perforation

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ABSTRACT

Background: Peptic perforation generally requires immediate surgery. BOEY scoring system is a simple way to predict the mortality and morbidity in peptic perforation. Apart from the factors mentioned in BOYE score, patient's age is also important. The study evaluates the accuracy of BOEY scoring system in predicting post-operative morbidity and mortality in patients operated for peptic perforation as well as inclusion of age as one of the criteria for the scoring system and thus modifying the system.

Methods: Total 103 patients were taken for this institution based prospective observational study. The 18th months study was planned as follow - initial 14 months for patient study, next 2 months for compilation of data, further 2 months for computation of statistics and final construction.

Results: Patients with BOYE score 0, 1, 2, 3 has morbidity rates as follow 7.01, 19.29, 36.85 and 36.85 respectively. Whereas mortality rate was 0, 0, 9.09 and 90.91 respectively. 76.4% of patients with post-operative complications belonged to age > 45 years. All the cases of mortality were >45 years of age.

Conclusions: It is simple and can assist in risk stratification of patients with perforated peptic ulcer. It can help us to identify high-risk patients preoperatively and help in better use of limited facilities. And lastly, a modification can be done by including age (> 45 years) with the other three parameters of the BOEY scoring system.

Keywords: BOEY score, Mortality, Morbidity, Peptic perforation, Age

INTRODUCTION

More than 4 million people in the world are affected by peptic ulcer disease annually. One of the most common complications of peptic ulcer disease is peptic perforation, which results in high rate of mortality and morbidity. About 5% patients of peptic ulcer disease encounter peptic perforation. PPU carries a mortality ranging from (1.3% to 20%) and 30 days mortality rate reaching 20% and 90-d mortality rate of up to 30% have been reported.¹ The diagnosis of peptic perforation is based on clinical history and examination combined with laboratory and radiological investigations. The mortality

and morbidity in a case of peptic perforation depends upon a number of factors. Depending upon these factors a number of scoring systems are there for predicting mortality and morbidity in a case of peptic perforation. Some of them are APACHE 2, MANNHEIMER peritonitis index, PULP scoring, ASA scoring. But the most simple of these scoring systems is BOEY scoring system which includes: delay in presentation (>24 hours), Pre operative shock (SBP<90 mmHg) and associate medical illness. Each of these criteria has point 1. So, BOEY score can be minimum 0 and maximum 3. This study is based on BOEY scoring system. In case of BOEY scoring system, apart from these three criteria, age

is also an important factor. With increase of patient's age, the chance of mortality and morbidity increases. So, age, as another criterion for the existing BOEY scoring system can be taken and thus BOEY score can be modified. With this scoring system, patients can be stratified and prediction of mortality and morbidity can be done. The purpose of this study is to validate the BOEY scoring system in our set up as well as make a trial if age, as one of the criteria for BOEY score can be included or not.

METHODS

It is a hospital based prospective observational study. The study is conducted in Bankura Sammilani Medical College and Hospital, Bankura from March 2019 to August 2020.

Sample size/design

Total 103 cases of peptic perforation were taken as sample size for the study after implication of inclusion and exclusion criteria. Formula used is mentioned below;

$$N = [Z^2 \times Sn (1 - Sn)] / L^2P$$

Where, N=sample size, Z=Degree of confidence =1.96, Sn=Standard deviation=86%, L=Margin of error=0.302 and P=expected prevalence=5%. All study subjects were case, control not required.

Inclusion and exclusion criteria

Inclusion criterion was all patients presenting with perforated peptic ulcer managed surgically and exclusion criterion was patients with perforated peptic ulcer disease managed conservatively.

Study variables

Parameters used in BOEY scoring system; time of presentation before surgery > 24 hrs - 1 point, presence of pre-operative shock (SBP<90 mmHg) - 1 point, associated medical illness - 1 point.

Study technique

This study is conducted after getting due permission from institutional ethical committee. Proper written informed consent from each patient or patient's party was obtained after explaining the study procedure to them in their own vernacular language. For statistical analysis data were entered into a Microsoft excel spreadsheet and then analyzed by SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and Graph Pad Prism version 5.

RESULTS

In this study, out of 103 patients 88 were male and rest were female. Majority of the patients belongs to age group 30 to 60. Out of 103 patients operated for peptic

perforation 35 patients had no complications, 57 patients had morbidity of various form and 11 patients had mortality. Most of the patients with no complication were from BOEY score 0 or 1. Among the 57 patients with morbidity 4, 11, 21, 21 were from BOEY score 0, 1, 2 & 3 respectively. Whereas out of 11 patients with mortality, 10 were from BOEY score 3. Considering these data, more than 73% of mortality is from BOEY score 2 and 3. And about 90% of mortality is from BOEY score 3. Hence the mortality and morbidity increased with the increasing BOEY score ($p<0.0001$). A total of 103 patients were included in this study out of which the lowest age was 19 and highest was 80. Out of 68 patients with complications, 52 cases were from age group of above 45.

Table 1: Distribution of sex.

Sex	N	%
Female	15	14.6
Male	88	85.4
Total	103	100.0

Table 2: Co-relation between BOEY score, no complication, morbidity and mortality.

BOEY score	No complication	Morbidity	Mortality	Total
0	18	4	0	22
1	16	11	0	27
2	1	21	1	23
3	0	21	10	31
Total	35	57	11	103

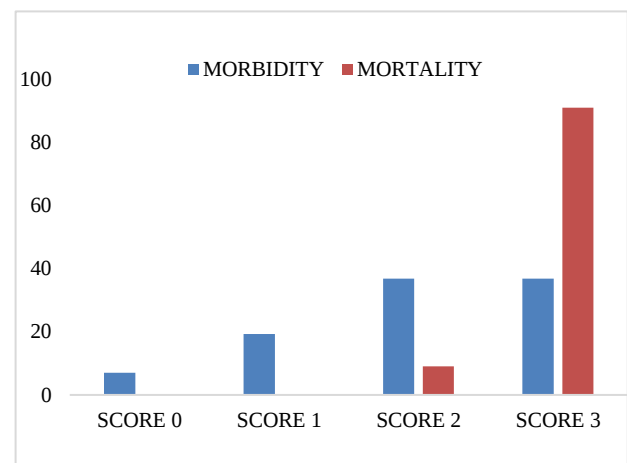


Figure 1: Co-relation between BOEY score, no complication, morbidity and mortality in percentage.

DISCUSSION

In the original study done by BOEY in the year 1987, the mortality rate was very high for score 3 that is 100%. Whereas for score 2 mortality and morbidity was around 32.1% and 42.1%. Significantly the morbidity for score 0

was 17.4 % and mortality was 1.5 %. The accuracy rate in predicting mortality was 93.9% and there were no false negative errors. The BOEY scoring system is used because of its simplicity and high predictive value for mortality for PPU patients.

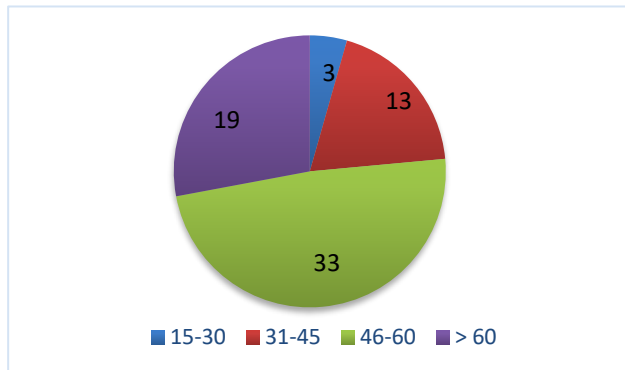


Figure 2: Co-relation between age group and morbidity and mortality.

In the most recent years this scoring has been used for predicting post-operative mortality and results of some these studies are as below: comparing this study with the original study done by BOEY the results are mortality rates for score 0 & 1 are zero. The mortality rate for score 2 has also reduced to a significant level but the morbidity is high. Whereas for score 3 the mortality rate reduced but it's still high. When compared with the most recent studies, the mortality rates of patients with score of 3 were around (45-60) % in Arici et al, 100% in Lee study, 40% in Agarwal study, 100% in Ritto study, 100% in Fung et al study; as compared to 90.91% in our study. Although the mortality rate for BOEY score 3 varies in different studies, it is evident in each study that the mortality and morbidity rate increase with the increasing score. This study also supports this data. The morbidity rates for BOEY score 0, 1, 2, 3 was 7.01, 19.29, 36.85 & 36.85 respectively. Whereas the mortality rate for BOEY scores 0 and 1 was zero. But for BOEY score 2 & 3 it was 9.09 and 90.91 respectively.^{1,3,5}

Distribution of age in patients with post-operative complications

Current study reveals that around 42.7% of peptic perforation was taken place in age group of <40 years, whereas around 57.3% of peptic perforation occurs in age group of >40 years, with mean age of 44.39. Mewara et al conducted a study in Rural Southern East Rajasthan, and they found mean age for gastric perforation was 40.29 years, with more number of patients in the age group of 30-40 years, which strongly supported the findings of current study. Soreideet al, Wilson et al, Sreelaxmi et al found the age group was in the higher range and opinion differs from the current study.⁵⁻⁷ Cueva et al found the similar data in their study of PPU, where they found the mean age is 60.3 years.⁸ Now in this study 76.4% of patients with post-operative complications belonged to

age ≥ 45 yrs. All the cases of mortality were ≥ 45 years of age. And among 57 cases with postoperative morbidity, 41(71.9%) cases were ≥ 45 years age. In rest 16(28.1%) morbidity cases were below the age of 45 yrs. Kocer et al in his study of factors affecting mortality and morbidity in patients with peptic ulcer perforation found that age of the patient is significantly associated with fatal outcomes in patients undergoing emergency surgery for PPU.⁹ Unver et al in his study by multiple logistic regression analysis shows that older age is the most important risk factor for morbidity in the present study.¹⁰ Older age is also an important risk factor for mortality in univariate analysis. Previous studies in the literature support our results. More frequent presence of comorbid diseases in older patients may be the cause of higher morbidity and mortality. Byakodi et al showed age ≥ 60 years as a risk factor for postoperative mortality and morbidity in peptic perforation.¹¹ Sivaram et al found an age above 65 years, female gender, perforation to surgery interval more than 36 h, and size of perforation more than 1 cm² were associated significantly with mortality.¹² From the above studies it is apparent that age of the patient is one of the important prognostic factors for peptic perforation cases. Now as per this study the cut off age for maximum mortality and morbidity is ≥ 45 years. As 76.4% of patients with post-operative complications belonged to age ≥ 45 yrs. All the cases of mortality were ≥ 45 years of age. And among 57 cases with post-operative morbidity, 41(71.9%) cases were ≥ 45 years age. In rest 16 (28.1%) morbidity cases were below the age of 45 years. Again, the mean age for developing peptic perforation is found to be 44.39 years. So as per findings of this study we can consider age ≥ 45 years, as one of the predicting factor for morbidity and mortality in peptic perforation. A 4th variable can be added to the BOEY score along with the other 3 variables, thus a modified BOEY scoring system can be formed which can be like this: time of presentation before surgery >24 hrs; 1 point, presence of pre-operative shock (SBP<90 mmHg); 1 point, associated medical illness; 1 point, age of the patient ≥ 45 years; 1 point.

Limitations

Some limitations of this study being the small sample size, old aged patients with more than one comorbidity and their combined effects can misconstrue the outcome, most of the patients in our study were malnourished due to poor socioeconomic status and had smoking/alcohol habits, thus high risk for any surgical intervention.

CONCLUSION

BOEY scoring system is simple, clinically relevant and can precisely predict postoperative morbidity and mortality. Further, it can be calculated at bedside preoperatively and can assist in risk stratification of patients with perforated peptic ulcer. In limited resource setting like ours, this can have various implications: it can help us identify high-risk patients preoperatively and help in better use of limited facilities; risk of adverse outcomes

can be explained as part of patient counselling, help preoperative optimization in ICU and extensive perioperative care for overall better outcomes. And lastly a modification can be done by including age (>45 years) with the other three parameters of the BOEY scoring system.

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Conflict of interest: None declared

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

REFERENCES

1. Chung KT, Shelat VG. Perforated peptic ulcer - an update. *World J Gastrointest Surg.* 2017;9(1):1-12.
2. Arici C, Dinckan A, Erdogan O, Bozan H, Colak T. Peptic ulcer perforation: an analysis of risk factors. *World J Surg.* 2018;23:45-9.
3. 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.* 2019;33:80-5.
4. Lee FY, Leung KL, Lai BS, Ng SS, Dexter S, Lau WY. Predicting mortality and morbidity of patients operated on for perforated peptic ulcers. *Arch Surg.* 2001 Jan; 136(1):90-4.
5. Abdallah HA, Saleem AEA. Comparative study between Graham's omentopexy and modified-Graham's omentopexy in treatment of perforated duodenal ulcers. *Egypt J Surg.* 2018;37:485-9
6. KaragözAvci S, Yüceyar S, Aytaç E, Bayraktar O, Erenler I, Ustün H, et al. Comparison of classical surgery and sutureless repair with dura seal or fibrin glue for duodenal perforation in rats. *Ulus Travma Acil Cerrahi Derg.* 2011;17(1):9-13.
7. Sanabria A, Villegas MI, Morales Uribe CH. Laparoscopic repair for perforated peptic ulcer disease. *Cochrane Database Syst Rev.* 2013;(2): CD004778.
8. Gona SK, Alassan MK, Marcellin KG, Henriette KY, Adama C, Toussaint A, et al. Postoperative morbidity and mortality of perforated peptic ulcer: retrospective cohort study of risk factors among black Africans in Côte d'Ivoire. *Gastroenterol Res Pract.* 2016;2016: 2640730.
9. Thorsen K, Søreide JA, Søreide K. Scoring systems for outcome prediction in patients with perforated peptic ulcer. *Scand J Trauma Resusc Emerg Med.* 2013;21: 25.
10. Kocer B, Surmeli S, Solak C, Unal B, Bozkurt B, Yildirim O, et al. Factors affecting mortality and morbidity in patients with peptic ulcer perforation. *J Gastroenterol Hepatol.* 2007;22(4):565-70.
11. Unver M, Fırat Ö, Ünalp ÖV, Uğuz A, Gümüş T, Sezer TÖ, et al. Prognostic factors in peptic ulcer perforations: a retrospective 14-year study. *Int Surg.* 2015;100(5):942-8.
12. Byakodi KG, Harini BS, Teggimani V, Kabade N, Hiregoudar A, Vishwas MR. Factors affecting morbidity and mortality in peptic ulcer perforation. *Int Surg J.* 2018;5:1335-40.
13. Sivaram P, Sreekumar A. Preoperative factors influencing mortality and morbidity in peptic ulcer perforation. *Eur J Trauma Emerg Surg.* 2018;44(2): 251-7.

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