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Original Research Article

A comparative study between Mannheims peritonitis index and Boeys score in predicting the morbidity and mortality in perforated pertic ulcer patients in a tertiary health care center in Bangalore

Harindranath H. R., Mamatha V. P.*

Department of General Surgery, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India

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***Correspondence:**
Dr. Mamatha V. P.,
E-mail: mamathavp57@gmail.com

ABSTRACT

Background: Peptic ulceration is one of the major health problem encountered all around the world. Peptic ulcers are associated with complications like bleeding, perforation and obstruction with perforation being the most frequent complication. Objectives of current study were to compare the efficacy of MPI and Boey score in predicting the morbidity and mortality of patients with perforated peptic ulcer in a tertiary health care center in Bangalore which helps in stratification of the patients into different categories based on the likelihood of morbidity and mortality for more appropriate intensive care and management.
Methods: A prospective observational study was conducted in a span of 9 months in the department of general surgery in Bangalore medical college and research institute. All the patients over 18 years with perforated peptic ulcer peritonitis who underwent laparotomy were included in the study. Data was appropriately tabulated; MPI and Boey score calculated and statistically analysed to predict morbidity and mortality of the patients.
Results: Total number of subjects in this study was 75. Mean age was 44.53 years. Overall mortality was 32% (24 patients). Most common complication noted in this study was surgical site infection followed by pulmonary complications.
Conclusions: Both MPI and Boey score were accurate in predicting the morbidity and mortality in PPU with higher scores having increased risk of morbidity and mortality. However, Boey score was more specific in predicting mortality and it can be used pre-operatively in predicting morbidity and mortality when compared to MPI which requires intra-operative findings for prediction.

Keywords: Boey score, Peptic ulcer, Mannheim peritonitis index, Morbidity, Mortality

INTRODUCTION

Peptic ulceration is one of the major health problem encountered all around the world.[1] The etiology of PPU is multifactorial and it is most commonly associated with Helicobacter pylori infection, NSAIDS, chronic alcohol intake and smoking, irregular diet, increased consumption of smoked and spicy food and type A personality.[1] With the introduction of antibacterial therapy to eradicate *H. pylori* infection and with the introduction of proton pump inhibitors, the incidence of peptic ulcer disease has been reduced.[2] Peptic ulcers are associated with complications like bleeding, perforation and obstruction which are life threatening with perforation being the most frequent complication.[3] Most patients with PPU present with symptoms and signs of peritonitis and eventually sepsis.[3]Surgery must not be delayed in patients with peritonitis because every hour of delay increases the risk

of morbidity and mortality.[4] Patient stratification into different categories based on likelihood of morbidity and mortality is important so that patients receive more appropriate treatment and better intensive care and have improved outcomes.[4] Various risk scores have been developed to predict the outcomes in patients with PPU-ASA, Boey score, PULP score, Mannheim peritonitis index (MPI). Mannheim peritonitis index was developed by Wacha and Linder in 1983. It was developed based on the retrospective analysis of data from 1253 patients with peritonitis, in which 20 possible risk factors were considered. Of these, only 8 proved to be prognostic relevance and were entered into the MPI, classified according to their predictive power.[5] In 1987, Boey et al introduced Boey scoring system which inluded three independent risk factors which makes this scoring system very simple and easy to implement.[6] In this study we are comparing efficacy of Mannheim peritonitis index and boey score in determining the morbidity and mortality of patients with peritonitis secondary to perforated peptic ulcer.

METHODS

This is a prospective observational study conducted in the department of general surgery in Bangalore medical college and research institute, Bangalore over a period of 9 months from January 2021 to September 2021. 75 patients who were found to have peptic ulcer perforation over the period of study of 9 months were included in the study.

Inclusion criteria

Patients aged above 18 years with perforations of stomach and duodenum (peptic ulcer perforations) and those who gave informed consent were included in the study.

Exclusion criteria

Those below 18 years of age and those not giving consent, patients with perforations due to trauma and malignancy and patients with perforation in other parts of the bowel except duodenum were excluded from the study.

Detailed history regarding presenting symptoms, associated co-morbid illness and past history, personal history including smoking and alcohol intake and drug history was taken. General physical examination of the patient including vital parameters namely pulse rate, blood pressure, respiratory rate, temperature, oxygen saturation and GCS was recorded. Detailed per abdominal examination was done to note tenderness, guarding, rigidity, organomegaly, free fluid in the abdomen and bowel sounds. Other systemic examination namely cardiovascular system, respiratory system and central nervous system was done and recorded. All patients underwent appropriate biochemical investigations, radiological investigations in the form of chest X-ray and erect X-ray abdomen to look for free air under diaphragm and ultrasonography of abdomen to look for peritoneal collection. The patients were resuscitated appropriately and taken up for emergency exploratory laparotomy. Intra-operatively, site and size of the perforation and amount and nature of the peritoneal fluid was noted. The margins of the perforation were freshened and modified Grahams Omental patch repair was done. Thorough peritoneal lavage was given with normal saline and abdominal drains were placed.

Table 1: Mannheim peritonitis index.

Risk factor	Weighting if present
Age >50 years	5
Female sex	5
Organ failure	7
Malignancy	4
Preoperative duration of peritonitis >24 hours	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Exudate	
Clear	0
Cloudy, Purulent	6
Fecal	12

Table 2: Definations of organ failure.

Organ failure indications
Kidney
Creatinine level >177 umol/l
Urea level >167 mmol/l
Oliguria <20 ml/h
Lung
PO_2 <50 mmHg
PCO_2> 50mmHg
Shock
Hypodynamic or hyperdynamic
Intestinal obstruction
Paralysis >24 h or complete mechanical obstruction

Table 3: Boey score.

Risk factors	Points
Time from perforation to admission >24 hours	1
Pre-op SBP <100 mmHg	1
Any one or more systemic illness: heart disease, liver disease, renal disease, DM	1

Post-operatively, intravenous antibiotics and adequate fluids and analgesics were added. Patients were monitored. Patients with complications were managed accordingly and those with uneventful recovery were discharged once they were stable, tolerating orally and

ambulating. All of them were started on *H. pylori* triple therapy empirically once oral feeds were started post operatively. Patients were called for follow up after 7 and 15 days of discharge and after that as per requirement.

Morbidity was evaluated as: pulmonary complications (lung consolidation, pleural effusion or atelectasis), surgical site infection (with wound culture suggestive of positive bacterial etiology), intra-abdominal collection and burst abdomen. Mortality was defined as death during hospital stay or within 30 days of operation.

Statistical analysis

The collected data was tabulated in the excel forms and evaluated using Mannheim peritonitis index and Boey score and the results were subjected to statistical analysis using SPSS v27.0 software to arrive at a conclusion.

RESULTS

The total number of patients in our study was 75.Out of which, 17 patients (22.66%) were female patients and 58 patients (77.33%) were male patients. The average age of the patients was found to be 44.53 years.

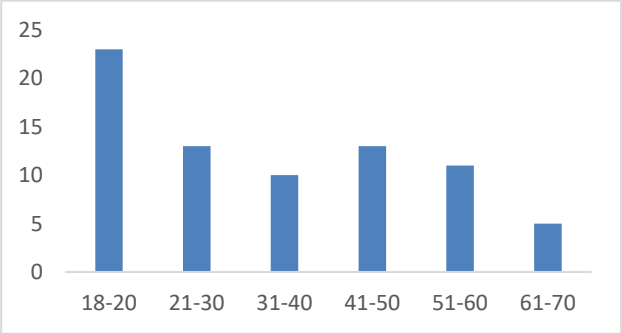

Figure 1: Age distribution.

Table 4: MPI and Total number of patients.

MPI	N
<21	30
21-29	25
>29	20

Table 5: MPI and Total number of mortality.

MPI	N
<21	0
21-29	10
>29	14

In our study, maximum numbers of patients were between the age group 0f 18 years to 20 years (23 patients). In 75 patients, 30 patients (40%) had a total MPI score of <21, 25 patients (33%) had a total MPI score between 21-29 and 20 patients (27%) had MPI score >29. There was no mortality seen in patients of MPI score <21 whereas mortality of 10 and 14 were noted in MPI scores of 21-29 and >29 respectively.

Table 6: Boey score and total number of patients.

Boey score	N
0	5
1	34
2	25
3	11

Table 7: Boey score and total number of mortality.

Boey score	N
0	0
1	4
2	9
3	11

On the basis of Boey score, all the patients were categorized into 4 groups. In first group of patients there were no risk factors and Boey score was 0 and there were 5 patients (7%) in that group. Second group was with one risk factor with Boey score of 1 and consisted of 34 patients (45%). Third group was with any two risk factors and Boey score of 2 and consisted of 25 patients (33%). The fourth group with all three risk factors with Boey score of 3 and included 11 patients (15%).

Table 8: MPI and total morbidity.

MPI	Surgical site infection	Pulmonary complication
<21	6	5
21-29	8	3
>29	1	1

No mortality was seen in patients with Boey sore of 0. Mortality of 4 was noted in Boey score of 1. Mortality of 9 and 11 was noted in Boey score 2 and Boey score 3 respectively. Overall, mortality was seen in 24 patients (32%) out of 75 patients in this study. Most of them expired due to septic shock and ARDS.

Table 9: Boey score and total morbidity.

Boey score	Surgical site infection	Pulmonary complications
0	1	1
1	5	4
2	9	4
3	0	0

Morbidity in the form of surgical site infection and pulmonary complications were seen in a total of 24 patients (32%). 15 patients had surgical site infection and 9 patients had pulmonary complications in the form of

lung consolidation, pleural effusion and atelectasis. Burst abdomen and intra-abdominal collections were not seen in this study population. Among the patients with Mannheim peritonitis index of less than 21, 6 of them had SSI and 5 of them had pulmonary complications. Whereas among patients with MPI between 21-29, 8 patients had SSI and 3 patients had pulmonary complications, and in the group of patients with MPI score of more than 29, 1 patient had SSI and 1 patient had pulmonary complication.

Table 10: Descriptive statistics.

Parameters	Mean	Standard deviation
Age	44.53	17.836
MPI	23.93	7.457
Boey score	1.56	0.826

Among the patients with Boey score 0, 1 of them had SSI and 1 of them had pulmonary complication. Whereas among patients with Boey score 1, 5 patients had SSI and 4 patients had pulmonary complications, and in the group of patients with Boey score 2, 9 patients had SSI and 4 patient had pulmonary complication.

Descriptive statistics

Mean age in the study was 44.53 years. Mean MPI was 23.93 and Mean Boey score was 1.56. Both MPI and Boey score were found to be statistically significant in predicting the morbidity and mortality of patients with perforated peptic ulcer.

DISCUSSION

Peptic ulcer disease results from the imbalance between gastric acid-pepsin and mucosal defence mechanisms.[7-9] The incidence of peptic ulcer disease has been estimated to be around 1.5% to 3%. The prevalence of peptic ulcer perforation ranges from anywhere between 5%-15% in the western population.[10] It is one of the clinical entity that has been associated with high morbidity and mortality.[7]peritonitis is defined as an inflammatory process of the peritoneum which is a thin tissue that covers the visceral organs and lines thee inner wall of te abdominal cavity.[11] High mortality in peritonitis patients is due to multiorgan failure, renal failure, sepsis and respiratory distress.[12]

Table 11: Pearson correlation between MPI and Boey score.

Parameters		Gender	Age	Outcome
MPI	Pearson correlation	0.45	0.496	0.647
Sig. (2-tailed)		0.000	0.000	0.000
Boey score	Pearson correlation	0.664	0.476	0.612
Sig. (2-tailed)		0.000	0.000	0.000

Correlation is significant at 0.01 level (2-tailed)

The mean age of the patients included in our study was 44.53 years and more common in male gender. This may be attributed to demographic profile of smoking and alcohol intake in younger age group men. However PPU has been seen in elderly patients which has been attributed to increasing use of NSAIDS in this population group.[8] In our study, morbidity and mortality increased with increase in age of the patients, and morbidity and mortality was high in patients who presented late to the hospital with features of peritonitis (>24 hours of onset of symptoms), and mortality was high in patients who had other associated co-morbid illness and organ failure at the time of presentation.

Surgical site infections and pulmonary complications were more common in this study population, and these complications were more commonly seen in patients with increased MPI and Boey score. Surgery for PPU is regarded as contaminated or dirty wound which has been attributed to the risk of wound infection and has been reported to be between 5% to 30% in various studies.[1] Pulmonary complications were attributed to the fact that all cases were actually upper abdominal surgery restricting vital capacity in early post-operative periods inspite of adequate analgesic support and thus adding to pulmonary complications.[1] In the present study, both the scoring systems were found to be accurate in predicting the mortality in patients with perforated peptic ulcer with higher score having higher mortality rate.

However certain important limitations were observed with the use of each system. Although MPI was easy to use and accurate in predicting mortality, it needs operative findings to complete the score and so in a true sense cannot be used as a preoperative scoring system.[9] On the other hand, Boey scoring system did not involve advanced age which is an important parameter in predicting the mortality in patients with PPU.

CONCLUSION

Despite recent advances in modern medicine and goal directed approach and aggressive operative and post-operative management in perforated peptic ulcer patient, it still remains challenging for the clinician and a serious surgical problem. A sensitive and specific prediction scoring system for perforated peptic ulcer patient remains indispensable so that timely initiation of aggressive treatment be initiated for high risk patient determined by scoring system. Both Mannheim peritonitis index and Boey score is accurate in predicting morbidity and mortality in patients with perforated peptic ulcer with

Boey scoring system being more specific in predicting mortality in our study. MPI has a drawback that it cannot be used as a preoperative tool for prediction as it requires intra-operative findings and Boey score would be more specific with the addition of advanced age as one of the risk factors.

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