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# To Study the Validation of Boey Score in Postoperative Morbidity and Mortality among Patients with Perforated Peptic Ulcer

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***Abstract:***

***Background:*** *perforated peptic ulcer is one of the most common indications for emergency gastrointestinal surgery. Delayed treatment, older age, presence of shock on admission and co-morbid disease risk factors for prediction of complication and mortality. A delay of more than 24 hours increases the lethal status seven to eight fold and complications rate by three folds.*

***Methods:*** *A study was undertaken with 100 diagnosed patients of peptic ulcer disease to predict their morbidity and mortality using risk stratified Boey Score.*

***Results:*** *Perforated peptic ulcer was more common in males with younger age group and risk significantly increases with increase in Boey score. Pulmonary complications are commonest followed by surgical site infection. The accuracy in predicting morbidity and mortality with Boey score was 88.70%and 84.90% respectively.*

***Conclusions:*** *Boey score is a simple and precise predictor of post-operative status of the patients with perforated peptic ulcer patients. Pre-operative prediction with Boey score goes a long way in reducing mortality and morbidity and requires timely management with aggressive treatment in such stratified high risk patients.*

***Keywords:*** *Perforated peptic ulcer.*

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## I. Introduction

Peptic ulcer disease and its complication (haemorrhage, perforation, and obstruction) posed a major threat to the world's population over the past two centuries with a high morbidity and mortality an estimated 50% and 30 % respectively. The discovery of Helicobacter Pylori has evinced great interest in the role played by this microbe.

No single factor can readily identify patients at high risk for a poor outcome, but older age, presence of co-morbidity, delay in surgery and presence of sepsis consistently have been associated with higher risk of morbidity and mortality in the perioperative period clearly, identification of modifiable risk factors with the potential to improve outcome are of greatest interest.

Postoperative rate of recovery is determined by various factors including initial presentation of the patient to the hospitals. patients might be complication with wound infection, burst abdomen, hematemesis, gastroduodenal fistula, enterocutenous fistula, intraperitoneal abscess, hypoalbuminemia, renal and respiratory complications and death.

The risk of mortality ( 6-30 %) and morbidity ( 21-43 %) at perforated peptic ulcer unfortunately have not changed during the last decades. perforation was the cause of death in 70% of the patients with peptic ulcer. Scoring system such as , peptic ulcer perforation (PULP) score, Jabalpur score and ASA (American society of anaesthesiologists ) have been already developed for prediction of mortality at PPU **(P**erforated peptic ulcer**).**

To facilitate the management of perforated peptic ulcer and to improve the outcome it is important to stratify the patients based on prediction of morbidity and mortality. It is very important that high risk patients receive more appropriate treatment and greater intensive care.

In 1987 Boey et al introduced the Boey scoring system which included three independent risk factors i.e. duration of perforation, co-morbid disease and preoperative shock which makes the scoring system very

simple and easy to implement in all emergency situation[3]. Hence this prospective study was planned to evaluate the performance of Boey Score in risk stratified morbidity and mortality prediction in perforated peptic ulcer.

## II. Material And Methods

A prospective study of 100 patients was done, who presented with signs and symptoms of perforated peptic ulcer**,** were admitted in various surgical units of J.L.N. medical college and Hospital, Ajmer, Rajasthan, between 1st Jan 2019 to 31st dec.2019.

**Study Design:** Prospective open label observational study

**Study Location**: This was a tertiary care teaching hospital based study done in Department of General Surgery, at J.L.N. medical college and Hospital, Ajmer, Rajasthan.

**Study Duration:**. 1st Jan. 2019 to 31st dec.2019.

**Sample size:** 100 patients.

**Sample size calculation:** A prospective study of 100 patients was done, who presented with signs and symptoms of perforated peptic ulcer**,** were admitted in various surgical units of J.L.N. medical college and Hospital, Ajmer. **Subjects & selection method**: Peptic perforation was diagnosed by detailed history, existing co-morbid conditions, physical & per abdominal examination, routine and radiological investigations, with intra operative finding Any existing co morbid condition as diabetes, tuberculosis, respiratory, cardiovascular or renal diseases were taken for prediction of outcome. Detailed physical examination and hydration status were given due consideration. per abdominal examination including tenderness, guarding, rigidity and rebound tenderness were recorded at the time of admission. Emergency investigations radiological investigation of X ray Chest, X ray abdomen ( FPA ) along with USG abdomen recorded prior to patient taken up for definitive surgical procedure.

**Inclusion Criteria**: All patients who presented to surgical emergency and outpatient department, who were diagnosed as perforated peptic ulcer were included our study.

**Exclusion Criteria**: Patients below 12 years of age, those with malignant gastric perforation, primary peritonitis of other causes such as corrosive acid perforation, associated traumatic injury to other organs and those not likely to come for follow up were excluded from our study.

**The BOEY'S scoring system**

All patients with perforated peptic ulcer patients were divided into four groups based on Boey scoring group.

· **Group 1**: those who had no risk factor were include with score of Zero (0).
· **Group 2**: those who had one risk factor with score of One (1).
· **Group 3** : those who had two risk factor with score of Two (2).
· **Group 4** : those who had all three risk factor with score of Three (3).

Boey scoring system highlights that scoring is proportional to three risk factors predicting morbidity and outcome in operated perforated peptic ulcer patients.

The risk factors were duration of perforation, . concomitant severe medical illness, pre operative shock.

Duration of perforation was determined by time interval between the onset of symptoms of severe abdominal pain
and arrival time in the hospital. Concomitant severe medical illness included Heart disease, Lung disease, liver failure, diabetes, renal failure, immune compromised patients.

Shock was defined as persistent hypo-tension at the of admission with,

· Systolic BP less than 90 mm of Hg
· Mean arterial pressure less than 60
· Reduction in Systolic BP more than 40 mm of Hg from baseline.

Scoring system according to Risk factors included

*1.* Duration of perforation ( hours since perforation)
· <24 hours (less than) Score 0
· >24 hours (more than) Score 1

2.Concomitant severe medical illness
· Absent score 0
· Present score 1

3.Preoperative shock
· Absent score 0
· Present score 1

All patients with peptic ulcer perforation were treated with exploratory laparotomy and through peritoneal levage and modified Graham's patch repair and placement of drains, under general anaesthesia.

Antibiotics were given to all patients post operatively.

Anti-helicobacter therapy were given for fourteen days
once patient started oral feeding. All patients were followed up and assessed fortnightly and later for 3 months. Patients were assessed for their morbidity and recurrence of symptoms. Patients demographic profile, Boey score of three independent risk factors, operative details and surgical outcomes were analyzed. Mortality was defined as death during the primary hospital stay and re-admissions.
Morbidity was assessed in terms of
Length of hospital stay
Post-operative complications such as-
· Burst abdomen
· Surgical site infection
· Leak at the repaired site
· Pulmonary complications pneumonia, atelectasis, pleural effusion.

## III. III Observation And Results

**TABLE -1**
Sex distribution

| S.N. | Gender | No. of patients | Percentage (%) |
|---|---|---|---|
| 1. | Male | 92 | 92 |
| 2. | Female | 8 | 8 |
| | Total | 100 | 100 |

In our study out of 100 patients 92 ( 92 % ) were males and 8 ( 8%) were female.
it shows male predominance in our study.

**TABLE - 2**
Age distribution in years

| S.N. | Age in years | No. of patients | Percentage (%) |
|---|---|---|---|
| 1. | <30 years | 24 | 24 |
| 2. | 31-40 years | 42 | 42 |
| 3. | 41-50 years | 20 | 20 |
| 4. | 51-60 years | 12 | 12 |
| 5. | >60 years | 2 | 2 |
| | Total | 100 | 100 |

In our study maximum number of patients were 42 ( 42%) of between 31-40 years of age group, followed by 24 (24%) below 30 years of age group, 20 (20%) were of 41-50 years age group, 12 (12%) were between 51-60 years age group, only 2 (2%) were above 60 years of age .

**TABLE - 3**
Distribution of patients based on duration of perforation on arrival in hospital

| S.N. | Duration | No. of patients | Percentage (%) |
|---|---|---|---|
| 1. | >24 hours | 42 | 42 |
| 2. | <24 hours | 58 | 58 |
| | Total | 100 | 100 |

In over study out of 100 patients 58 (58 % ) were admitted with in 24 hour of onset of symptoms, and 42 (42%)
were admitted after 24 hour of onset of symptoms.

**TABLE -4**
Distribution of patients based on co morbid conditions

| S.N. | Co morbid condition | No. of patients | Percentage (%) |
|---|---|---|---|
| 1. | COPD | 18 | 18 |
| 2. | DM | 4 | 4 |
| 3. | COPD + DM | 2 | 2 |
| 4. | Absent | 76 | 76 |
| | Total | 100 | 100 |

There were some patients having co morbid condition, having COPD 18 (18%), DM 4(4%), COPD + DM 2(2%) with peptic perforation rest 76 ( 76%) cases were not having any associated co-morbidity.

**TABLE -5**

Distribution of patients based on presence of preoperative shock.

| S.N. | Pre operative shock | No. of patients | Percentage (%) |
|---|---|---|---|
| 1 | Present | 36 | 36 |
| 2 | Absent | 64 | 64 |
| | Total | 100 | 100 |

There were 36 (36%) patients presented with signs and symptom of shock at the time of admission, rest 64 (64%)
patients were without any signs and symptom of shock.

**TABLE -6**

Distribution of patients using Boey score

| Group | Boey score | Risk factor | No. of patients | Percentage (%) |
|---|---|---|---|---|
| 1 | 0 | No risk factor | 40 | 40 |
| 2 | 1 | One risk factor | 28 | 28 |
| 3 | 2 | Two risk factor | 22 | 22 |
| 4 | 3 | Three risk factor | 10 | 10 |
| Total | | | 100 | 100 |

On the basis of three risk factors (duration of perforation, co-morbid condition, preoperative shock), all patients were categorized into 4 groups.
first group were patients with no risk factor and Boey score was 0 and there were 40 patients (40%) .
Second group were with one risk factor with Boey score of 1 consisted of 28 patients (28%).
Third group was with any two risk factors and with Boey score of 2 included 22 patients (22%).
The Fourth group with all three risk factors with Boey Score of 3 included 10 patients (10%).

**TABLE -7**

Distribution of patients according to site of peptic ulcer perforation

| S.N. | Perforation Site | No. of patients | Percentage % |
|---|---|---|---|
| 1. | Pre pyloric | 62 | 62 |
| 2. | Pyloric | 26 | 26 |
| 3. | Duodenum first part | 12 | 12 |
| | Total | 100 | 100 |

On the basis of site of perforation, the most common site was pre pyloric in 62 ( 62%) patients, followed by 26
(26%) pyloric and 12 ( 12%) at the first part of duodenum.

**TABLE -8**

Incidence of pulmonary complications in patients categorized on basis of Boey score.

| S.N. | Boey score | Present (n%) | Absent n (%) | Total n (%) |
|---|---|---|---|---|
| 1. | 0 | 4 (10%) | 36 (90%) | 40 (100%) |
| 2. | 1 | 6 (21.4%) | 22 (78.6%) | 28 (100%) |
| 3. | 2 | 12 (54.5%) | 10 (45.5%) | 22 (100%) |
| 4. | 3 | 8 (80%) | 2 (20%) | 10 (100%) |
| | Total | 30 (30%) | 70 (70%) | 100 (100%) |

Pulmonary complications ( pneumonia, atelectasis , pleural effusion ) were present in all groups of patients stratified on the basis of Boey score. Overall 30% of patients had pulmonary complication. In patients with Boey score 0 group pulmonary complications were found in 4 patients (10%). In Boey score of 1 there were 6 patients (21.4%) with Boey score of 2 pulmonary complications were in 12 patients (54.5%).In Boey score of 3 eight patients (80%).

**TABLE -9**
Surgical site infection in different Boey group

| S.N. | Boey Score | Present n(%) | Absent n (%) | Total (n %) |
|---|---|---|---|---|
| 1. | 0 | 0 (0%) | 40 (100%) | 40 (100%) |
| 2. | 1 | 8 (28.6%) | 20 (71.40%) | 28 (100%) |
| 3. | 2 | 14 (63%) | 8 (36.4%) | 22 (100%) |
| 4. | 3 | 6 (60%) | 4 (40%) | 10 (100%) |
| | Total | 28 (28%) | 72 (72%) | 100 (100%) |

Overall surgical site infection was noted in 28 patients accounting for (28%) patients with surgical site infection. No surgical site infection was observed in patients with Boey score 0 groups. With Boey score of 1 group we found 8 patients (28.6%) and in Boey score 2 group 14 (63.6%) patients and in Boey score 3 in group 3 we had 6 patients (60%) . Comparing the incidence of surgical site infection of different Boey group an increasing trend is seen with increasing Boey score except in score 3 which might be because of less no of patients with high mortality.

**TABLE -10**
Incidence of burst abdomen in different Boey group

| S.N. | Boey score | Present n% | Absent | Total |
|---|---|---|---|---|
| 1. | 0 | 0 (0%) | 40 (100%) | 40 (100%) |
| 2. | 1 | 2 (7.1%) | 26 (92.2%) | 28 (100%) |
| 3. | 2 | 12 (54%) | 10 (45.5%) | 22 (100%) |
| 4. | 3 | 6 (60%) | 4 (40%) | 10 (100%) |
| | Total | 20 (20%) | 80 (80%) | 100 (100%) |

There were no patients of burst abdomen in Boey score 0 group. Boey score 1 group had 2 patients (7.1%) and Boey score 2 group had 12 patients (54.5%) and Boey score 3 group had 6 patients (60%) had burst abdomen.
Overall there were 20 patients (20%) who had burst abdomen showing an increasing trend.

**TABLE -11**
Incidence of leak at repaired Site in different Boey group

| S.N. | Boey Score | Present n (%) | Absent n(%) | Total n (%) |
|---|---|---|---|---|
| 1. | 0 | 0 (0%) | 40 (100%) | 40 (100%) |
| 2. | 1 | 0 (0%) | 28 (100%) | 28 (100%) |
| 3. | 2 | 4 (18.2%) | 18 (81.8%) | 22 (100%) |
| 4. | 3 | 2 (3%) | 8 (80%) | 10 (100%) |
| | Total | 6 (6%) | 94 (94%) | 100 (100%) |

There was no leak at repaired site in Boey score 0 and 1 group. It was observed that 4 patients (18.2%) in Boey score 2 and 2 patients (20%) in Boey score 3 group had leak.
Overall 3 patients (6%) had leak at repaired site in different groups.

**TABLE - 12**
Distribution of various complications

| S.N. | Complication | No. of patients | Percentage (%) |
|---|---|---|---|
| 1. | Pulmonary | 30 | 30 |
| 2. | Surgical site infection | 28 | 28 |
| 3. | Burst Abdomen | 20 | 20 |
| 4. | Leak at repaired site | 6 | 6 |

The most complication was pulmonary complication seen in 30(30%) of patients followed by surgical site infection in 28 (28%) of patients and burst abdomen in 20 (20%) of patients and least common was the leak at the repaired site with 6 patients (6%)

**TABLE -13**
Length of hospital stay (in days) in each group of Boey Score.

| S.N. | Boey score | No of patients | Minimum (Days ) | Maximum (Days ) |
|---|---|---|---|---|
| 1. | 0 | 40 | 6 | 14 |
| 2. | 1 | 28 | 7 | 15 |
| 3. | 2 | 22 | 7 | 28 |
| 4. | 3 | 10 | 3 | 21 |
| | Overall | 100 | 3 | 28 |

The duration of hospital stay varied from minimum of 3 days and maximum of 28 days and one patient died on third post-operative day because of severe post operative respiratory complications.

**TABLE -14**
Morbidity in each group in Boey score

| S.N. | Boey score | Present n (%) | Absent n (%) | Total ( n %) |
|---|---|---|---|---|
| 1. | 0 | 4 (10%) | 36 (90%) | 40 (100%) |
| 2. | 1 | 12 (42%) | 16 (57.1%) | 28 (100%) |
| 3. | 2 | 14 (63.6%) | 8 (36.4%) | 22 (100%) |
| 4. | 3 | 8 (80%) | 2 (20%) | 10 (100%) |
| | Overall | 38 (38%) | 62 (62%) | 100 (100%) |

Morbidity Included pulmonary complications, surgical site infection, burst abdomen, leaks at repaired sites. Overall the morbidity noted in was 38 (38%) patients. Comparing with different Boey score an increasing trend was noticed with increase in Boey score. Boey score 0 group the morbidity was in 4(10%) patients, 12 patients (42.9%) in score one and 14 patients (63.6%) in score 2 and lastly 8 patients (80%) in score 3 .

**TABLE -15**
Mortality in each group in Boey score.

| S.N. | Boey Score | Present (n%) | Absent (n%) | Total (n%) |
|---|---|---|---|---|
| 1. | 0 | 0 (0%) | 40 (100%) | 40 (100%) |
| 2. | 1 | 2 (7.1%) | 26 (92.9%) | 28 (100%) |
| 3. | 2 | 8 (36.4%) | 14 (63.6%) | 22 (100%) |
| 4. | 3 | 4 (40%) | 6 (60%) | 10 (100%) |
| | Overall | 14 (14%) | 86 (86%) | 100 (100%) |

Mortality occurred in only two patient (7.1%) in Boey Score 1 group, 8 patients (36.4%) in Boey score group 2 and 4 patients (40%) in group with Boey Score 3 group expired. Overall there were 14 patients (14%) who expired. Comparing the incidence of mortality with score pattern we notice an increasing trend as Boey score increases.

**TABLE -16**
Distribution of cause of mortality in various groups of Boey score

| S.N. | Causes | No. of patients (n) | Percentage (%) |
|---|---|---|---|
| 1. | Respiratory Failure | 10 | 10 |
| 2. | Myocardial infarction | 2 | 2 |
| 3. | Septicemic shock | 2 | 2 |
| | Total | 14 | 14 |

In our study 10 patients (10%) died of respiratory failure and 2 patient (2%) died of Myocardial infarction and 2 patients (2%) died of septicaemia shock.

## IV. Discussion

Perforated peptic ulcer is a common emergency surgery. Patients demographic profile along with 3 independent risk factor included in Boey scoring system (duration of perforation, co morbid conditions, preoperative shock) and operative details, surgical outcomes (complications, morbidity, mortality, length of hospital stay were analyzed and evaluation of scoring system was done in predicting morbidity and mortality among patients with perforated peptic ulcer. It was observed that PPU was common in males and also occurred in much younger age group .which was conformity with various study by other investigators[3,4,6,7]. This may be attributed to demographic profile of smoking, alcoholic beverages in younger age group in men thus increasing

the risk of PPU in young adults. However, PPU rising in elderly which is attributed to increasing use of NSAIDS in this population.

In our study pre pyloric perforation was commonest site while other investigators had reported first part of duodenum as common site for ulcer location. However all share the common patho-physiology with acid hyper secretion and high prevalence of helicobacter pylori infection.

In our study Modified Graham's patch with a pedicle omental patch repair was done in all cases with routine eradication of helicobactor pylori infection to avoid recurrences and re-perforation[1,2]. This empirical treatment was based on assumption that prevalence of Helicobactor pylori infection in PPU is very high (56-80%)[2]. Though in our study the overall morbidity was (38%),pulmonary complication (30%), wound infection (28%) which was attributed to the fact that all cases were actually upper abdominal surgery restricting vital capacity in early post-operative periods in spite of analgesia support and thus adding to pulmonary complications.

Wound infection rate was 28% in our study while an infection rate of 15-40% and overall post-operative complication in various studies ranged from 17-63%.

Though mortality figure in our patients was 14% over a period of 30 days but it escalated to 40 % with Boey score of 3 where all risk factors were present. Though overall mortality after surgery for PPU ranged from 6-14% and escalates to 30-60% with Boey score of 2 or more[5,7]. Mortality of 36.4%was noted in our study with Boey score of 2 and 40% with Boey score 3 Boey et al published results in with 100% mortality in Boey score of 3 in PPU[3]. Improved outcome by risk stratification dividing patients into high and low risk groups with improving critical care management are contributory factors for better outcome while old age and delay in treatment and definitive operation adds to mortality risk[7].

## V. Conclusion

Peptic ulcer perforation comprises one of the most common surgical emergency procedure in our country. It had mortality incidence of ranging between 6%-14%[5,7].

Thus it was imperative to identify high risk group patients subjecting them to risk analysis and planning their treatment as per need base and intensive care monitoring.

The present prospective study was designed and conducted in 100 patients presenting the peptic ulcer perforation and risk stratified using Boey scoring system. All underwent emergency laparotomy with Graham's omental patch repair. A statistical analysis of the post-operative complications, morbidity and mortality was done as Boey groups. An attempt was made to evaluate the Boey score to predict the morbidity and mortality in patients with perforated ulcer.

In our study we found that perforated peptic ulcer was more common in males than in females and that men in this series were younger than the women which are also in conformity with the various studies available in the literature. Pre pyloric region was the most common site of perforated peptic ulcer.

Pulmonary complications were the most common complication in our study followed by surgical site infections.

The accuracy of Boey score in predicting morbidity and mortality in patients with perforated peptic ulcer was 88.7% and 84.9% respectively which was near perfect prediction.

Perforated peptic ulcer is a fairly common serious surgical condition requiring emergency surgical management. Primary closure of the perforation with Graham's omental patch formed the mainstay of operative procedure in our study group as the size of the perforation in all the patients ranged between 0.5-1 cm.

Mortality rate was 14% and morbidity rate being 38%. A near perfect preoperative prediction certainly goes a long way in reducing the morbidity and mortality in such cases with timely institution of more aggressive treatment in such stratified and predicted high risk patient groups. Thus the Boey scoring system served as a simple precise predictor of postoperative mortality and morbidity.

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