

Evaluation of Mortality and Morbidity in Emergency Gastrointestinal Surgeries Using P-Possum Score in RIMS Ranchi

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ABSTRACT

BACKGROUND

Emergency GI surgeries are the most common surgical procedures done in most of the hospitals and health care centres. These surgeries hold a high risk of mortality and morbidity which can be effectively managed if predicted early. For this, P-POSSUM scoring system has been proved to be highly accurate in an emergency setting.

METHODS

This study was done in Rajendra Institute of Medical Sciences, Ranchi, over a period of two years, from February 2018 to October 2019. The sample size was 50 which included patients admitted in Emergency Department of RIMS, Ranchi, for emergency GI surgery. Patients with immunocompromised state, diabetes mellitus or of age <12 years and those who failed to follow-up were excluded from the study.

RESULTS

It was observed that out of 50 cases, intestinal perforation was the most common cause for emergency laparotomy. 36% cases had uneventful post-operative period, while 54% had some sort of complication and 10% died. On analysis of morbidity, the p-value was 0.778 (degree of freedom = 8), hence significant. On analysis of mortality, the p-value was 1.000 (degree of freedom = 8), hence significant.

CONCLUSIONS

P-POSSUM scoring system is an effective and accurate system for predicting mortality and morbidity in an emergency setting.

KEYWORDS

Emergency Gastrointestinal Surgery, Morbidity, Mortality, P-POSSUM Score

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BACKGROUND

Gastrointestinal surgical procedures can be elective, or it can be an emergency surgery and among the two, emergency surgeries have higher mortality and morbidity rates. The post-operative morbidity and mortality is highly influenced in GI surgeries due to variation in the surgical pathology and limited time period in which to optimize co-morbidities.^[1] As surgical safety is of concern and each surgical procedure comes along with inherent risks, it is important to set parameters for calculating mortality and morbidity rates.^[2]

To combat these problems a better scoring system was required which would help calculating the mortality and morbidity rates effectively in elderly, high risk patients and also in emergency patients. Therefore, this lead to the development of 'Physiological and Operative Severity Score for the Enumeration of Mortality and Morbidity' or 'POSSUM' scoring system. This scoring system lacked efficiency in many cases and thus it evolved to 'Portsmouth-POSSUM' or 'P-POSSUM' scoring system in which linear regression was applied to produce more predictable results. In this scoring system twelve physiological and six operative parameters are recorded indicated in Table 1.

Physiological Parameters	Surgical Parameters
<ul style="list-style-type: none"> • Age • Glasgow Coma Score • Haemoglobin concentration • White cell count • Serum sodium concentration • Serum Potassium concentration • Serum Urea concentrations • Heart rate • Systolic blood pressure • Respiratory co-morbidities • Cardiac co-morbidities • Electrocardiographic abnormalities 	<ul style="list-style-type: none"> • Operative severity • Degree of cancer spread • Peritoneal soiling • Number of procedures required • Blood loss • Urgency of surgery

Table 1. Physiological and Surgical Parameters of P-POSSUM Scores

These parameters are to be scored by four grade exponential scale as 1, 2, 4 and 8.^[3] Application of P-POSSUM score for calculating the risk of mortality and morbidity will be very helpful in assessing the outcome of the surgery and will be helpful in planning the treatment regimen for the gastrointestinal surgery.^[4] P-POSSUM scoring technique has been often used in assessing and auditing the performance of individuals and institution and it is appropriately called the Surgeon based Scoring System.^[5] Many research papers have been published in the developed countries proving the efficacy of this scoring system in predicting the risks in surgical procedures but only few studies have been performed in the developing countries.^[5,6,7]

METHODS

This prospective, cross-sectional and hospital-based study was done in 50 patients who were admitted to the Emergency ward of the Rajendra Institute of Medical Sciences, Ranchi and undergone emergency GI surgery during two years, from February, 2018 to October, 2019 with 30 days follow up period. The categorization of the patients

undergoing any GI surgery was done according to the P-POSSUM scoring system. Informed consent was taken and other procedures were followed as described by the Institutional Ethics Committee of RIMS, Ranchi. Appropriate workup was done in the hospital as required. The scoring of the patients was done by P-POSSUM system and calculation of mortality and morbidity rates was done after 30 days of follow up. Inclusion of the subjects was done among the patients who were admitted to the Emergency ward of the RIMS, Ranchi and undergone emergency GI surgery during two years. Exclusion of the patients was done if the patient was below 12 years of age, immuno-compromised, loss of follow up or suffering from disorders like Diabetes Mellitus etc.^[6]

RESULTS

Out of 50 patients that were included in the study, 34 (68%) were male and 16 (32%) were female. On analysing the age distribution, maximum number (16) of people belonged to age group between 40 years to 49 years, which was 34% of the total. Youngest patient in the study was aged 13 years and oldest being 82 years of age.

Case Diagnosis Analysis

Among 50 cases of emergency GI surgery, 14 (28%) cases were of intestinal perforation, 8 (16%) cases were of duodenal perforation while 7 (14%) cases were of intestinal obstruction. Rest cases include perforation peritonitis, appendicular perforation, sigmoid volvulus, antral perforation, appendicular abscess, gangrenous bowel, gastric perforation, obstructed inguinal hernia, prepyloric perforation, sigmoid perforation, strangulated femoral and incisional hernia.

Complication Analysis

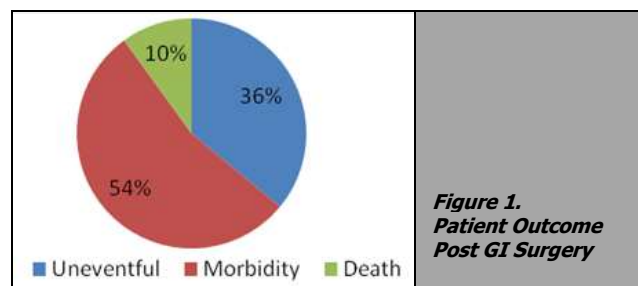
Among all the 50 cases, 18 (36%) had no significant morbidity, while in the rest 32 (64%) some sort of post op complications was seen. The most frequently occurring complication in the study was wound site infection, with total number as 10 (20%). The least common occurrence was of anastomotic leak.

Patient Outcome Post GI Surgery

Out of total 50, 27 (54%) had some sort of morbidity in post-operative period, 18 (36%) had an uneventful post-operative period, while 5 (10%) of patients died after the surgery.

Mortality Risk Frequency Statistics

Range of 9.9% risk was done to make 10 groups and then analysis was done, indicated in Table 2. The highest frequency was seen in the range of 20.1-30.0% which was 14 (28%). There were low frequencies in the higher extreme.



Mortality Score Range	Frequency	Percent
10.1 - 11.0	5	10.0
11.1 - 20.0	8	16.0
20.1 - 30.0	14	28.0
30.1 - 40.0	4	8.0
40.1 - 50.0	6	12.0
50.1 - 60.0	3	6.0
60.1 - 70.0	6	12.0
70.1 - 80.0	1	2.0
80.1 - 90.0	2	4.0
> 90.1	1	2.0
Total	50	100.0

Table 2. Morbidity Risk Frequency Statistics

Morbidity Risk Range	Frequency	Percent
20.1 - 30.0	2	4.0
30.1 - 40.0	1	2.0
40.1 - 50.0	1	2.0
50.1 - 60.0	3	6.0
60.1 - 70.0	5	10.0
70.1 - 80.0	9	18.0
80.1 - 90.0	10	20.0
> 90.1	19	38.0
Total	50	100.0

Table 3. Morbidity Risk Frequency Statistics

Morbidity Risk Frequency Statistics

The highest frequency of 19 (38%) was seen in the range of 90.1-100%, followed by range of 80-90.0% which was 10 (20%), indicated in Table 3. There was increased frequency in the higher extreme of the mortality risk range. This could be because of the reason that this study included cases of 'emergency' and 'major' gi-surgeries, which increases the operative score to a significant level. For analysis of significance of mortality and morbidity risk calculated by P-POSSUM Scoring, logistic regression was done, and the significance value calculation was done by Hosner - Lameshow Test. For this study p-value of 0.05 was considered as significant level.

DISCUSSION

For any surgical procedure done, the outcome of all patients is of utmost importance to the surgeon. Therefore preoperative check-up is done on all patients even in emergency cases so that the outcome could be predicted in the individual cases. In our study, 50 cases of emergency GI surgeries were studied, where expected and observed P-POSSUM score was compared to know the accuracy and significance of the scoring system. Of the total, 5 patients expired (crude mortality rate – 10%), 27 patients had complications (morbidity rate – 54%). Statistically there was insignificant difference between expected and observed cases of morbidity (chi-square – 4.808, df - 8, p-value – 0.778) and mortality (chi-square – 0.369, df - 8, p-value –

1.000) both. Therefore the scoring system, P-POSSUM is an accurate method of predicting outcomes in emergency GI surgery.

Copeland G P^[8] et al had applied the POSSUM system for a comparative audit in 344 patients undergoing reconstructive vascular surgery. The estimated mortality rate of 10.2% for unit A (observed 9.4%) and 20.2% for unit B (observed 20.2%) were obtained and using ROC curves it was proved that there was no statistically significant difference between the 2 units. They concluded that the POSSUM scoring system was a better guide for comparing efficiency of quality of care rather than crude mortality rates.

Sagar PM^[9] also used POSSUM scoring system to compare adverse outcome following colorectal resection in 438 patients among 5 surgeons. Their crude mortality rates ranged from 5.6% to 6.9% and morbidity rates varied from 13.6% to 30.6%, risk adjusted analysis using POSSUM score showed no statistically significant difference and the overall observed to expected ratio for mortality was found to be 0.87 and for morbidity 0.9. The POSSUM is a good indicator of adverse outcome.

Mohan Lal Echarya^[10] et al evaluated the POSSUM and P-POSSUM scores in predicting postoperative morbidity and mortality in patients undergoing emergency laparotomy. A total of 100 patients were included in this study. The observed (O) mortality was 12 (12.0%), while POSSUM predicted 40 (40%) and P-POSSUM 27 (27%). When the results were tested by Chi-square test, the P value was found to be 0.55 and 0.85 for POSSUM and P-POSSUM, respectively, which showed no significant correlation for observed and expected mortality. The observed morbidity was 69 (69%), while POSSUM expected morbidity was 79 (79%), and this again overestimates the morbidity. POSSUM is over predicting the rate of morbidity, and test of correlation showed no significance with P = 0.75. POSSUM and P-POSSUM were found to overestimate mortality and morbidity in our patient's population.

CONCLUSIONS

This research study was done in 50 cases of emergency GI surgeries, which includes 5 deaths. On application of P-POSSUM score same number of deaths were predicted. Twenty-seven cases were seen with some form of post-operative complications which was not significantly different from the expected rate of P-POSSUM score. Based on the results of this study, it can be said that the P-POSSUM scoring system is an accurate scoring system for predicting post-operative mortality and morbidity among cases taken up for emergency GI surgeries. The most common complication was of wound site infection and other infections which can effectively be prevented by proper pre-operative and post-operative use of antibiotics, good surgical skills, and proper post-operative care of the patient. Early ambulation of the patient and breathing exercise should be practiced. Despite P-POSSUM scoring system being effective in predicting the outcome of the patient, it has some

limitations one of which is its calculation is dependent on obtaining operative variables in the intra-operative period.

Financial or Other Competing Interests: None.

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