Assessment of morbidity and mortality by P-POSSUM scores in Emergency GI Surgeries

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Date of receiving: 15/1/2021

Date of peer review: 22/1/2021

Date of Acceptance 27/1/2021

DOI:10.47799/pimr.0902.05

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ABSTRACT

Background: Assessment of morbidity and mortality risk in emergency gastrointestinal surgeries is a fairly difficult challenge. To have a better scientific, reliable, and reproducible method of assessment POSSUM and its modified version P-POSSUM scores have been devised. In this study, we tried to evaluate the P-POSSUM Scores in patients undergoing emergency GI surgical procedures.

Methods: This study was done in the Department of General Surgery, PIMS a tertiary care hospital. Consecutive emergency surgical procedures following inclusion and exclusion criteria were selected for the study. A total of n=50 cases were included in the study. P-POSSUM scores were derived for each of the cases and analysis of the predicted morbidity and mortality was compared.

Results: The range of 9.9% risk was done to categorize into 10 different groups with increasing order of scores. The highest frequency was observed in 20.1 – 30.0% which was 22% lower frequency scores were observed in higher extremes. The morbidity risk scores show the highest frequency in 32% in the range of > 90.0 cases followed by 80.1 – 90.0 having cases of 28%.

Conclusion: P-POSSUM is an accurate and reliable scoring method for assessing morbidity and mortality in emergency Gastrointestinal surgeries. However, it was found to overestimate mortality and morbidity in our patient population. P-POSSUM over-estimates risk for morbidity in low-risk groups while it accurately predicts the risk in higher-risk groups.

Keywords: P-POSSUM, Emergency GI Surgeries, Morbidity, Mortality

Introduction

Gastrointestinal surgical procedures are sometimes required in emergencies such cases are often associated with higher mortality and morbidity. The postoperative sequelae are highly influenced by surgical pathology and due to limited period for optimizing existing co-morbidities in the patients.[1]Although the basic aim of any surgical procedure is a reduction in morbidity and mortality rates adverse outcomes do occur in case of emergency surgical procedures. An assessment of the efficiency of a procedure must be available because crude morbidity and mortality rates comparison does not give a clear picture due to the variability of patients' conditions. [2-4] To combat these problems a scoring system is required which would help in calculating the mortality and morbidity rates effectively in elderly and high-risk patients. This leads to the development of what is called a 'Physiological and Operative Severity Score for enumeration of Mortality and Morbidity or POSSUM scoring system. A recent modification called Portsmouth-POSSUM or P-POSSUM scoring system with more predictable results is used currently. [5]This risk scoring quantifies a patient's risk of adverse outcome based on the severity of illness which is derived from data available at an early stage of the hospital stay. [6] This helps the surgeons to plan and implement more effective treatment options available at their disposal. It has been found that P-POSSUM has predicted morbidity and mortality accurately in various settings and indirectly assesses the quality of health care provided. [7] It is often used as a tool to assess and audit the performance

of individuals or institutions. [7-9]It is operating surgeon-based score greater used in general surgeries, vascular surgeries, colorectal surgeries, oesophageal surgeries, laparoscopic and hepatic resections. [10, 11] Many studies involving the system have been conducted from developed countries and only very few studies have been undertaken in developing countries as a result the available data is very less. [12] Hence, we decided to study the score in our cases to assess the surgical outcome, either as morbidity or mortality in patients keeping in mind the different categories of patients seeking surgical care at our hospital including emergency GI surgeries.

Material and Methods

This cross-sectional study was conducted in the Department of General Surgery, Prathima Institute of Medical Sciences, Naganoor, Karimnagar. Institutional ethical committee permission was obtained for the study. Written consent was obtained from all the participants of the study.

Inclusion criteria

1. Patients undergoing emergency GI surgeries.
2. Patients above the age of 18 years.
3. Both males and females
4. Patients voluntarily willing to participate in the study

Exclusion criteria

1. Patients below the age of 18 years
2. Patients undergoing elective GI surgeries.
3. Immunocompromised patients
4. Patients lost to follow-up
5. Patients not willing for the study
6. Patients with Diabetes mellitus

Based on the inclusion and exclusion criteria n=50 consecutive patients were enrolled in the study. They included all forms of an emergency such as the acute abdomen, acute appendicitis, hollow viscus perforation, acute intestinal obstruction, and blunt abdominal injuries. The selected patients underwent thorough clinical examination and a detailed history including

similar complaints in the past or any previous surgeries were taken. All patients were

simultaneously evaluated for any systemic disease. Patients presenting with shock or

hypotension was adequately resuscitated before surgery.Routine investigations like Hb, TLC, BT, CT, Urine analysis, and blood grouping andcross-matching were done. All cases underwent ECG, Random Blood Sugar, blood ureaand serum creatinine, HIV/ HbsAg investigations. Chest X-ray and USG abdomen and pelvis, erect x-ray abdomen was done in all cases. A broad-spectrum antibiotic was given to all patients in the operation theatre at the time ofinduction of anesthesia.In all cases of hollow viscus perforation, acute intestinal obstruction & blunt injuryabdomen, midline laparotomy incision was given. All cases of acute appendicitis wereoperated on through McBurney's incision.The physiological component of the P- POSSUM data set was collected from parameters atadmission before starting any kind of treatment intervention. The operative componentwas computed after laparotomy and revised if the patient underwent re-laparotomy. Patientswere treated as per their individual needs throughout their hospital stay. Previouslygiven definitions of postoperative complications were used while recording morbidity asyes or no. Mortality was also recorded. Patients were discharged from thehospital only after satisfactory recovery. All discharged patients were followed up inthe surgical outpatient department for a minimum of one month for treating earlypostoperative complaints (mostly wound related) and recording death within this period ifany. Expected mortality was calculated from P-POSSUM mortality and morbidityequations using linear analysis.Chi-square test was used to deduce whether the variables advocated in the P-POSSUM score had a significant association with morbidity and mortality.

Results

In the present study, it was observed that the maximum numbers of cases undergoingemergency GI surgeries were those of acute appendicitis, accounting for about 52%. The next commonest were those of hollow viscus perforation 28%, followed by acute intestinal obstruction 12% and blunt injury abdomen with the incidence of 8%. The details of incidence are given in Table 1.

Table 1: Showing the incidence of diagnosis in cases of study

Diagnosis	Frequency	Percentage
Acute Appendicitis	26	52
Hollow Viscus Perforation	14	28
Acute Intestinal Obstruction	06	12
Blunt Injury Abdomen	04	08
Total	50	100

Of the n=3 cases in which mortality was observed, one case underwent emergency appendectomy for acute appendicitis. One case underwent exploratory laparotomy for hollow viscus perforation and one case was of acute intestinal obstruction. The cause of death was septicemia in n=1 case another cause of death in n=1 case was Aspiration pneumonitis.More cases of morbidity were observed from acute appendicitis at 6% followed by hollow viscus perforation in 4% cases.

Table 2: Incidence of mortality and morbidity

Diagnosis	Total No. of Cases	Mortality	Morbidity
Acute Appendicitis	26	1(2%)	3(6%)
Hollow Viscus Perforation	14	1(2%)	4(8%)
Acute Intestinal Obstruction	06	1(2%)	1(2%)
Blunt Injury Abdomen	04	00	1(2%)
Total	50	3(6%)	9(18%)

The total number of cases with postoperative complications were n=7(14%), wound infection was in n=4 cases, wound dehiscence, hypotension, and chest infection was in one case each. They have managed adequately.

Out of n=50 cases, n=45 was below aged below 60 years and 5 cases were in the range of 61 to 70 years. N=3 cases in which mortality was observed were below the age of 60 years. No significant association was noted between age and incidence of mortality. Postoperative complications in n=12 cases(24%) out of which n=10 cases were below 60 years and n=2 cases were from the age group of 61-70 years Significant association noted between age group and morbidity with P = 0.04.

Table 3: significance between the age, morbidity, and mortality

Age	No of cases	Mortality	P values	Morbidity	P values
< 60 years	45	3	X2 =0.655	10	X2 = 4.98
61 – 70 years	5	2	P= 0.551	2	P= 0.041

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. The parameters are scored by 4-grade exponential scales such as 1, 2, 4, and 8.[14]The range of 9.9% risk was done to categorize into 10 different groups with increasing order of scores. The highest frequency was observed in 20.1 – 30.0% which was 22% lower frequency scores were observed in higher extremes indicated in table 4.

Table 4: Mortality risk assessment P-POSSUM scores

Morality score range	Frequency	Percentage
10.1 – 11.0	4	8
11.1 – 20.0	9	18
20.1 – 30.0	11	22
30.1 – 40.0	4	8
40.1 – 50.0	4	8
50.1 – 60.0	7	14
60.1 – 70.0	2	4
70.1 – 80.0	5	10
80.1 – 90.0	3	6

> 90	1	2
Total	50	100

The morbidity risk scores show the highest frequency in 32% in the range of > 90.0 cases followed by 80.1 – 90.0 having cases of 28% depicted in table 5. Similarly, the increased frequency of cases was in the higher extreme of the morbidity risk range. The reason was in cases of emergency and major gastrointestinal surgeries the operative scores increase to a higher level. The analysis of mortality risk was calculated by P-POSSUM scoring, logistic regression was done, and the significance value calculation was done.

Table 5: Mortality risk assessmentP-POSSUM scores

Morbidity score range	Frequency	Percentage
20.1 – 30.0	3	6
30.1 – 40.0	1	2
40.1 – 50.0	2	4
50.1 – 60.0	5	10
60.1 – 70.0	3	6
70.1 – 80.0	6	12
80.1 – 90.0	14	28
> 90.0	16	32
Total	50	100

Discussion

The basic concept in health is to provide quality health care with a reduction in an adverse outcomes. By comparing adverse outcome rates, assessment of the adequacy of health care provided, and evolves new strategies for a better outcome. However, a comparison using crude mortality rate can be inaccurate as it does not consider the patients' condition andthe disease process. To overcome this shortcoming, POSSUM a risk-adjusted scoring system was proposed.[14] Later P-POSSUM, a modification of POSSUM, was proposed, as it correlates better with the observed mortality rate.[13, 15] But POSSUM must be correlated to the general condition of the local population for it to be effective. [2, 12] This is important for patients in developing countries like India where the general health of the population is variable and presentation frequently variable and delayed.[9]The validity of P-POSSUM scores was compared in 50 cases of emergency gastrointestinal surgeries. In this study. postoperative complications were n=7(14%), wound infection was in n=4 cases, wound dehiscence, hypotension, and chest infection was in one case each. Mohil RS et al; [16]found 20% cases of chest infection and wound infection in 35% cases. Rana DS et al; [17] found 58.65% cases of postoperative complication in which 27% were chest infections and 17% were wound infections. The crude morbidity rate in the study was 18% and the P-POSSUM scores expected morbidity was 61.25% statistically significant difference in observed and expected morbidity rates were observed X2=14.25 p=0.0414. It was also noted that the P-POSSUM score over-estimates risk for morbidity in low-risk groups while it accurately predicts the risk in higher-risk groups. Copeland GP et al; [18] found a POSSUM system for comparative audit in 344 cases of reconstructive vascular surgeries. The estimated mortality rate was 10.2%. For unit A and 9.4% for unit B 20.2% and using ROC curves, it was shown that no statistically significant differences between the two units. They concluded that the POSSUM scoring system was a better guide for comparing the efficiency of quality of care rather than crude mortality rates. Rana DS et al; found no statistically significant difference was found between the observed and expected morbidity rates. Similar findings were observed in Chieng et al; [19]and SunilKumar et al; [20]. Application of POSSUM scoring system to compare adverse outcome following colorectal resections was done by Sagar PM et al; [2] The crude mortality rates were from 5.6% to 6.9% and morbidity rates varied from 13.6% to 30.6% the risk-adjusted analysis by POSSUM scores showed no statistically significant difference in overall mortality rates. Comparison of POSSUM and P-POSSUM was done by ML Echara et al;[21]in patients undergoing emergency laparotomy. They observed mortality was 12.0% and while POSSUM predicted 40% mortality the P-POSSUM 27%. Similarly, the morbidity rates were 69% the POSSUM expected the morbidity to 79%. The test of correlation showed no significance.

Conclusion

Within the limitations of the current study, we can conclude that P-POSSUM is an accurate and reliable scoring method for assessing morbidity and mortality in emergency Gastrointestinal surgeries. However, it was found to overestimate mortality and morbidity in our patient population.P-POSSUM over-estimates risk for morbidity in low-risk groups while it accurately predicts the risk in higher-risk groups.

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How to cite this article : G. Chandra shekhar Goud, Kale Rajesh. Assessment of morbidity and mortality by P-POSSUM scores in Emergency GI Surgeries. Perspectives in Medical Research 2021; 9 (2):19-23

DOI:10.47799/pimr.0902.05

Sources of Support: Nil, Conflict of interest: None declared