ORIGINAL RESEARCH PAPER

General Surgery

STUDY OF P-POSSUM SCORE IN MANAGEMENT OF PATIENTS UNDERGOING GASTROINTESTINAL SURGERIES

KEY WORDS: P-POSSUM score, mortality, morbidity. gastrointestinal surgery.

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ABSTRACT

Background: Acute & chronic abdominal conditions requiring urgent surgery need timely treatment, mortality, and morbidity are important yardsticks for measuring surgical outcomes. Scoring systems like Portsmouth-Physiological and Operative Severity Score for enumeration Mortality and Morbidity (P-POSSUM) account for intraoperative events. **Aim:** To study the evaluation of the P-POSSUM score in patients undergoing gastrointestinal surgeries & correlation of the P-POSSUM score with expected morbidity. **Materials & Methods:** This prospective study was conducted at the surgery department of tertiary care hospital. A total of 300 patients undergoing gastrointestinal surgery were included in the study. **Results:** Out of 300 patients, 25 of them were associated with the death of the patient resulting in a crude mortality rate of 8.3 %.The majority of study subjects 136 had 16-20 physiological scores & 227 had 10-14 operative scores. An observed to the expected ratio (O: E) of mortality & morbidity was 0.78 & 0.92 there was no significant difference between the predicted and observed values. **Conclusion:** The present study suggests that P-POSSUM is an accurate scoring system for predicting postoperative adverse outcomes among patients undergoing major general surgeries.

INTRODUCTION

Acute & chronic abdominal conditions requiring urgent surgery need timely treatment, mortality, and morbidity are important yardsticks for measuring surgical outcomes. Various attempts have been made to predict the postoperative outcome after major surgeries so that decision-making regarding the feasibility of the surgery, resource allocation, counseling patients or their kin, clinical condition optimization, effective control of anesthesia and surgery, and adequate postoperative support and comparing the performance of different surgical teams can be made more systematically. There are many available morbidity and mortality predictors (ASA, APACHE, SAPS II). ASA (American Society of Anaesthesiologists) for general risk prediction, APACHE III (Acute Physiology and Chronic Health Evaluation III) for intensive care, Goldman Index for cardiac-related complications peri operatively and ACPGBI (Association of Colo Proctology of Great Britain and Ireland).

Scoring systems like Portsmouth-Physiological and Operative Severity Score for enumeration Mortality and Morbidity (P-POSSUM) and Surgical Apgar score (SAS) account for intraoperative events. But SAS does not include the patient's preoperative status, making it appear less representative of the postoperative course.

Portsmouth-POSSUM (P-POSSUM) includes both physiological and operative finding parameters. It is a widely used guide for better utilization of health care resources for postoperative patients. The POSSUM score describes 18 factors in two parts; 12 physiological factors (PS) and 6 operative factors (OS) from which predicted mortality can be calculated.

The mode and time of presentation are very much variable in the Indian scenario, so it's difficult and unrealistic to directly compare one patient with others. P-POSSUM scoring is valid in accurately predicting the mortality and morbidity rates, although, a bit over-prediction in low-risk cases.

So, this study was conducted to study the evaluation of the P-POSSUM score in patients undergoing gastrointestinal surgeries & correlation of the P-POSSUM score with expected morbidity.

MATERIALS AND METHODS:

Study Design: A Prospective study

Study Setting: Surgery department of tertiary care hospital

Study Duration: 18 months

Study Subjects: 300 patients undergoing gastrointestinal surgery were included in the study

Inclusion Criteria:

All patients undergoing gastrointestinal surgery were included in the study.

Exclusion criteria:

1. Patient age <15 and >75 years.
2. Patient died before intubation.
3. Not willing to participate in the study

P-POSSUM scoring

Copeland et al. first described POSSUM in 1991 as a scoring system for surgical audits. It has been called a surgeon-based scoring system. It was found to overpredict death, especially amongst low-risk patients. This led to the logistic regression modification and the P POSSUM's development.

These parameters are to be scored by a four-grade exponential scale as 1, 2, 4, and 8, in which the individual sum of physiological and operative severity scores was used to predict 30 days of postoperative morbidity and mortality using equations derived from logistic regression analysis. P-POSSUM, the refinement of the original scoring system, collects the same physiological and operative parameters, and a different formula is employed to calculate predicted mortality.

Physiological Parameters (12)	Operative Parameters (6)
• 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	• Operative severity • Degree of cancer spread • Peritoneal soiling • Number of procedures required • Blood loss • Urgency of surgery

The data analysis was done using SPSS version 28.

The expected mortality rate was obtained using linear regression analysis and the O: E ratio was calculated. The Chi-square test was then applied to obtain the p-value to note any significant difference between the predicted death rate and the actual outcome. The rate of increment in deaths for each risk factor was calculated based on the hypothesis that deaths were linearly related to the score for each studied risk factor. The 't-test was applied to validate this hypothesis significance level was kept at <**0.05.**

RESULTS AND ANALYSIS

Table 1. Distribution of patients according to age

Age	Number/Percentage Of Study Subjects
<60	102 (34)
61-70	166(55)
>71	32(11)
Total	300(100)

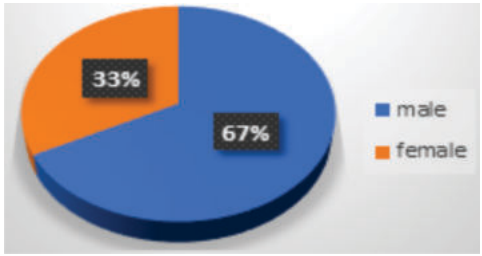

Figure 1. Distribution of study subjects according to gender

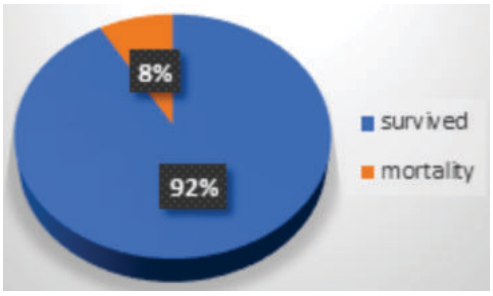

Figure 2. Distribution of study subjects according to the outcome

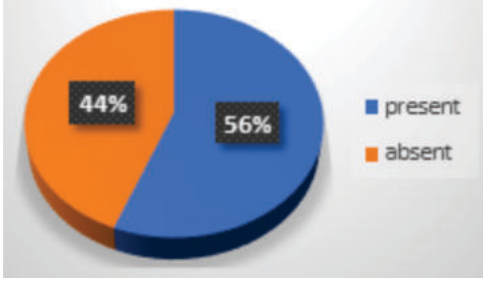

Figure 3. Distribution of study subjects according to status of morbidity

Table 2. Physiological score distribution and operative score distribution.

Scores		Total	Morbidity	Mortality
PS	11-15	58	11	0
	16-20	136	64	2
	21-25	73	61	5
	26-30	17	15	3
	31-35	0	0	0
	36-40	0	0	0
	41-45	16	16	15
OS	<10	0	0	0
	10-14	227	114	6
	15-19	55	35	4
	20-24	11	11	9
	>25	7	7	6

Table 3. Comparison of observed and expected mortality rate

Predicted risk for mortality	No of patients	Observed frequency	Expected frequency	O: E Ratio	Significance
1-10	255	0	0	0	Yates x2 = 1.526
11-20	12	0	0	0	
21-30	6	0	5	0	
31-40	5	0	4	0	
41-50	5	0	3	0	Yates p=0.56
51-60	0	0	0	0	
61-70	0	0	0	0	
71-80	4	4	4	1	
81-90	11	11	8	1.3	
91-199	15	15	8	1.8	
1-100	300	25	32	0.78	

Table 4. Comparison of observed and expected morbidity rate

Predicted risk for morbidity	No of patients	Observed frequency	Expected frequency	O: E Ratio	Significance
1-10	0	0	0	0	Yates x2 = 7.8
11-20	134	30	44	0.6	
21-30	27	22	23	0.9	
31-40	27	20	22	0.9	
41-50	15	11	13	0.8	Yates p=0.76
51-60	7	5	6	0.8	
61-70	9	7	7	1	
71-80	9	6	7	0.8	
81-90	28	25	27	0.9	
91-199	44	37	27	1.37	
1-100	300	163	176	0.92	

DISCUSSION

The basic and ultimate aim of any surgical procedure is to cause a reduction in morbidity and mortality rates which must be determined to cause evaluation and help in the faster adaptation of more effective treatment regimens. Rates of perioperative in-patient mortality and morbidity are important objective indices commonly used to evaluate the quality of surgical institutions. Therefore, preoperative assessment and predictions of postoperative outcomes are useful for reducing the morbidity and mortality associated with a given surgical procedure.

In our prospective study, we assessed the P-POSSUM score in 300 patients undergoing gastrointestinal surgeries & correlation of the P-POSSUM score with expected morbidity & mortality in a tertiary care center. The majority of study subjects 166 (51%) come under 61-70 years, with male preponderance 67%. (Table.1, Figure.1)

The majority of morbidity (16) & mortality (15) cases were seen in 41- 45 physiological scores similar to an operative score, suggestive of cases of morbidity and mortality was increased with increasing physiological & operative scores. (Table.2)

The mortality rate of the present study was 8% (25) which was comparable to **Sutton et al** reported observed mortality rate of 8.4% **Hota PK et al** reported 5 out of 80 cases (6.25%), **Anbarasu K et al** reported P-POSSUM predicted mortality rate was 13%. (Figure.2)

The present study shows morbidity in 168(56%) cases similarly**, Mahaseth et al** showed 65% of cases were with morbidity, and 50% by **Jhobta RS et al** in 2006. (Figure.3)

In the present study, on the application of linear analysis for p-POSSUM Mortality Score, the observed mortality was 25, p POSSUM expected mortality was 32, O: E ratio is 0.78. (Table.3)

Similarly, **Hota PK et al** reported a Comparison of observed and P-POSSUM predicted mortality rates done using linear analysis represented in Table 2. An observed to the expected ratio (O: E) of 0.71 was obtained and there was no significant difference between the predicted and observed values (Yates'x2 =1.667, P = 0.23). **Anbarasu K et al** reported on the analysis we found no statistical difference between observed and expected mortality rates (p = 0.59). An O: E ratio of 0.85 was obtained.

In the present study, on the application of linear analysis for the p-POSSUM Morbidity Score, the observed morbidity was 163, and p POSSUM expected morbidity was 176, O: E ratio being 0.92. (Table.4).

Similarly, **Hota PK et al** reported comparison of observed and P-POSSUM predicted morbidity rates was done using linear analysis, an observed-to-expected ratio (O: E) of 0.60 was obtained and there was no significant difference between the predicted and observed values (Yates'x2 = 8.00, P = 0.09). **Anbarasu K et al**. reported an observed to the expected ratio (O: E) of 0.76 was obtained and there was no significant difference between the predicted and observed values (p=0.089).

CONCLUSION

The present study suggests that P-POSSUM is an accurate scoring system for predicting postoperative adverse outcomes among patients undergoing major general surgeries. This study, therefore, validates P-POSSUM as a valid means of assessing the adequacy of care provided to the patient to prevent postoperative complications which can further lead to morbidity and mortality. It can be used for surgical audits to assess and improve the quality of surgical care and result in better outcomes for the patient preventing the anticipated complications in gastrointestinal surgeries.

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