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Study Of Evaluation Of P-POSSUM Scoring In Predicting The Mortality Of The Patient In Emergency Surgery In Tertiary Care Center.

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ABSTRACT

Emergency laparotomies necessitate prompt decision-making and precise risk assessment. This retrospective study, conducted from January to December 2021, aimed to evaluate the predictive efficacy of the Physiological and Operative Severity Score for the enumeration of Mortality and morbidity (P-POSSUM) in 100 cases of emergency laparotomies at a tertiary care center. Patient demographics, procedural characteristics, and physiological and operative severity scores were collected and analyzed. Statistical comparisons, linear regression analysis, and correlation assessments were employed to evaluate the association between P-POSSUM scores and mortality outcomes. Of the 100 patients, 72% were male, with a predominance in the <60 age group. The most common procedure was resection with iliostomy/colostomy (30%). P-POSSUM scores demonstrated a significant difference between the expired and survived groups ($p < 0.0001$). Linear regression confirmed the P-POSSUM score as a strong predictor of mortality ($p < 0.0001$), with a moderate correlation coefficient (0.32). The P-POSSUM score effectively stratifies mortality risk in emergency laparotomies, aiding in informed decision-making. While further research is warranted, our study underscores the score's utility in enhancing risk assessment and guiding management strategies in these critical scenarios.
Keywords: Emergency Laparotomy, P-POSSUM Score, Mortality Prediction.

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INTRODUCTION

Emergency surgery in tertiary care centers poses unique challenges, necessitating accurate risk assessment tools to predict patient outcomes [1]. The Portsmouth Physiological and Operative Severity Score for the enumeration of Mortality and morbidity (P-POSSUM) has emerged as a promising predictive model for mortality in emergency surgical settings. Our study aims to rigorously evaluate the efficacy of the P-POSSUM scoring system in forecasting mortality rates among patients undergoing emergency surgery in a tertiary care center [2, 3].

Considering the critical nature of emergency procedures, a reliable mortality prediction tool becomes paramount for informed decision-making and optimal resource allocation [4]. By investigating the predictive accuracy of the P-POSSUM scoring system, this research endeavors to contribute valuable insights that can enhance risk stratification and improve patient care strategies in emergency surgical scenarios [5-7]. The findings from our study may have significant implications for clinical practice, fostering a better understanding of mortality risk factors and ultimately improving the overall management of emergency surgery patients in tertiary care settings.

MATERIAL AND METHODS

Our retrospective study was conducted under the Department of General Surgery from January 2021 to December 2021, we aimed to assess the predictive efficacy of the Physiological and Operative Severity Score for the enumeration of Mortality and morbidity (P-POSSUM) in emergency laparotomies. A total of 100 cases, spanning the 12-month period, were included in the analysis. Comprehensive patient information, relevant medical history, and appropriate investigations were collected during hospitalization, following standard procedures.

Upon data collection, patients were scored based on their physiological parameters, including age, cardiac and respiratory history, blood pressure, pulse rate, Glasgow Coma Scale (GCS), hemoglobin levels, white blood cell (WBC) count, urea, sodium, potassium, and electrocardiogram (ECG) findings. Additionally, operative severity scores were assigned, considering all laparotomies as major. The physiological score ranged from 12 to 88, while the operative score ranged from 6 to 48, resulting in a minimum total score of 18 and a maximum of 136.

The mortality rates were observed and tabulated, and expected mortality rates were calculated using the P-POSSUM equation. Subsequently, linear regression analysis was applied to calculate the observed-to-expected (O:E) ratio. Chi-square tests were then performed to ascertain the significance of any differences between the predicted and observed mortality rates. A significance level of 0.05 was chosen for hypothesis testing.

Finally, vital parameters, demographic profiles, and details of emergency cases and surgeries were documented for statistical analysis. The obtained chi-square values and associated p-values were utilized to evaluate the significance and effectiveness of the P-POSSUM scoring system in predicting mortality and morbidity outcomes in emergency laparotomies.

RESULTS

In our study out of 100 patients 72(72%) were Male and 28(28%) were Female. In our study out of 100 patients 79(79%) patients were of <60 year age group,12(12%) patients were of 61-70 years of age group,9(9%) patients were >70 years of age group.

In our study out of 100 patients taken for laparotomy, Resection with ileostomy / colostomy was the most commonly done procedure with a total of 30 cases (30%). This was fallowed by Resection and anastomosis in 22 cases (22%), Primary Closure of perforation with omental patch 19 cases(19%), Adhesiolysis of band 8 cases(8%) and Appendicectomy 6(6%).

In our study out 100 patients 86 patients having no CVS abnormality (86%),12 patients were on antihypertensive (12%),1 patient on warfarin therapy (1%) and 1 patients found to have cardiomegaly (1%).

Physiological parameter total score

The physiological parameter total score was 28.6+9 (13-55). The median total score was 27 (IQR1-IQR3 22-33).

Operative total score

The operative total score was 17.2+4.1 (12-30). The median total score was 16.5 (IQR1-IQR3 13-20).

Table 1: Comparison of POSSUM score with Outcome

Groups	Mean POSSUM score	Statistical test applied	P value	Interpretation
Expired (n=27)	54.78+11.42	Unpaired t test	<0.0001	The mean POSSUM score in the expired group was significantly higher than the survived group
Survived (n=73)	42.48+8.51			

Table 2: Linear regression for prediction of mortality with POSSUM score

Variable	Coefficient	95% Confidence Limits	Standard Error	F-test	P-value
POSSUM score	0.021	0.014-0.028	0.004	33.9279	<0.0001
Constant	-0.688	-1.023- -0.353	0.169	16.5784	<0.001

Table 3: Correlation co-efficient =0.32

Source	dF	Sum of square	Mean square	F-statistic	P-value
Regression	2	5.0688	5.0688	33.9279	<0.0001
Residuals	98	14.6412	0.1494		
Total	99	19.71			

Co-efficient for POSSUM score is positive. The p value and 95% limits indicate that POSSUM score is a strong predictor of mortality.

DISCUSSION

Emergency laparotomies represent a critical aspect of surgical practice, often demanding rapid decision-making and intervention. In our retrospective study encompassing 100 cases over a 12-month period, we evaluated the efficacy of the Physiological and Operative Severity Score for the enumeration of Mortality and morbidity (P-POSSUM) in predicting mortality outcomes. The demographic characteristics of our patient cohort revealed a predominance of males (72%) and a higher prevalence in the age group of <60 years (79%). The most commonly performed procedure was resection with iliostomy/colostomy (30%), reflecting the acuity and complexity of cases in emergency settings [9, 10].

Our analysis incorporated both physiological and operative severity scores, with physiological parameters demonstrating a median total score of 27 (IQR 22-33) and operative severity scores

displaying a median total score of 16.5 (IQR 13-20). Notably, the physiological parameter total score ranged from 13 to 55, indicating a wide variability in patient presentations. This underscores the heterogeneity of cases encountered in emergency laparotomies, necessitating a comprehensive scoring system for accurate risk assessment [11-13].

The gender distribution in our study aligns with existing literature, where emergency surgical cases often exhibit a male preponderance. This observation may be attributed to the higher incidence of traumatic injuries and acute abdominal conditions in males. Additionally, the age distribution highlights the predominance of younger patients (<60 years) undergoing emergency laparotomies, emphasizing the urgency and severity of conditions affecting this demographic.

The procedural breakdown elucidates the spectrum of emergency laparotomies performed in our study. Resection with iliostomy/colostomy emerged as the most common procedure, reflecting the prevalence of conditions requiring bowel resection and diversion in emergency settings. This finding aligns with the acuity of cases and the need for expeditious surgical interventions to manage perforations or obstructions. The distribution of procedures underscores the diverse pathologies encountered in emergency laparotomies, emphasizing the importance of a scoring system that can accommodate this heterogeneity.

Cardiovascular abnormalities, crucial factors in mortality prediction, were observed in a minority of patients. The majority (86%) exhibited no cardiovascular abnormalities, while 12% were on antihypertensive medications, and 1% each were on warfarin therapy or presented with cardiomegaly. This distribution emphasizes the diverse clinical scenarios necessitating emergency laparotomies, ranging from trauma to acute abdominal pathologies, with varying degrees of cardiovascular involvement [14].

Our statistical analysis, comparing the mean P-POSSUM scores between the expired and survived groups, demonstrated a significant difference ($p < 0.0001$). The mean P-POSSUM score in the expired group (54.78) was notably higher than in the survived group (42.48). This underscores the utility of the P-POSSUM score in stratifying patients based on mortality risk, corroborating findings from previous studies.

Linear regression analysis further substantiated the predictive value of the P-POSSUM score in determining mortality outcomes. The positive coefficient for the P-POSSUM score (0.021) indicates a direct relationship with mortality, reinforcing its role as a prognostic indicator. The low p-value (<0.0001) and the narrow 95% confidence interval for the coefficient suggest the robustness of the P-POSSUM score as a strong predictor of mortality in emergency laparotomies.

The correlation coefficient (0.32) signifies a moderate positive correlation between the P-POSSUM score and mortality. While not exceptionally strong, this correlation is consistent with the multifactorial nature of mortality prediction in emergency surgical cases. The F-statistic (33.9279) for the regression model and its associated p-value (<0.0001) indicate the overall significance of the model in explaining the variance in mortality outcomes. The model's fit is reinforced by the proportion of total variability explained by the regression model (R-squared), suggesting that approximately 32% of the variability in mortality can be attributed to the P-POSSUM score.

Our study highlights the P-POSSUM score's effectiveness in predicting mortality in emergency laparotomies. The differentiation in scores between the expired and survived groups suggests the score's discriminatory ability in identifying high-risk patients. The incorporation of both physiological and operative parameters contributes to a comprehensive risk assessment, accommodating the diverse clinical scenarios encountered in emergency surgical practice.

The linear regression analysis establishes the P-POSSUM score as a significant independent predictor of mortality. The positive coefficient implies that as the P-POSSUM score increases, the risk of mortality also increases. This aligns with the intuitive expectation that patients with higher scores, indicative of more severe physiological derangements and operative complexity, are at a greater risk of adverse outcomes.

While the correlation coefficient indicates a moderate association, it is essential to acknowledge the multifaceted nature of mortality prediction. The P-POSSUM score captures a spectrum of physiological

and operative factors, but other unaccounted variables may contribute to mortality outcomes. Therefore, the modest correlation does not diminish the score's utility but underscores the complexity of predicting mortality in emergency surgical scenarios.

Despite the promising findings, our study has limitations. The retrospective nature introduces inherent biases, and the sample size may not fully represent the diversity of emergency laparotomy cases. Additionally, the study's single-center design may limit the generalizability of findings to broader populations. Future research could involve multi-center collaborations to enhance external validity.

CONCLUSION

In conclusion, our study underscores the P-POSSUM score's valuable role in predicting mortality outcomes in emergency laparotomies. The incorporation of both physiological and operative parameters provides a holistic assessment of risk, facilitating informed decision-making in high-stakes clinical scenarios. As we strive for continuous improvement in patient care, the P-POSSUM score emerges as a reliable tool, aiding surgeons in identifying and managing high-risk cases more effectively.

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