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Original Research Article

Assessment of surgical outcome in emergency gastrointestinal surgeries using P-POSSUM score

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ABSTRACT

Background: The physiological and operative severity score for the enumeration of mortality and morbidity (POSSUM) and its modification, Portsmouth-POSSUM (P-POSSUM), are considered as methods of risk scoring. Application of this scoring system helps in assessing the quality of the health care provided and surgical outcome. Its utilization in our country where the level of healthcare and resources differ is limited. Hence, a prospective study to assess the outcome of emergency GI surgeries using P-POSSUM scoring system in a teaching hospital at district level was taken up.
Methods: 80 cases which underwent emergency GI surgeries were studied. Using P-POSSUM equation, predicted mortality and morbidity rates were calculated and compared with the actual outcome. Statistical significance was calculated using chi square test.
Results: An observed to expected ratio of 0.71 and 0.60 was obtained for mortality and morbidity respectively. No significant difference was noted between expected to observed mortality and morbidity rates with P=0.23 and P=0.09 for mortality and morbidity respectively, suggesting a reasonably good quality of outcome. P-POSSUM over predicted mortality and morbidity in low risk groups while it accurately predicted the outcome in high risk groups.
Conclusions: The quality of surgical care provided and surgical outcome are comparable to other health care systems, with observed to expected mortality and morbidity ratio being nearly same. P-POSSUM can be used as a tool for outcome audits.

Keywords: Emergency gastrointestinal surgeries, Morbidity, Mortality, P-POSSUM

INTRODUCTION

Emergency gastrointestinal surgeries are commonly performed procedures having mortality and morbidity rates considerably greater than that of an elective surgery. Measuring the outcome of emergency surgical procedures is crucial for both the patient and health providers, by which improvement in the health service can be achieved.

The basic aim of any surgical procedure is reduction in morbidity and mortality rates. By comparing the influence on adverse outcome; assessment of the efficiency of that particular procedure and the quality of care provided can be done. But comparison using crude morbidity and mortality rates is fallacious because of differences in general health of the local population and variable presentation of the patient's condition.[1-3] Risk scoring seeks to quantify a patient's risk of adverse outcome based on the severity of illness derived from data available at an early stage of the hospital stay. The determination of outcome of surgery helps to plan and implement more effective treatment regimen.[4]

POSSUM and P-POSSUM are accepted methods of risk scoring. P-POSSUM has predicted morbidity and mortality accurately in various settings and indirectly assesses the quality of health care provided. It is often used as a tool to assess and audit the performance of individuals and institutions. It is often called surgeon based scoring system. Most of the studies mainly involve patients from developed countries. Only a few studies have been taken up in developing countries regarding risk adjusted audits of general surgical patients. Hence this prospective study was taken up in a teaching hospital at a district level catering mainly to the rural population.[5-9,13]

METHODS

This prospective study was carried out on 80 patients who were admitted in department of general surgery, Mamata General Hospital, Khammam and underwent emergency GI surgery during two years from October 2014 to September 2016 with 30 days follow up period. Patients undergoing any emergency gastrointestinal surgery were included and categorized as defined by the P- POSSUM scoring system.

Informed consent was taken. The protocol was approved by the Institutional Ethical Committee. During hospitalisation, appropriate work up as deemed necessary was done and operated. The patients were then scored depending on their physiological parameters and the intra operative findings. Then final expected mortality rate was calculated after 30 days. Patients of either sex undergoing emergency GI surgeries, above the age of 18 years and willing to participate in the study were included, while those below the age of 18 years, undergoing elective GI surgeries, immunocompromised, lost to follow-up, not willing for the study and those with Diabetes mellitus were excluded from the study.[5]

Statistical analysis

The equations used were: For mortality: Log (R/1-R1) = (0.1692 x PS) +(0.155 x OS) - 9. 065.Where R1 = risk of mortality. For morbidity: Log (R2/1-R2) = 5.91+(0.16xPS) +(0.19x OS) Where R2 = risk of morbidity the expected mortality and morbidity rate was obtained using linear regression analysis and the O: E (observed to expected) ratio was calculated. 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. These values were compared with other studies.

RESULTS

The present study was conducted over 80 cases of acute abdomen requiring emergency GI surgery admitted in the department of General Surgery, Mamata General Hospital, between October 2014 to September 2016. The incidence of various conditions presenting as acute abdomen which were included in the present study is represented in Table 1.

Table 1: Incidence of type of acute abdomen.

Diagnosis	No. of cases n=80	Percentage
Acute appendicitis	43	53.8
Hollow viscus perforation	23	28.7
Acute intestinal obstruction	10	12.5
Blunt injury abdomen	04	05
Total	80	100

Table 2: Comparison of observed and expected mortality rate.

Predicted risk for mortality (%)	No. of cases n=80	Expected mortality n=07	Observed mortality n=05	O:E ratio	Significance
0-5	62	02	00	00	
5-10	06	00	00	00	
10-20	03	00	00	00	
20-30	02	00	00	00	
30-40	01	00	00	00	
40-50	01	00	00	00	Yates' X^2=1.438
50-60	00	00	00	00	
60-70	00	00	00	00	
70-80	00	00	00	00	Yates' P= 0.23
80-90	01	01	01	1.0	
90-100	04	04	04	1.0	
Total	80	07	05	0.71	

Observed expected mortality rate: Comparison of observed and P-POSSUM predicted mortality rates was done using linear analysis represented in Table 2. An observed to 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). Comparison of observed and expected mortality using P-POSSUM score for mortality is depicted in Table 2.

Observed expected morbidity rate: Comparison of observed and P-POSSUM predicted morbidity rates was done using linear analysis represented in table 3. An observed to expected ratio (O:E) of 0.71 was obtained and there was no significant difference between the predicted and observed values (Yates'x2 = 8.00, P = 0.09). Comparison of observed and expected morbidity using P-POSSUM score is depicted in Table 3.

Table 3: Comparison of observed and expected morbidity.

Predicted risk for morbidity (%)	No. of cases n=80	Observed morbidity n=17	Expected morbidity n=28	O:E ratio	Significance
<10	00	00	00	00	
10-20	43	00	06	00	
20-30	07	00	02	00	
30-40	07	00	02	00	
40-50	01	00	00	00	Yates' X^2=8.00
50-60	02	01	01	1.0	
60-70	02	01	01	1.0	
70-80	02	02	02	1.0	Yates' P=0.09
80-90	05	03	04	0.75	
90-100	11	10	10	1.0	
Total	80	17	28	0.60	

Table 4: Incidence of post-operative complications noted in the present study.

Post-operative complications	No. of cases N=17
Wound infection	14
Wound dehiscence	13
Chest infection	01
Impaired renal function	01
Hypotension	01
Respiratory failure	01

Table 5: Analysis of association of variables with mortality and morbidity.

Variable	Mortality	Morbidity
Age	0.457	0.03
Cardiac history	-	-
Respiratory history	0.24	0.42
SBP	<0.0001	0.07
Pulse rate	0.04	0.09
GCS	-	-
TLC	0.00007	0.79
Haemoglobin	0.30	0.23
Serum sodium	0.002	0.22
Serum potassium	<0.0001	0.63
Blood urea	0.005	0.54
ECG	0.24	0.02
Mode of surgery	0.004	0.07
Multiple procedures	0.007	0.64
Operative severity	0.25	0.08
Peritoneal contamination	0.12	0.012
Amount of blood loss	0.012	0.17
Malignancy	-	-

(p<0.05=significant).

Post-operative complications

The incidence of various post-operative complications noted in the present study are depicted in Table 4.

The analysis of association of the 12 physiological and 6 operative variables is represented in Table 5.

DISCUSSION

The basic tenet in the health care is to provide quality health care with reduction in adverse outcome. By comparing adverse outcome rates, assessment of adequacy of care provided can be done and evolve new strategies for better outcome. In this study, P-POSSUM scoring was applied in 80 patients who underwent emergency GI surgeries and the observed and expected mortality and morbidity rates were compared.

In the present study, mortality was noted in 5 out of 80 cases (6.25%) which is in close resemblance to the average mortality in various studies Vishwani et al (6.75%), Afridi SP et al and Dorairajan et al (9.2%).[10-12]

No significant difference was noted in observed and expected mortality in higher risk groups with O: E ratio 0.71 and Yates' P=0.23. Similar findings were noted in a study done by Mohil RS et al (O: E = 0.66, x2 = 5.33, 9 df, p =0.619) and May S et al (O/E ratio was 0.63 with p value of 0.479), Kumar P et al (O: E ratio of 0.73, $\chi 2$ =2.4, 9 df, p=0.82).[13-15]

Leading cause of mortality was sepsis as noted in 4 out of 5 cases (5%) followed by aspiration pneumonitis in 1 case (1.2%). Similar findings were noted in a study done by May S et al with septicaemia being the cause of death in 3.3% cases and 14.5% of cases in a study conducted by Kitara DL et al.[14,16] P-POSSUM accurately predicts mortality in high risk groups and over predicts mortality in low risk groups. Similar finding was noted in a study done by Raut et al.[17]

Sensitivity of P-POSSUM score in predicting mortality was found to be 100% (95% CI 47.82-100) with a positive predictive value of 71.43%. Specificity of P-POSSUM score was found to be 97.3% (95% CI 90.7-99.68) with a negative predictive value of 100%.

Of the 12 physiological variables, low serum sodium levels, low serum potassium levels, elevated TLC, elevated pulse rate, low SBP and elevated blood urea levels and of the 6 operative variables, multiple procedures, mode of surgery and amount of blood loss were found to be significantly associated with mortality. Morbidity was noted in 17 cases (21.25%). Similar result was noted in a study done by May S et al (28.8%), Kumar P et al. (35.3%) and Akbar NA et al (44%).[14,15,18]

Commonest cause of morbidity was found to be wound infection as noted in 14 out of 17 cases (17.5%). Similar result was noted in studies done by Akbar NA et al (10%), Vishwani et al (28%), May S et al (9.2%) and Raut et al. (35.7%).[14,17,18]

Observed to expected (O: E) morbidity ratio in the present study was found to be 0.60. This is comparable to study by Mohil RS et al with O: E Ratio of 0.68 and Khan AW et al showing O: E Ratio of 0.66.P-POSSUM score for morbidity could accurately predict morbidity in cases with higher score.[13,19]

Age, ECG and peritoneal soiling were found to have significant association with morbidity. Sensitivity of P-POSSUM score in predicting morbidity was found to be 100% (95% CI 80.49-100) with a positive predictive value of 60.71%. Specificity of P-POSSUM score in predicting morbidity was found to be 82.54% (95% CI 70.9-90.9) with a negative predictive value of 100%.

CONCLUSION

P-POSSUM is a good tool for assessing the outcome of surgery and in turn to assess the quality of surgical care provided in variable settings. It can be used for surgical audit in assessing the outcome in cases undergoing emergency GI surgeries.

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