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ORIGINAL RESEARCH

Evaluation of Possum Scoring in Predicting the Morbidity in Patients Undergoing Laparotomy for Perforation Peritonitis

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Abstract

Introduction: Physiological and Operative Severity Score for the enumeration of Mortality and Morbidity was developed by G P Copland et al, driven by the need to develop a simple risk scoring system applicable to diverse general surgical populations. It is simple, easy and applicable to all general surgical procedures, requiring only 12 physiological and 6 operative facts, all easily available from routine admission and operation data. Despite advances in anti-microbial and supportive care, the mortality rate of diffuse suppurative peritonitis remains unacceptably high. A simple, accurate scoring system is needed in predicting outcome and help in prognostication of the patient. This study is done to evaluate the diagnostic validity of POSSUM score in predicting morbidity in patients undergoing laparotomy for perforation peritonitis

Methodology: It is adiagnostic test evaluation study conducted in general surgery department in a tertiary care centre in South India. Patients undergoing emergency laparotomy for perforation peritonitis in the age group above 13 years were included. Sample size was calculated as 86. Demographic information, physiological variables, operative variables are collected from case records. Morbidity values calculated by POSSUM equation. The patients' observed morbidity outcomes compared with the predicted outcomes using statistical analysis

Results: The main cause for perforation leading to surgery was pyloric perforation 29.1%, appendicular perforation 23%, ileal perforation 11%. Mostly patients in emergency were male (73%). Mean age of the emergency patients was 46 years with age range from 13-80. There was no significant difference between the observed and predicted values for morbidity.

Conclusion: Based on our study, POSSUM can be used as a good stratification tool for predicting morbidity within 30 days from the operative day in high risk patients. With this scoring system the outcome of the patient can be predicted and pre-operative counseling of the patient can be done. Not only that the care takers can be informed prior as a part of the informed consent and can be used for evaluation of the technique of pre-optimization in high risk patients.

Key words: POSSUM score, morbidity, perforation peritonitis

Introduction

A Physiological and Operative Severity Score for the enumeration of mortality and morbidity was developed by G P Copland et al, driven by the need to develop a simple risk scoring system applicable to diverse general surgical populations[1,2]. It is simple, easy and applicable to all general surgical procedures, requiring only 12 physiological and 6 operative facts, all

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easily available from routine admission and operation data. POSSUM was developed as a tool to compare morbidity and mortality in a wide range of general surgical procedures and should be applied at the time of induction of anaesthesia before surgery, intra operatively and followed up for up to 30 days.

Acute generalized peritonitis accounts for about 35.2% of all visceral surgical emergencies. The leading cause of generalized peritonitis is intestinal perforation which requires emergency surgical exploration and repair. This is associated with high incidence of post operative morbidity and significant mortality rate. Despite advances in anti-microbial and supportive care, the mortality rate of diffuse suppurative peritonitis remains unacceptably high. A simple, accurate scoring system is needed in predicting outcome and help in prognostication of the patient.

POSSUM is a two part scoring system that includes a physiological assessment and a measure of operative severity. There are 12 physiological and 6 operative variables which are divided into 4 grades with an increase in score. If a variable is not present, a score of 1 is allocated. The physiological variables are age, cardiac history, respiratory history, blood pressure, pulse rate, glasgow coma scale, haemoglogin, white cell count, serum urea, serum sodium, serum potassium, ECG and the operative variables are operative severity, multiple procedures, total blood loss, peritoneal spillage, presence of malignancy, mode of surgery. The minimum score is 12, with a maximum of 88. Once these scores are known it is possible to estimate the predicted risk of mortality and morbidity using a complex equation. Many studies in the literature shows POSSUM score useful in predicting the morbidity and mortality in emergency situations leading to emergency surgeries[2,3,4]. This study is done to assess the diagnostic validity of POSSUM in predicting morbidity in patients undergoing laparotomy for perforation peritonitis by identifying an optimum cut off for score with the help of an ROC curve and describing its sensitivity and specificity.

Materials &Methods

It is adiagnostic test evaluation study conducted in general surgery department in a tertiary care centre in South India. Study participants were selected by consecutive sampling. Patients undergoing emergency laparotomy for clinically and preoperatively confirmed cases perforation peritonitis in the age group above 13 years were included. Sample size was calculated as 86 based on the formula N =(Z1-α/2)2PQ / d2/ prevalence. Demographic information, physiological variables, operative variables were collected from case records. Morbidity values were calculated by POSSUM equation. The predicted morbidity was calculated by POSSUM equations. After surgery, the patient's observed morbidity was noted for a month and compared with the predicted outcome with statistical analysis after entering into Excel Spreadsheet and using SPSS software. Morbidity as evidenced by the presence of any of the following wound haemorrhage, pneumonia, Wound infection, Septicaemia, Wound dehiscence, Impaired renal function, anastamotic leak. Sensitivity and specificity of the score was calculated with actual clinical outcome as gold standard. Any p-value of 0.05 or less is taken as significant. 95% confidence intervals was also calculated.

Results

Commonest perforations leading to surgery were pyloric perforation 29.1%, appendicular perforation 23%, ileal perforation 11% (table 1). Mostly patients in emergency were males (73%). Mean age of the emergency patients was 46 years with age range from 13-80 yrs. Most common complication was wound infection, 58% (Table 2).

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Indications	Frequency	Percent
Pyloric perforation	25	29.1
Appendicular perforation	20	23.3
Ileal perforation	9	10.5
Jejunal perforation	6	7
Rectosigmoid perforation	4	4.7
Caecal perforation	2	2.3
Gall bladder perforation	6	7
Gastric perforation	6	7
Transverse colon perforation	1	1.2
Duodenal perforation	6	7
Multiple bowel perforation	1	1.2
Total	86	100

Table 1 : Indications for emergency surgical procedures done among study population

Complications	Frequency	Percent
Wound infection	50	58.1
Wound dehiscence	1	1.2
Chest infection	1	1.2

Table 2 : Complications following surgery

As per ROC curve obtained from our study, an optimum cut off of POSSUM score to predict morbidity defined as a composite outcome is 82.9 (figure 1). Diagnostic validity characteristics for this cut off have been calculated and are given in table 3.

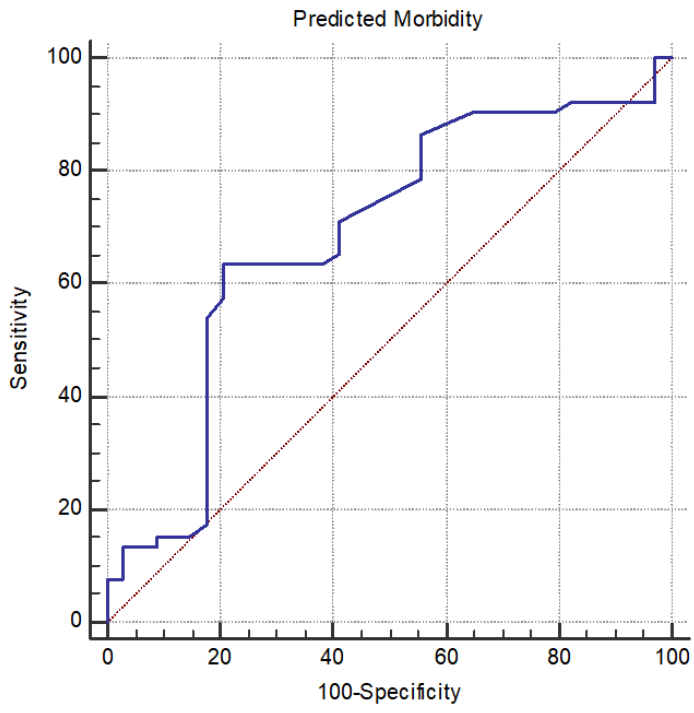

Figure 1: ROC curve to predict morbidity using POSSUM score with actual clinical outcome as gold standard

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Diagnostic validity characteristic	Proportion
Area under the ROC curve (AUC)	0.685
Standard Error	0.0613
95% Confidence interval	0.576 to 0.781
Optimum cut off	>82.9
Sensitivity	63.46
Specificity	79.41

Table 3: Diagnostic validity of POSSUM score cut off

Discussion

In this era of increased scrutiny, surgeons must be able to demonstrate clearly and accurately how they perform through comparative audit of mortality and morbidity rates. Thus audit of an individual surgeon, a unit or a hospital can be done simply by monthly meetings of mortality and morbidity or by many sophisticated scoring systems. POSSUM is such a scoring system which predicts mortality & morbidity. The main causes for perforation in our study leading to surgery were pyloric perforation 29.1%, appendicular perforation 23%, ileal perforation 11%. Study by Kumar D et al. also reports the similar conditions as the main causes of peritonitis.[5] Mostly patients in emergency were male (73%). Mean age of the emergency patients was 46 years with age range from 13-80. Most common complication being wound infection 58%. Wakabayashi H et al. reported that in elective digestive surgery, the POSSUM system can be useful in the risk assessment for surgery in elderly patients.[6] Jensen TC et al., Watanabe M et al., also found that in colorectal cancer surgery POSSUM predicted well.[7,8] Pratt W et al. reported that POSSUM is a valuable perioperative scoring system for pancreatic resections and outcomes, and can be employed to guide management decisions that impact postoperative recovery.[9]

Conclusion

In our study POSSUM can be used as a good stratification tool for predicting morbidity within 30 days from the operative day in high risk patients. One of the limitations in POSSUM is that it over predicts morbidity in some low risk patients. In high risk patients, POSSUM is fairly accurate is predicting morbidity. With this scoring system the outcome of the patient can be predicted and pre-operative counseling of the patient can be done. Not only that the care takers can be informed prior as a part of the informed consent and can be used for evaluation of the technique of pre-optimization in high risk patients. This study shows that although POSSUM over predicts the morbidity in some low risk patients it is a good method of evaluation

Bibliography

1. Copeland G.P. et al. POSSUM: a scoring system for surgical audit. Br J Surg1991; 78:356-60.
2. Lam C.M., Fan S.T., Yuen A.W.C., Law W.L., and Poon K. Validation of Possum scoring system for audit of major hepatectomy. Brjsurg 2004; 91: 450-4.
3. Mohil R.S., Bhatnagar D., Bahadur L., Rajneesh, Dev K.D., Magan M. Possum and P-Possum for risk adjusted audit of patients undergoing emergency laparotomy.Brjsurg 2004; 91: 500-3.
4. Tekkis P.P., McCuloch P., Poloniecki J.D., Prytherch D.R., kessaris N., Stegar A.C.. Risk adjusted prediction of operative mortality in oesophagogastric surgery with O. Possum. Brjsurg 2004; 91: 288-95.
5. Kumar D., Garg I., Sarwar A.H., Kumar L., Kumar V., Ramrakhia S., Naz S, Jamil A., Iqbal Z.Q., Kumar B.. Causes of Acute Peritonitis and Its Complication. Cureus. 2021

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May 28;13(5):e15301. doi: 10.7759/cureus.15301. PMID: 34221758; PMCID: PMC8237913

6. Wakabayashi H., Sano T., Yachida S., Okano k.. Validation of risk assessment scoring systems for audit of elective surgery for gastrointestinal cancer in elderly patients. International journal of surgery 2007; 5: 323-27
7. Jensen T.C., Bosco C., LAWL. Evaluation of P-POSSUM in surgery for obstructing colorectal cancer and correlation of the predicted mortality with different surgical options. Diseases of the colon & rectum 2005; 48: 493-98.
8. Makoto W., Naokuni Y., Tomokazu Osamukamisaka N, Mitsuo T. Estimation of Mortality and Morbidity Risk in Colorectal Surgery using POSSUM Predictor Equation. Japanese Journal of Gastroenterological Surgery 2004; 37: 1714-20.
9. Pratt W., Joseph S., Callery M., Vollmer C. POSSUM accurately predicts morbidity for pancreatic resection. Surgery; 143:8-19