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Mannheim Peritonitis Index as an Evaluative Tool in Predicting Mortality and Morbidity in Patients with Hollow Viscus Perforation Peritonitis

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Abstract

Background: *Despite advances in diagnosis, surgery, antimicrobial therapy and intensive care support, secondary peritonitis remains a potentially fatal condition especially if not treated at the earliest. Early assessment by scoring systems will influence the management and prognosis.*

Aim: *Evaluation of Mannheim Peritonitis Index (MPI) score for predicting the Mortality and Morbidity in patients with hollow viscus perforation peritonitis.*

Materials and Methods: *Prospective study of 100 patients with peritonitis due to hollow viscus perforation who presented to Kempegowda Institute of Medical Sciences*
HOSPITAL, BANGALORE from October 2014 to August 2016. The structured scoring system i.e. MPI was applied along with other clinical and biochemical parameters recorded in pre-structured proforma. Data was analysed for predicting mortality and morbidity using EPI info and SPSS software.

Results: *The overall mortality and morbidity was 19% and 57% respectively. MPI scores of ≤ 20, 21-29, and ≥ 30 had a mortality of Nil, 4%, and 15% respectively. MPI score of 30 had highest sensitivity of 100% and specificity of 91.43% in predicting mortality, 80.65% sensitivity and 75.83% specificity for morbidity. MPI score of > 25 were associated with 6.45 times higher risk of mortality (p=0.03), 5.72 times higher risk of morbidity (p=0.005) compared to patients with MPI score ≤ 25.*

Conclusion: *The MPI is a specific score, which has a good accuracy and provides an easy way to handle with clinical parameters, allowing the prediction of the individual prognosis of patients with secondary peritonitis. Increasing scores are associated with poorer prognosis, needs intensive management and hence it should be used routinely in clinical practice.*

Introduction

Acute generalized peritonitis due to hollow viscus perforation is a potentially life threatening condition. The prognosis of peritonitis remains poor despite development in diagnosis and management. Early identification of patients with severe peritonitis may help in selecting patients for aggressive surgical approach[1-3]. Grading the severity of acute peritonitis has assisted in decision making and has improved therapy in the management of severely ill patients[4]. Empirically based risk assessment for important clinical events has been extremely useful in evaluating new therapies, in monitoring resources for effective use and improving quality of care [5,6].

Many scoring systems have been designed and used successfully to grade the severity of acute peritonitis like, Acute physiology and chronic health evaluation (APACHE) II score, Simplified acute physiology score (SAPS), Sepsis severity

score (SSS), Ranson score, Imrite score, Mannheim peritonitis index (MPI)[7,8]. MPI was developed by Wacha and Linder in 1983[9]. It was developed based on the retrospective analysis of data from 1253 patients with peritonitis, in which 20 possible risk factors were considered. Of these only 8 proved to be of prognostic relevance and were entered into the Mannheim Peritonitis Index, classified according to their predictive power. Patients with a score exceeding 26 were defined as having a high mortality rate[9] The Mannheim Peritonitis Index (MPI) is a specific score, which has a good accuracy and provides an easy way to handle with clinical parameters, allowing the prediction of the individual prognosis of patients with peritonitis[10]. Realising the need for a simple accurate scoring system in these conditions the present study was undertaken to evaluate the performance of MANNHEIM PERITONITIS INDEX scoring system in predicting the risk of morbidity and mortality in patients with peritonitis due to hollow viscous perforation.

Materials and Methods

Prospective study of 100 patients with peritonitis due to hollow viscus perforation who presented to Kempegowda Institute of Medical Sciences Hospital, Bengaluru from October 2014 to August 2016.Patients presenting with peritonitis secondary to hollow viscus perforation were included in the study. Patients with primary peritonitis, peritonitis due to trauma, age less than 18 years and patients who were managed conservatively were excluded from the study. Initial preoperative work up and resuscitation with intravenous fluids, antibiotics, analgesics, nasogastric decompression was done in all the cases. Site of peritonitis secondary to hollow viscus perforation was diagnosed during surgery and was dealt with appropriate surgical procedure. Peritoneal lavage was given in all cases. The MPI [Table/Fig-1] was applied along with other clinical and biochemical parameters recorded in pre-structured proforma. Prediction was categorized into 3 groups: i) score ≤ 20 ii) Score 21-29 iii) score ≥ 30. Further resuscitation and ICU care was given as and when was necessary. Patients were followed up postoperatively till the outcome i.e. mortality, morbidity or discharge. Data obtained was analysed for predicting mortality and morbidity.

Table-1

RISK FACTOR	POINTS
AGE >50 YEARS	5
FEMALE SEX	5
ORGAN FAILURE	7
MALIGNANCY	4
PREOPERATIVE DURATION OF PERITONITIS >24 HOURS	4
ORIGIN OF SEPSIS NOT COLONIC	4
DIFFUSE GENERALISED PERITONITIS	6
EXUDATES	
CLEAR	0
CLOUDY,PURULENT	6
FECAL	12
DEFINITIONS OF ORGAN FAILURE KIDNEY	CREATININE > 1.6mg/dl UREA 60 mg/dl OLIGURIA <20 ml/hr
LUNG SHOCK	PaO2 <50 mmhg PaCO2 >50 mmhg HYPODYNAMIC OR HYPERDYNAMIC
INTESTINAL OBSTRUCTION	PARALYSIS >24 HOURS OR COMPLETE MECHANICAL OBSTRUCTION

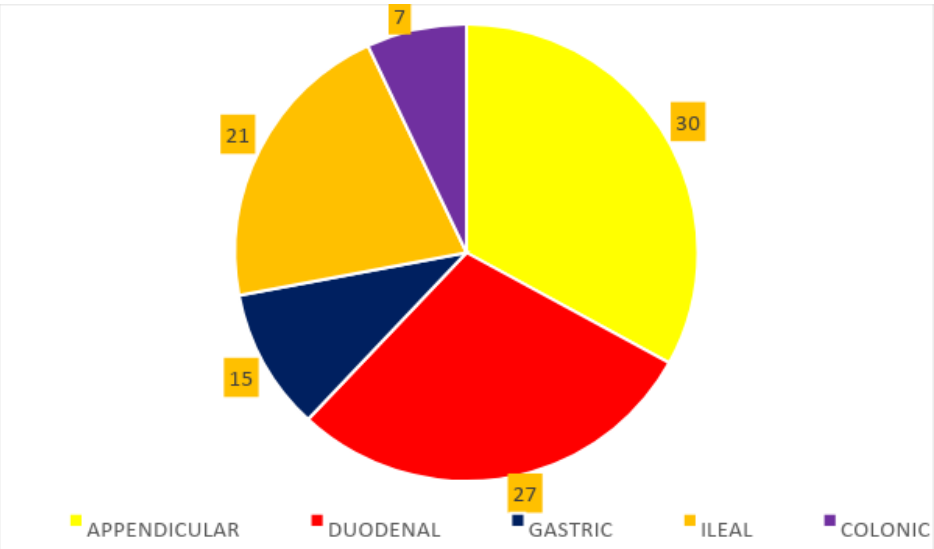
Statistical analysis

Statistical analysis was done using EPIINFO and SPSS (Version 16). Chi-squared test was used for intergroup comparisons. Risk ratio and 95% confidence interval (CI) were calculated for each group. ROC analysis was performed to identify the threshold with highest sensitivity and

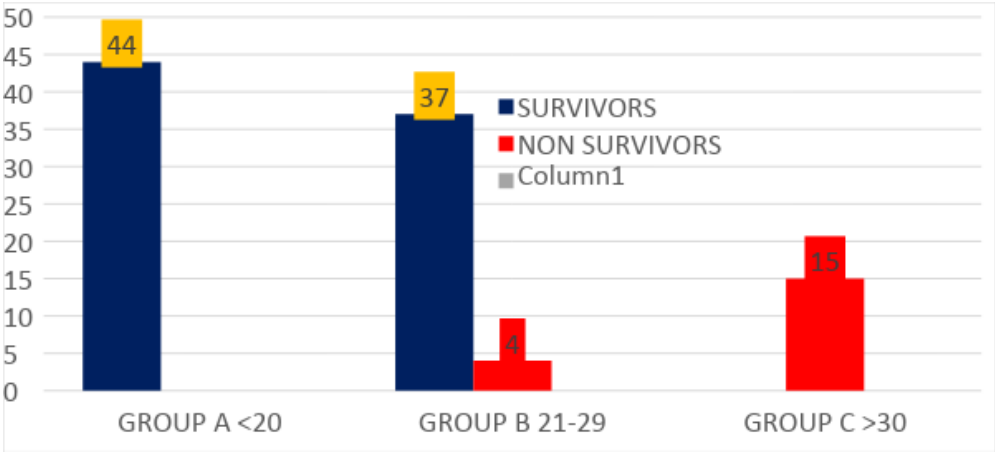
specificity and that threshold was used for classification in univariate and binary logistic regression analysis. The level of significance was fixed at p-value of < 0.05.

This study was conducted after obtaining the clearance from the ethical committee of the institute and informed written consent from the patients included in the study.

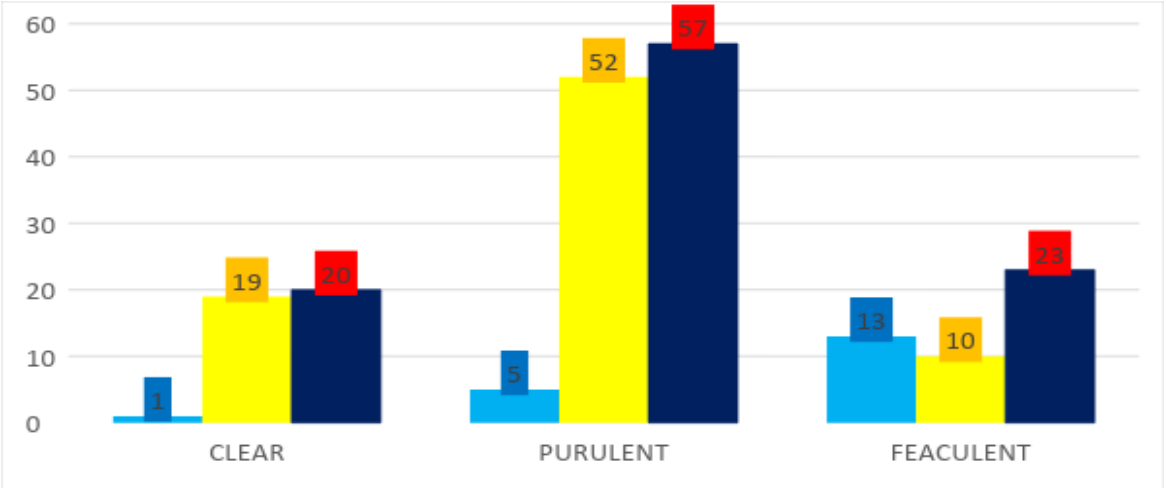
Site of Perforation (Table 2)



Distribution of MPI Score (Table 3)



Fate of patients according to colour of exudate (Table 4)



Results

Mean age in our study was 43.9 (± 13.8) years (range 19–80). For those who survived, Mean days of hospitalization was 13.3 days.

The site of perforation in our study is depicted in [Table/Fig-2].Simple closure of perforation was done in 14% cases, closure with omental graft was done in 42% cases, resection anastomosis in 10%, resection with ileostomy in 2%, appendicectomy in 30%, ileo-colonic anastomosis colostomy was done in 2% cases.

There were nineteen deaths (19%) in our study, fifteen patients died of multiple organ dysfunction and two patients died of cardiogenic shock and two due to Acute respiratory distress syndrome. Three patients in the study had perforation due to malignancy, two colonic and two gastric out of which two expired due to septicaemia and MODS. Mortality was 5% in patients who presented with clear exudates, 9% in patients who presented with purulent exudates and 57% in patients who presented with faeculent exudates.

MPI score was analysed with the mortality [Table/Fig-3] and type of exudate[Table/Fig-4] . With highest sensitivity of 72.09% and specificity of 71.43% ,MPI score of 25 was taken as a threshold value for dichotomous analysis using ROC curve [Table/Fig-4]. MPI score of 30 and more were associated with 100% mortality compared to patients with MPI score of 21-29 was 11% mortality and was statistically significant (p=0.03). Summary of the MPI in our study has been depicted in [Table/Fig-3].

MPI score was also evaluated with morbidity. Overall morbidity in our study was 57%. Pulmonary complications were seen in 31% cases, Hypotension in 26% cases, wound dehiscence was in 14%,cases,ARF was observed in 17% cases respectively. According to the analysis MPI score of ≥ 26 had 5.72 times higher risk of morbidity than MPI score of ≤ 25 (CI 1.60 – 20.48, p=0.005).

Discussion

Peritonitis secondary to hollow viscus perforation is one of the commonest reasons for emergency surgery done even today. Various factors like age, sex, organ failure, malignancy, extent of peritonitis, type of contamination, site of perforation, surgical interventions are all known to influence mortality and morbidity. Effective preoperative management, timely surgery and proper post-operative care will decide the outcome.

Different studies have mortalities ranging from 6.4% to 17.5%[12-15]. According to the literature MPI is an independent, objective and effective scoring system in predicting mortality and has advantages over the other scoring systems[15-18].

Kusumoto yoshiko et al., evaluated the reliability of the MPI in predicting the outcome of patients with peritonitis in 108 patients. A comparison of MPI and mortality showed patients with a MPI score of 26 or less to have mortality of 3.8%, where as those with a score exceeding 26 had mortality of 41.0%[19].

In a study conducted by Qureshi AM et al., score of < 21 had mortality of 1.9%, score of 21-29 had 21.9% and score > 30 had mortality of 28.1%. Mortality rate for MPI score more than 26 was 28.1% while for scores less than 26 it was 4.3% [20].

Malik AA et al., did prospective study using 101 consecutive patients having generalized peritonitis over a two-year period. In the MPI system, mortality was 0 in the group of patients with a score of less than 15, while it was 4% in the patients scoring 16-25 and 82.3% in those with scores of more than 25[21].

In our study patients with MPI scores of ≤ 20, 21-29, ≥ 30 had a mortality of Nil, 12%, and 100% respectively. Greatest sensitivity and specificity for the MPI score as a predictor of mortality was at the score of 30. We found, on dividing the patients into two groups around this threshold score a statistically significant difference in mortality with 12.1% mortality for 21-29 and 100% mortality for MPI > 29 (p=0.03).

This clearly suggests increasing risk of mortality with increasing MPI score, however to determine if this relationship is linear or exponential a larger study is required.

Conclusion

MPI is disease specific, easy scoring system for predicting the mortality in patients with secondary peritonitis.MPI score has the advantage of being easier to calculate with very minimum basic investigations and was specifically designed as scoring system for peritonitis. This will help us to divert the resources of hospital to appropriate patient help in decisions like transfer of patients to intensive care unit, the choice of more effective but expensive antibiotics and treatment modality.

Increasing scores are associated with poorer prognosis, needs intensive management and hence it should be used routinely in clinical practice.

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