Original Research Article

Validity of mannheim peritonitis index in predicting outcome of patients with perforative peritonitis in a tertiary care centre Kerala, India

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ABSTRACT

Background: Perforation peritonitis is one of the most commonly encountered surgical emergencies in our country. The prognosis of secondary 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.
Methods: The study was conducted in 128 cases of perforation peritonitis admitted and treated in the department of surgery in a tertiary care centre. Initial diagnosis was made on the basis of detailed history, clinical examination and presence of pneumoperitoneum on erect abdominal X-ray. Patients were first assessed using a predesigned Performa, then MPI score was calculated for each patient and the patients were followed-up till death or discharge from the hospital.
Results: The ROC curve analysis shows area under the curve was 0.986 with a standard error of 0.008, 95% CI (0.971 to 1.001), p<0.0001. In our study authors found that for the MPI score of 26, sensitivity was 91.3% and specificity was 92.4%, with a positive likelihood ratio of 12.01 and a negative likelihood ratio of 0.09. Age of the patient, presence of organ failure, associated malignancy, generalised type of peritonitis and the original MPI Score has got a significant association with the final outcome (i.e. p value <0.05).
Conclusions: MPI is an excellent prognostic index for peritonitis with high accuracy in individual prognosis that is cheap, cost effective, easily measurable and reproducible. The study accentuates that early diagnosis, appropriate resuscitation and prompt surgical intervention still remain the keystones in the management of perforation peritonitis.

Keywords: Mannheim peritonitis index score, Outcome prediction, Peritonitis, Validity

INTRODUCTION

Patients presenting with secondary peritonitis following perforation of a hollow viscus, is a common surgical emergency. These patients require resuscitation and emergency surgery failing which they develop sepsis which can lead to death of the patient.[1] Even with modern aggressive treatment of peritonitis, mortality is up to 40%. Factors determining the outcome in these patients with peritonitis include age, degree and duration of peritonitis, general health of the patient and nature of underlying cause. For better management of patients with peritonitis, they should be divided into groups whereby they can be instituted aggressive treatment and also for better allocation of resources.[2]

There are many prognostic indices available which are based on clinical features, biochemical investigations and invasive monitoring. Features of an ideal index are that it should be

highly accurate in predicting the outcome, easy to calculate and easy to use. The objective of this study is to evaluate the accuracy of Mannheim Peritonitis Index (MPI) in predicting the mortality in patients with perforation peritonitis. Even though many western studies are available regarding the usefulness of MPI in stratifying patients with perforation peritonitis, Indian studies are limited. Here in this study, the validity of MPI in predicting the outcome of patients with perforation peritonitis is estimated. By using MPI authors can stratify patients according to their MPI score and can provide better allocation of resources for those who require extra care.

METHODS

This is a prospective study conducted in Govt. Medical College Thiruvananthapuram, designed to evaluate the validity of MPI in predicting prognosis in patients with perforation peritonitis. A total of 128 patients with secondary peritonitis admitted in the department of Surgery, who underwent exploratory laparotomy were enrolled in the study. These 128 patients had confirmed diagnosis of perforation peritonitis. This study was conducted after obtaining clearance from the Institutional Human Ethics committee. Informed written consent from study participants before enrolling them in the study.

Table 1: Mannheim peritonitis index.

Risk factor	Weightage, if any
Age >50 years	5
Female gender	5
Organ failure*	7
Malignancy	4
Preoperative duration of peritonitis >24 hour	4
Origin of sepsis not Colonic	4
Diffuse generalized peritonitis	6
Exudates	
Clear	0
Cloudy, purulent	6
Faecal	12

* Definitions of organ failure: Kidney: creatinine >177 μmol/L, urea >16μmol/L, oliguria <20ml/h; Lung: pO2 <50mmHg, pCO2 >50mmHg; Shock: hypodynamic or hyperdynamic; Intestinal obstruction (only if profound): Paralysis >24 h or complete mechanical ileus.

The study extended for a period of nine months from December 2017 to August 2018. All consecutive cases with radiologically proven secondary peritonitis who underwent emergency exploratory laparotomy (radiologically proven means, either having free gas under diaphragm on erect x-ray abdomen or CT abdomen findings suggestive of pneumoperitoneum) were included in the study. The cases of primary peritonitis and patients who were treated conservatively for secondary peritonitis were excluded from the study. The patients were assessed using a predesigned Performa, MPI score (Table 1) was

calculated for each patient and the patients were followed-up till death or discharge from the hospital.

Statistical analysis was done using EPIINFO and SPSS (Version 16). Descriptive data analysis was performed for socio personal and clinical data. ROC analysis was done to identify the cut off score with highest sensitivity and specificity and that score was used for classification in univariate analysis using Chi-squared test to compare among groups. Risk ratio and 95% confidence interval (CI) were calculated for each group. Death was the main outcome measure against which the MPI scores were analyzed. The level of significance was fixed at p-value of <0.05.

RESULTS

In this study, 128 patients operated for perforation peritonitis during the study period were included, out of which 66.0% (84) were males and 34.0% (44) females. Out of the 128, majority 61.0% (78) were below the age of 50 years. Among the study participants 21% (27) had organ failure, 70% (89) presented 24 hours after the onset of symptoms and 18% (23) mortality was observed.

The ROC curve analysis shows area under the curve 0.986 with a standard error of 0.008, 95% confidence interval (0.971 to 1.001) and p <0.0001. In our study authors found that for the MPI score of 26, sensitivity was 91.3% and specificity was 92.4%, with a positive likelihood ratio of 12.01 and a negative likelihood ratio of 0.09. (Figure: 1)
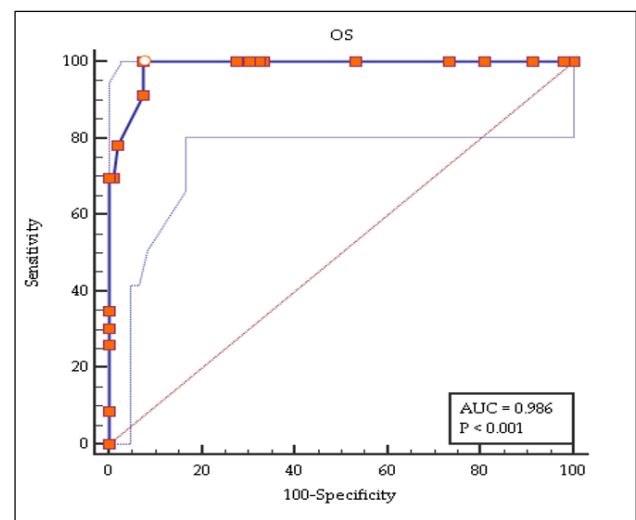

Figure 1: ROC curve of Sensitivity and Specificity of MPI score for mortality.

Out of the 128 patients studied in the series, majority of them were having MPI score <21(55%). 33% of patients were having MPI score 21-29. Only 13% of patients were having MPI score 30 or more. Among those with MPI score <21, 100.0% were discharged, those with MPI score 21-29, 83.3% got discharged whereas 16.7% got

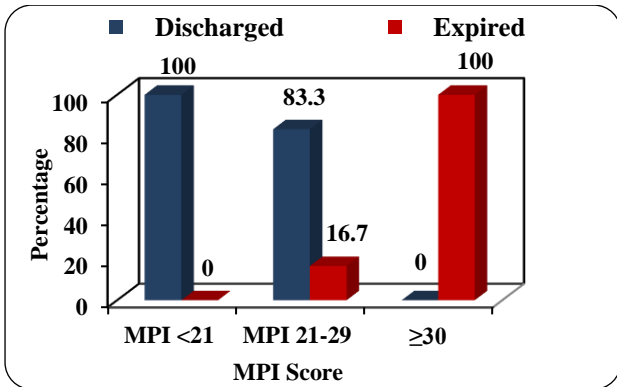expired and in those with MPI ≥30, 100.0% of them expired. (Figure 2).

Figure 2: Outcome distribution as per MPI score.

On analyzing the relation between individual variables in MPI Score and the outcome in this study it was found that age of the patient, presence of organ failure, associated malignancy, generalized type of peritonitis and the original MPI Score has got a significant association with the final outcome (i.e. p value <0.05) (Table 2).

DISCUSSION

The prognosis of peritonitis and intra-abdominal sepsis, particularly when multi-organ dysfunction develops, remains poor despite improvements in diagnosis and surgical and medical management of this condition. Early and objective classification of the severity of peritonitis may help in selecting patients for aggressive surgical approach.[3]

Table 2: Association between variables in MPI Score and the final outcome.

Variables	Total N=128	Survived (%) n=105	Death (%) N=23	p value
Age				
≤50	78 (60.9%)	74 (70.5%)	4 (17.4%)	<0.001
>50	50 (39.1%)	31 (29.5%)	19 (82.6%)	
Sex				
Male	84 (65.6%)	72 (68.6%)	12 (52.2%)	0.209
Female	44 (34.4%)	33 (31.4%)	11 (47.8%)	
Organ failure				
Absent	101 (78.9%)	97 (92.4%)	4 (17.4%)	<0.001
Present	27 (21.1%)	8 (7.62%)	19 (82.6%)	
Malignancy				
Absent	117 (91.4%)	100 (95.2%)	17 (73.9%)	0.005
Present	11 (8.59%)	5 (4.76%)	6 (26.1%)	
Preoperative duration				
<24hr	39 (30.5%)	33 (31.4%)	6 (26.1%)	0.799
>24hr	89 (69.5%)	72 (68.6%)	17 (73.9%)	
Origin of sepsis				
Colonic	6 (4.69%)	3 (2.86%)	3 (13.0%)	0.071
Not colonic	122 (95.3%)	102 (97.1%)	20 (87.0%)	
Type of peritonitis				0.001
Localized	41 (32.0%)	41 (39.0%)	0 (0.00%)	
Generalized	87 (68.0%)	64 (61.0%)	23 (100%)	
Nature of exudate				
Clear	2 (1.56%)	2 (1.90%)	0 (0.00%)	
Purulent	120 (93.8%)	100 (95.2%)	20 (87.0%)	0.100
Fecal	6 (4.69%)	3 (2.86%)	3 (13.0%)	

Several scoring systems have been developed for this purpose such as Acute Physiology and Chronic Health Evaluation (APACHE II), which considers 12 physiological variables, Simplified Acute Physiology Score (SAPS); Sepsis Severity Score (SSS); Ranson Score; Mannheim Peritonitis Index (MPI).[4-8]

The concept of MPI to measure the prognostic outcome in these patients in Indian setting is very much appealing and practically well suited, as India being a developing nation, there is always scarcity of resources. So, if authors are able to identify these high-risk patients of peritonitis or patients with poorer outcome; then the available resources can be better allocated and utilized.[8]

Out of the 128 patients studied in the series, majority of them were having MPI score <21(55%). 33% of patients were having MPI score 21-29. Only 13% of patients were having MPI score 30 or more. In this study authors found that for the MPI score of 26, sensitivity was 91.3% and specificity was 92.4%, with a positive likelihood ratio of 12.01 and a negative likelihood ratio of 0.09.

In a similar study conducted by Sharma et al, 100 patients were studied. It was found that the sensitivity of MPI was 92% with a specificity of 78% in receiver operating characteristic curves.[1] In another study conducted by Billing et al, it was found that, for a threshold index score of 26, the sensitivity was 86 (range 54-98) per cent, specificity 74 (range 58-97) per cent for predicting death.[9] In another study by Wabwire et al, ROC curve analysis showed a predictive power of 0.916 with a sensitivity of 88.9% and specificity of 85.2% at MPI of 29 points.[10]

So, to summarize, authors can say that the MPI is an excellent prognostic index for peritonitis with high accuracy in individual prognosis that is cheap, cost-effective, easily measurable and reproducible which guides in the better allocation of resources for those who require extra care.

CONCLUSION

Morphometric features of transverse and sigmoid sinus with other superficial landmarks is essential during poster lateral approaches to the posterior cranial fossa. The measurements of asterion with other bony landmarks provide database for the clinical-surgical practice and also for forensic and anthropological application.

ACKNOWLEDGEMENTS

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