Original Research Paper

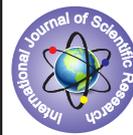# "SIGNIFICANCE OF MANNHEIM PERITONITIS INDEX AS AN EVALUATIVE TOOL IN PREDICTING MORTALITY IN PATIENTS OF PERITONITIS"

Surgery

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ABSTRACT A scoring system which can compare patient populations and severity of illness, objectively predict mortality, morbidity and can help to evaluate the treatment strategy is the direct need for evaluative research of intensive care. Keeping in mind that perforation peritonitis is the commonest surgical emergency in the lower rungs of the society which we encounter in our hospital, this study was undertaken to evaluate Mannheim Peritonitis Index (MPI) scoring system in defining the prognosis of the patients and to be able to deliver better patient care and furnish efficient management. It was a crosssectional study of 100 patients of perforation peritonitis who were admitted in surgery department over a period of two years. MPI score was calculated for each patient of peritonitis as per the score sheet. ROC analysis was done to identify the best cut off for MPI. The cut off from ROC curve came out to be 26. Sensitivity and specificity of MPI in predicting mortality was calculated to be 100% and 65.54 % respectively. The rate of mortality was 10% .This was a pioneering study in India where MPI scoring system has been applied specifically for patients of peritonitis in a our hospital setup. As there was an increase in mortality with the increment of MPI scores so we deduce that MPI score proved to be a useful tool to predict the mortality in patients of peritonitis.

INTRODUCTION

The outcome of surgical intervention; whether death or uncomplicated survival, complications or long term morbidity is not solely dependent on the abilities of the surgeon in isolation. The patient's physiological status, the disease that requires surgical correction, the nature of the operation and the pre operative and post operative support services have a major effect on the ultimate outcome.The systematic approach to quantifying illness in critically ill patients like peritonitis is a recent phenomenon1. Early and objective classification of the severity of peritonitis may help in selecting patients for aggressive surgical approach . The development of such systems has been specifically the need for methods to compare patient populations and severity of illness, objectively predict morbidity and mortality. Scoring systems like APACHE II, SAPS, MPI have been developed in response to an increasing emphasis on the evaluation and monitoring of health services (Notashet al., 2005; Wisner, 1992). Early evaluation of severity of lesion using Mannheim Peritonitis Index (MPI) allows us to estimate the possibility of patient survival. The MPI is one of the simplest scoring systems in use that allows the surgeon to easily determine risk during initial surgery. It is a disease specific score based on easy to handle clinical parameters. The recollection of retrospective data is possible and valid, because MPI only requires information routinely found in surgical registers. It takes into account age, gender, organ failure, cancer, and duration of peritonitis, involvement of colon and extent of spread and character of peritoneal fluid. Peritonitis due to perforation of gastro intestinal viscus is the most common surgical emergency in India. Despite advances in surgical techniques, antimicrobial therapy and intensive care support, management of peritonitis continues to be highly demanding, difficult and complex and the spectrum of disease is different from that found in the western world2 . Our hospital is located in urban India and caters to a low socioeconomic group of people in which peritonitis is common. As there is scarcity of data in this part of the world regarding the application of MPI for predicting outcome of patients with peritonitis, this study was undertaken to evaluate MPI scoring system in defining the prognosis of the patients as well as for better patient care and management.

MATERIAL AND METHODS
Setting

This study was carried out in the Department of Surgery

Study Design
This was an observational cross-sectional study.

A total of 100 patients of peritonitis who were admitted in surgery department over a period of two years were included in the study. All the patients who were operated for peritonitis and whose OT records were complete were included in the study. They were interviewed by the principal investigator and information was recorded and documented. After preoperative resuscitation the patient underwent exploratory laparotomy. Appropriate treatment was carried out according to the findings. Postoperatively standard care was given to all the patients. Patients were observed for complications and mortality

Mannheim Peritonitis Index – Score Sheet	
Risk factor	**Score**
Age > 50 years	5
Female gender	5
Organ failure*	7
Malignancy	4
Pre-operative duration of peritonitis >24 hours	4
Origin of sepsis non colonic	4
Diffuse generalized peritonitis	6
Exudate	0
Clear	6
Purulent	12
Faecal	

*Definition of organ failure
1) Kidney
a) Creatinine more than 177 micromole/litre   or
b) Urea more than 167 millimole/litre   or
c) oliguria less than 20 ml/hour
2) Lung: a) $pO_2 \leq 50$ mm of Hg b) $pCO_2 > 50$ mm of Hg
3) Shock: a) Hypodynamic   or   b) Hyperdynamic
4) Intestinal obstruction (only if profound)
a)Paralysis of more than 24 hours

b) Complete mechanical ileus [3]

Statistical Method
The MPI score was calculated as per the score sheet formulated below. Patients were grouped under three categories based on severity of disease; those with MPI less than 21, between 21 to 29 and those greater than equal to 30. Data were then analysed using SPSS software version 12.0 and rate of mortality was seen in each group.

Statistical Analysis
ROC curve was plotted for MPI and a cutoff point was found for the scoring system. At this given score the various indices such as True Positive, False Positive, False Negative, True Negative were calculated using these values the various statistical indices such as Sensitivity, Specificity, Positive predictive value, Negative predictive value, Likelihood ratio positive, Likelihood ratio negative were calculated.

RESULTS AND DISCUSSION
Results
The number of patients with age 0- 30 years was 33 between 31 to 60 were 59 and those with age more than 60 years were 8. There were 74 males as compared to 26 females.The symptomatology of patients are perforation peritonitis is enumerated in Table 1.

Table 1: Symptomatology

Symptom	Percentage
Pain abdomen	100 %
Vomiting	52.2 %
Distension of abdomen	36.3 %
Constipation/loose stools	31.8 %
Fever	26.1 %
Oliguria	13.4 %
Cold extremities	3.8 %

Some of the patients had presented with more than one symptom and the above values indicate the percentage of patients having a particular symptom amongst the total number of patient[4,5,6,7]

Duration of Symptoms
Out of total 100 patients 70 patients had presented within 24 hours of onset of features of peritonitis and 30 patients had presented after 24 hours of onset of peritonitis.

Site of Perforation
Gastroduodenal perforation was found to be the most prevalent. Ileal perforation being the second in order followed by jejunal, biliary perforationand there was one case of ceacal perforation.

According to the site of perforation the treatment was individualized

Complications
Of the 100 patients, 10 patients died in the post-operative period. Out of the remaining 90 patients who survived 50 patients had no complications and 40 patients had complications

Observed Mortality Rate
In the present study the numbers of deaths due to perforation peritonitis were 10 and hence the mortality rate was **10%.**

Mortality Predicted by MPI Score
MPI score was calculated for each patient of peritonitis as per the score sheet. The mortality rate in each group is shown in Table 2

Cut Off Point for MPI
ROC analysis was done to identify the best cut off for MPI. The cut off came to be 26 for which the sensitivity and specificity was calculated to be 100% and 65.54 % respectivelyFrom the ROC curve, (Figure 1.) the area under the curve for MPI was calculated as 88.9% which a statistically significant finding is.

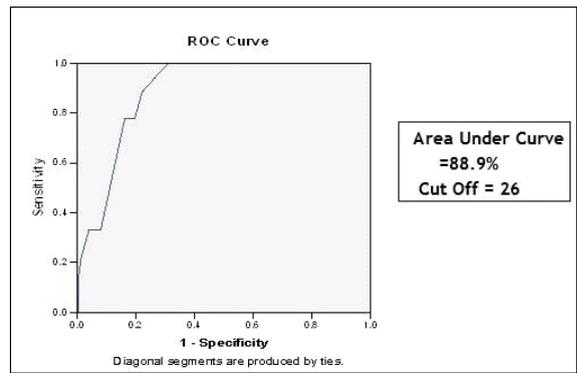### Table 2: Mortality rate by MPI scoring system

Score	Number of patients	Deaths	Mortality Rate
<21	45	0	0%
21-29	42	2	4.76%
≥ 30	13	8	61.53%

Figure 1: ROC CURVE OF MPI

Table 3: Analysis of MPI scoring system with cut-off of 26

Indices	MPI
Sensitivity	100 %
Specificity	65.54%
Positive Predictive Value	0.15
Negative Predictive Value	1
Positive Likelihood Ratio	2.857
Negative Likelihood Ratio	0

Table 5: Mortality rates for MPI score groups[8,9]

MPI score	Ermolovet al., (1996)	Quereshiet al., (2005)	Present study
< 21	0%	1.9%	0%
21-29	42%	21.9%	4.76%
> 30	100%	28.1%	61.53%

Conclusion
To conclude, ours was a pioneering study in India where MPI scoring system has been applied specifically for patients of peritonitis .

Till date no other studies have been found in the literature and on the internet data base as far as it could be traced; who have observed the potential of MPI score in Indian subcontinent for predicting the outcome in patients of peritonitis.

In our study, it was found that when MPI score increased, mortality increased so MPI score proved to be a useful tool to predict the mortality in patients of peritonitis. We propose that MPI would definitely be an effective objective aid in the hands of surgeons dealing with such patients in intensive care units.

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