

## Original Research Article

# Effectiveness of Mannheim peritonitis index in predicting the morbidity and mortality of patients with hollow viscous perforation

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**Received:** 28 November 2016

**Accepted:** 23 December 2016

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### ABSTRACT

**Background:** Peritonitis due to hollow viscous perforation is common cause of emergency surgery in India. Despite advances in surgical skills, antimicrobial agents and supportive care the morbidity and mortality of secondary peritonitis remains high. Prognosis and outcome of it depends on many factors which includes patient related factors, disease specific factors and management. Categorizing patients into different risk groups would help in management. Mannheim peritonitis index (MPI) is based on measuring simple clinical parameters in case of hollow viscous perforation. This study was conducted to know efficacy of MPI for predicting morbidity and mortality in hollow viscous perforation.

**Methods:** 50 patients with peritonitis undergoing surgical treatment at Dr. D.Y. Patil medical college, Nerul were included in study. Demographic, clinical data, surgical treatment, outcome were documented and analysed.

**Results:** The morbidity and mortality rate were higher in patients with MPI >29. Surgical site infections were most common complication in patients with MPI <21. Respiratory complications were common in patients with MPI >21. More ICU stay was required in in patients with MPI <21.

**Conclusions:** MPI which is very easy to calculate is simple and effective in predicting morbidity and mortality in patients with hollow viscous perforation.

**Keywords:** Hollow viscous perforation, MPI, Mortality, Peritonitis

## INTRODUCTION

Peritonitis secondary to hollow viscous perforation carries high risk of morbidity and mortality. Despite advances in medical field, the morbidity and mortality of peritonitis due to hollow viscous perforation remains high. A good scoring system is required for stratifying patients in different groups, use of different treatment modalities and monitoring outcome and improving standard of care.<sup>1,2</sup> Several scoring systems are there like acute physiology and chronic health evaluation II (APACHE II), Sepsis Severity Score (SSS), BOEYS etc. MPI is simple to calculate and specific allowing prediction of outcome of individual patient with peritonitis due to hollow viscous perforation. Mannheim

Peritonitis Index (MPI) was developed by Wacha and Linder in 1983.<sup>3</sup> 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 MPI, classified according to predictive powers.<sup>4</sup> Main objective of this study was to evaluate MPI in predicting morbidity and mortality of patients with peritonitis due to hollow viscous perforation.

## METHODS

This prospective observational study was conducted by the Department of General Surgery at Dr. D.Y. Patil

Medical College and hospital from December 2012 to July 2014. A total of 50 patients were included in study. Diagnosis of peritonitis due to hollow viscous perforation made by history and clinical examination, X-ray chest PA view and abdomen with both domes of diaphragm which shows air under diaphragm, detailed history of presenting illness and history suggestive of chronic health disorders such as cardiac, renal, hepatic conditions noted. Blood investigations done on admission and relevant clinical details noted. Standard operative procedures were followed for different causes of perforative peritonitis. Morbidity assessed in terms of post-operative complications such as pneumonia or lung atelectasis, wound infection, acute myocardial infarction or heart failure, intra-abdominal collection, acute renal failure and urinary tract infection. Mortality defined as any death occurring during the hospital stay.

#### Inclusion criteria

- Patients with clinical suspicion and investigatory support for the diagnosis of peritonitis due to hollow viscous perforation who are later confirmed by intra operative finding

#### Exclusion criteria

- Patients with hollow viscous perforation due to trauma,
- Patients with any other significant illness which is likely to affect the outcome more than the disease in study

Once diagnosis of peritonitis had been determined by operative findings, the patient was enrolled into the study. Using history, clinical examination and lab values risk factors found in MPI were classified according to values indicated and individual variable scores were added to establish MPI score. The cases were first grouped into three, as described by Billing: those below 21 patients, between 21-29 patients, and those above 29 patients. Patient evolution was followed, occurrence of complications and discharge due to improvement or death. Time elapsed from initial diagnosis to moment of event (death or discharge from hospital) was determined. Out-patient follow-up was continued for 30 days to establish perioperative morbidity and mortality. The

minimum possible score was zero, if no adverse factor were present, and maximum was 47 if presence of all were confirmed. Analysis was done with each variable in the scoring system as an independent predictor of morbidity or mortality and the scoring system as a whole.

#### Statistical analysis

The data was analyzed using SPSS software version 16.3. Each variable in the MPI score along with other patient variables was analyzed using chi square analysis with various outcomes that were noted in the study. P value <0.05 was taken as significant in this study. The results were averaged (mean + standard deviation) for each parameter for continuous data and numbers and percentage for categorical data presented in table and figure. Proportions were compared using Chi-square test of significance.

**Table 1: Mannheim peritonitis index.**

Risk Factor	Weightage
Age >50	5
Female gender	5
Organ failure*	7
Malignancy	4
Preoperative duration of peritonitis > 24 hours	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
<b>Exudates</b>	
Clear	0
Purulent	6
Fecal	12

\* Kidney failure = creatinine level >177 umol/L or urea level >167mmol/L or oliguria 20ml/hour; Pulmonary insufficiency = PO<sub>2</sub> <50 mmHg or PCO<sub>2</sub> >50 mmHg; Intestinal bstruction /paralysis >24hours or complete mechanical ileus, Shock: systolic blood pressure <90mm of hg, MAP<60mm of hg

#### RESULTS

In this study, 50 patients with diagnosis of secondary peritonitis were included. Patient with age 16 yrs to 79 yrs was part of study. Males accounted for 62% of the patients in the present study.

**Table 2: Morbidity (Complications) and MPI Score.**

MPI score	Surgical site infection	Respiratory	Cardiovascular	Endotoxic Shock	Multi-Organ disfunction
<21	4	0	1	0	0
21-29	8	12	3	1	1
>29	6	10	9	3	4
Total	14	22	13	4	5

The most common site of perforation was duodenum (44%), appendicular perforation (30%) being next common. 42% of study population was in low risk group (score <21) and 20% were in high risk (score >29). Patients with organ failure on admission, longer duration of illness before surgery, diffuse peritonitis, and feculent exudates were more likely to have higher scores and hence fall into high risk group than their counterparts. Patient with less MPI score required less number of ICU stay.

Around 80% of high risk group (MPI >29) required more than 5 days of ICU stay. Morbidity (in form of post-operative complications) and MPI score-Respiratory complications in form of lower respiratory tract infection, post-operative pneumonia, and pleural effusion were most common complication. High risk group (MPI>29)

has more complications than intermediate (MPI 21 TO 29) and low risk group (MPI <21).

**Table 3: Mortality and MPI Score.**

Outcome	MPI Score			Total
	< 21	21-29	>29	
Discharged	21	18	6	45
Dead	0	1	4	5
Total	21	19	10	50

p value is 0.002 i.e. (<0.05)

Mortality rate was 40% in high risk group (MPI score >29). There was no mortality in low risk group (MPI score <21). Mortality rate was 5.26 % in intermediate risk group.

**Table 4: Outcome of patients according to MPI variable.**

Risk factor	Discharged	Death	Total
Age >50 years	18	3	21
Female gender	16	3	19
Organ failure	4	6	10
PDP >24 hours	35	6	41
Origin of sepsis not colonic	45	5	50
Diffuse generalised peritonitis	26	5	31
<b>Exudates</b>			
Clear	17	0	17
Purulent	22	1	23
Fecal	6	4	10
Malignancy	0	0	0

## DISCUSSION

The rate of death in patients with peritonitis is still very high with the mean being 19.5% and reaching upto 60% in some studies.<sup>4-6</sup> Few of the other studies confirmed age as a decisive factor related with mortality however this study does not show any statistical significance. In other studies, patients with generalized peritonitis range from 30–66%; in present study, generalized peritonitis was present in about 62% of the patients.<sup>6</sup>

The influence of gender on prognosis has been shown of little importance in this study. Gender composition cited in other publications showed percentages, varying from 43 to 52% females and 48 to 57% male 62% were male in this study.<sup>6,7</sup>

Mean MPI score reported in literature for localized peritonitis is 19 (range 0 to 35) and in generalized peritonitis, 26 to 27 points (range 11 to 43) which is similar to the values noted in this study.<sup>6,7</sup> Notash AY, et al have shown important cut-off points to be 21 and 29

when using the MPI, with mortality of 60%, and up to 100% for scores of more than 29.<sup>8</sup>

## CONCLUSION

This is a validation study of the Mannheim peritonitis index scoring system for predicting the morbidity and mortality in patients with peritonitis due to hollow viscous perforation. The results of this study proves that MPI scoring system is a simple and effective tool for assessing this group of patients, and can be used as a guiding tool to decide on the management of the patient after the definitive procedure is done.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Patil VA, Mahapatra B, Panchal A, Deolekar S. Effectiveness of Mannheim peritonitis index in predicting the morbidity and mortality of patients with hollow viscous perforation. *Int J Res Med Sci* 2017;5:533-6.