

## Research Article

# Effectiveness of Mannheim peritonitis index scoring system in predicting the morbidity and mortality in peritonitis due to hollow viscous perforation

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### ABSTRACT

**Background:** This study attempts to evaluate the prognostic value of MPI scoring system in patients with peritonitis due to hollow viscous perforation, to assess it as a clinical tool in stratifying these patients according to individual surgical risk.

**Methods:** 52 patients with hollow viscous perforation admitted in Navodaya hospital from June 2013 to June 2015 were included in the study. Necessary data was collected; MPI score was calculated for each patient and analysis done.

**Results:** The number of post operative complications, duration of ICU and hospital stay proportionately increased with the MPI score. Out of the 8 variables used in this scoring system, duration of pain, intra peritoneal fluid and organ failure on admission carried more significance in predicting the morbidity in the post op period than the other variables.

**Conclusions:** Mannheim peritonitis index is a simple and effective method in predicting the morbidity and mortality of patients with peritonitis due to hollow viscous perforation.

**Keywords:** Mannheim peritonitis index, Hollow viscous perforation, Peritonitis

### INTRODUCTION

Acute generalized peritonitis from gastrointestinal hollow viscous 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.<sup>1-3</sup>

Grading the severity of acute peritonitis has assisted in no small way in decision making and has improved therapy in the management of severely ill patients.<sup>4</sup> 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.<sup>5,6</sup>

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).<sup>7,8</sup> MPI was developed by Wacha and Linder in 1939. 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. 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.<sup>9</sup>

## METHODS

Total of 52 patients with peritonitis due to hollow viscous perforation who would present to Navodaya Medical College Hospital & Research Centre, Raichur.

**Duration of the study:** June 2013 - June 2015

**Method of collection of data (including sampling procedure, if any):**

Our study is a prospective study conducted over a period of 24 months. After obtaining detailed history, complete general physical examination and systemic examination, the patients will be subjected to relevant investigations. The complete data is collected in a specially designed case recording form. The data collected will be transferred into a master chart which is then subjected for statistical analysis. Patients are selected with following inclusion and exclusion criteria.

### Design of the study

Prospective and randomised study.

### Sample size

Cases admitted with peritonitis due to hollow viscous Perforation to Dept. of surgery, NMCH & RC, Raichur during the period about 52 cases.

### 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 findings.

Various aetiologies causing such features include,

1. Acid peptic disease
2. Typhoid
3. Tuberculosis
4. Appendicitis
5. Malignancy

### Exclusion criteria

1. Patients with hollow viscous perforation due to trauma
2. Patients with associated vascular diseases
3. 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 pts, between 21-29 pts, and those above 29 pts.

In addition to personal data such as name, age, sex, etc., the following information was registered: file number; dates of admission and discharge from the hospital; days hospitalized; date of surgery and information related to illness (surgical findings, medical treatment and evolution of illness).

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.

## RESULTS

**Table 1: Distribution of study subjects and MPI.**

| MPI score | Frequency | Percent |
|-----------|-----------|---------|
| <21       | 32        | 62 %    |
| 21-29     | 12        | 23 %    |
| >29       | 8         | 15 %    |
| Total     | 52        | 100 %   |

In the study group 62% population was in the low risk group (<21) and 23% were in the moderate risk group, 15% were in the high risk group (>29). Patients with organ failure on admission, longer duration of illness before the surgery, diffuse peritonitis, feculent exudates were more likely to have higher scores and hence fall into high risk group than their counterparts.

**Table 2: Mortality and MPI score.**

| MPI score | Patients | Mortality | Percent |
|-----------|----------|-----------|---------|
| <21       | 32       | -         | -       |
| 21-29     | 12       | 2         | 17%     |
| >29       | 8        | 4         | 50%     |
| Total     | 52       | 6         |         |

In the study group, 50% of patients had mortality among patients with MPI score more than 29 and none of the patients died with MPI score less than 21, 17% of patients had mortality in MPI score 21-29.

**Table 3: Development of wound complications.**

| SSI   | Score |       |     | Total |
|-------|-------|-------|-----|-------|
|       | <21   | 21-29 | >29 |       |
| No    | 28    | 7     | 3   | 38    |
| Yes   | 4     | 5     | 5   | 14    |
| Total | 32    | 12    | 8   | 52    |

Up to 62% of the patients with scores >29 developed wound related complications in the post op period which was about 41% in patients with score 21-29 and about 12% in patients with scores <21. The post op complications were significantly higher in the group with score >29. This included the surgical site infections, pulmonary, renal complications and development of multi organ failure.

**Table 4: Pulmonary complications.**

| Pulmonary | MPI score |       |     | Total |
|-----------|-----------|-------|-----|-------|
|           | <21       | 21-29 | >29 |       |
| No        | 29        | 9     | 2   | 40    |
| Yes       | 3         | 3     | 6   | 12    |
| Total     | 32        | 12    | 8   | 52    |

The pulmonary complications in the form of post op pneumonia, pleural effusion which required continuous monitoring of oxygen saturation, nebulisation and hence lead to longer post op recovery were significantly higher as the score increased.

>75% of patients with >29 had some form of pulmonary complications which was only about 9% in patients with score <21 ( $p < 0.005$ ).

## DISCUSSION

In the study group of 52 patients, 62% of patients had MPI score less than 21, of which 12% of patients developed wound infection with 0% mortality and 88% of patients being normal, 41.4% of patients had morbidity (wound infection) and mortality with MPI score 21 to 29 and those patients with MPI score than 29 had the highest mortality i.e. 50%.

In the study of Billing et al, patients with scores of less than 21 had a mortality rate ranging from 0-2.3% and those with MPI between 21 and 29 had a mortality rate of approximately 65%.<sup>10</sup> MPI score of more than 29 had the highest mortality, up to more than 80% in some studies.

In the study group, 75% of the patients had morbidity in terms of wound infection and SICU (surgical intensive care unit) monitoring with MPI score more than 21 as compared to 5.7% among patients with MPI score less than 21.

Notash 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 more than 29.<sup>11</sup>

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%.<sup>12</sup>

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%.<sup>13</sup>

Malik AA et al, did prospective study using 101 consecutive patients having generalized peritonitis over a two-year period.<sup>14</sup> 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.

What draws one's attention when comparing the results of studies of the MPI conducted in the last 30 years is the repetition of the most important risk factors in a significant number of studies, namely: organ failure, age above 50 years, faecal nature of fluid in the peritoneal cavity, neoplastic cause, exit site outside of the colon, diffuse peritonitis and presence of symptoms more than 24 h before the procedure.

Analysis of the collected material revealed that division of patients based on the obtained MPI score may help assess the risk of developing serious disturbances of the general condition in the postoperative period as well as the necessity of continued treatment of the patient in an intensive care unit or relaparotomy. Sensible use of the score will facilitate identification of patients in the high-risk group, thus possibly raising awareness of their increased risk of postoperative complications, such as: cardiorespiratory failure, acidosis, electrolyte disorders and postoperative wound complications. Despite the fact that the Mannheim score is easy to use and effective in predicting mortality, it cannot be used as a preoperative system used at admission to stratify patients based on the risk of death, since it requires consideration of intraoperative assessment, such as the nature of fluid in the peritoneal cavity and anatomical exit site as well as histopathological assessment (a cause of neoplastic or non-neoplastic origin). Other disadvantage of the score is the fact that it does not take into account chronic diseases and major systemic disorders, which are very important risk factors for death and serious complications.

## CONCLUSION

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.

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