**ORIGINAL ARTICLE**

UTILITY OF MANNHEIM'S PERITONITIS INDEX IN PREDICTING OUTCOME OF PERITONITIS IN PATIENTS WITH HOLLOW VISCOUS PERFORATION
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# UTILITY OF MANNHEIM'S PERITONITIS INDEX IN PREDICTING OUTCOME OF PERITONITIS IN PATIENTS WITH HOLLOW VISCOUS PERFORATION

Akash Raya,[1] Aditya Prakash Yadav,[1] Sanjeev Kumar Shahi,[1] Binod kr Rai[2]

## ABSTRACT

### INTRODUCTION

Peritonitis due to hollow viscous perforation is one of the common causes for emergency surgery requiring immediate surgical intervention. Scoring systems that provide objective descriptions of the patient's conditions at specific points in the disease process aid our understanding of these problems. Hence this study is undertaken to study the effectiveness of Mannheim's peritonitis index in predicting the outcome in peritonitis patient.

### MATERIAL AND METHODS

This study was carried out in Department of Surgery of National Medical College and Teaching Hospital. A total of 44 patients with diagnosis of peritonitis due to hollow viscous perforation over period 2 years was included in this study. History and detailed clinical examination were performed as per the working proforma. Blood investigation was done. Data analysis was done using SPSS (Statistical Package for social sciences) version 25.

### RESULTS

In this study 44 cases of peritonitis due to hollow viscous perforation were included. The mean age of patients was $38.16 \pm 21.09$ years. Abdominal pain and abdominal distension were most common presentation. MPI scoring system done in all patients depending on preoperative and intra-operative and patients were categorized into three categories, <21, 21 to 29, and >29 where 50% of patients had MPI less than 21, 25% of patient had MPI score 21-29 and 25% of patient had MPI score >29.

### CONCLUSION

MPI scoring system is required to predict the outcome in peritonitis patients and whether the line of management taken is appropriate or needs to be changed.

### KEYWORDS

Peritonitis, Mannheim's peritonitis index, Hollow viscous perforation

1. Department of Surgery, National Medical College and Teaching Hospital, Birgunj, Nepal
2. Department of Surgery, Pediatric Surgery Unit ,National Medical College and Teaching Hospital, Birgunj, Nepal

For correspondence
Dr. Akash Raya
Department of Surgery
National Medical College & Teaching Hospital
Birgunj, Nepal
Email: akashraya@gmail.com

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# INTRODUCTION

Peritonitis secondary to hollow viscous perforation is a potentially life-threatening condition. Despite development in diagnosis and management the prognosis of peritonitis remains poor, the mortality rates are still high, ranging from 10-20%. Early identification of patients with peritonitis may help in selecting patients for accurate surgical treatment.[1–3]

Treatment is primarily surgical and early surgical intervention is always desired especially in previously healthy patients and those with postoperative peritonitis. Different scorings are used to predict the outcome in patients with peritonitis.[4] Among the various scoring systems Mannheim peritonitis Index (MPI) is a specific, simple with a good accuracy and provides an easy way to handle with clinical parameters, allowing the prediction of the individual prognosis of patients with peritonitis.[5]

The aim of this study is to see the effectiveness of MPI scoring system to predict the outcome of peritonitis caused due to hollow viscous perforation in patients presenting to surgical emergency department of National Medical College.

# MATERIAL AND METHODS

A cross-sectional study was done at National Medical College, Department of Surgery, Birgunj from October 2020 to August 2022. Total of 44 cases were included in the study who presenting in emergency department who had to undergo emergency surgery and diagnosed as hollow viscous perforation. Ethical clearance (F-NMC/517/076-77) was obtained from institutional review committee of NMC Birgunj. Patients who have icterus, hemoglobin level < 7gm/dl, patients with history of blood transfusion and trauma, patients on steroids, primary peritonitis occurring in conditions other than hollow viscous perforation were excluded from the study, also patients who were managed conservatively were not included in the study.

The sample size was calculated using the formula:
$$n = \frac{(Z^2 x\ p(q))}{e^2}$$
Where, n= required sample size
Z= confidence level at 90 % (standard value of 1.64), p = proportion of population = 0.736, m= margin of error at 10% (standard value of 0.1). The mortality of patients with MPI score >29 was 20.9%.[6] So, the value of p = 0.209 and that of q = 1- p = 0.79. Putting the value in the above equation the sample size was estimated as 44

Preoperative work up was done. Also, fluids replacement, antibiotics, analgesics, nasogastric tube decompression was done in all the cases. Site of perforation along with extent of peritonitis and character of exudate were documented. Appropriate surgical procedure with peritoneal lavage was done. Further management was done according to the condition of the patients. Patients were followed up until the various outcome like discharge, morbidity of mortality were documented. Morbidity was determined by identification of one or more of the complications like chest infection, surgical site infection, superficial wound gape, wound dehiscence, deep vein thrombosis, pulmonary embolism etc. The MPI scoring was applied along with other clinical and biochemical parameters recorded in pre-structured proforma. Total patient MPI score was the sum total of all the positive risk factor scores. Prediction of outcome was categorized into 3 groups: i) score <21 ii) score 21-29 iii) score >29.

Data collection was done in data collection sheet and later entered in Office Excel version 2016. Data analysis was done using Statistical Package for the Social Sciences (SPSS) version 16. Variables were expressed in mean ± standard deviation, frequency and percentage where applicable.

# RESULTS

Total of 44 patients with the diagnosis of hollow viscous perforation with peritonitis were included in the study. Among the total cases 20 (45.5%) were male and 24 (54.5%) were female patients respectively. The age of the patients ranged from 17 to 97 years and the mean age of the patients was 38.16 ± 21.09 years. Among the MPI scoring deaths was highest in patients with fecal exudate with 6 deaths (Table 1).

**Table 1. Mannheim peritonitis index scoring system[7]**

| MPI score | Frequency | Death |
|---|---|---|
| Age > 50 | 12 | 2 |
| Female | 24 | 4 |
| Organ failure | 23 | 4 |
| Malignancy | 6 | 3 |
| Duration >24 | 24 | 3 |
| Origin of sepsis not colonic | 7 | 3 |
| Generalized peritonitis | 22 | 5 |
| Exudate | | |
| Clear | 12 | |
| Cloudy | 15 | |
| Fecal | 17 | 6 |

The commonest etiological presentation was appendicular perforation where 23 (52.3%) patients presented with it and among them there was 2 (33.2%) death (Table 2)

**Table 2. Etiological distribution with mortality**

| Etiology | Male | Female | Total | Death |
|---|---|---|---|---|
| Appendicular perforation | 10 (50%) | 13 (54.2%) | 23 (52.3%) | 2 (33.2%) |
| Ascending colon CA with ileal perforation | 0 | 2 (8.3%) | 2 (4.5 %) | 1 (16.7%) |
| DU perforation | 8 (40%) | 4 (16.6%) | 12 (27.2%) | 1 (16.7%) |
| Obstructed hernia with jejunal perforation | 1 (5%) | 0 | 1 (2.3%) | 1 (16.7%) |
| Obstructed hernia with peritonitis | 1 (5%) | 0 | 1 (2.3%) | |
| Typhoid ileum perforation | 0 | 3 (12.5%) | 3 (6.8%) | 1 (16.7%) |
| Transverse colon CA with jejunal perforation | 0 | 1 (4.2%) | 1 (2.3%) | |
| Tubercular cecal perforation | 0 | 1 (4.2%) | 1 (2.3%) | |
| Total | 20 | 24 | 44 | 6 |

Maximum number of mortality was 5 (45.5%) which was seen in MPI group of >29 which was statistically significant with p value 0.002 (Table 3)

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**Table 3.** Patients in MPI groups with mortality

| MPI score | Frequency | Percentage (%) | Death |
|-----------|-----------|----------------|-------|
| <21 | 22 | 50 | 0 |
| 21-29 | 11 | 25 | 1(9.1%) |
| >29 | 11 | 25 | 5(45.5%) |

An area under the curve (figure 1) for mortality at MPI score of 29 or more was 0.906 (95%CI: 0.815-0.996) in Receiver operating characteristic curves (ROC) and predicted mortality in approximately 83.3% of the patients (sensitivity, 83.3%, 95% CI: 72.3 -94.3; specificity, 84.2%, 95%CI: 73.5 – 94.9).
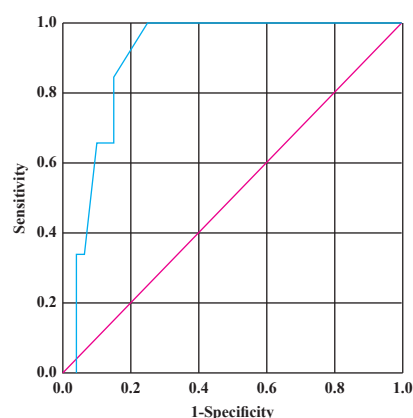


**Figure 1. ROC curve for mortality**

## DISCUSSION

In our study, 44 cases of peritonitis were included with age ranging from 17 to 97 years. The mean age of the patients was $38.16 \pm 21.09$ years. There was female preponderance (54.5%). The most common etiology of peritonitis was appendicular perforation seen in 52.2 % of patients, followed by duodenal perforation (27.2%), gastric (7%), typhoid ileal perforation (6.8%).

Most patients presented with history of abdominal pain, abdominal distension. MPI scoring system done in all patients depending on preoperative and intra-operative and patients were categorized into three categories those <21, 21 to 29, >29. 50% of patients had MPI less than 21. 25% of patient had MPI score 21-29 and 25% of patient had MPI score >29

In our study patient with MPI score > 29 had mortality of 45.5% and MPI between 21-29 had 9.1% and less in MRI score < 21 similarly study conducted by Ravindra N Irpatgire et al[7] shows that patients with MPI score >29 had maximum mortality (61.5%) and MPI between 21-29 scores had 20.9% mortality. Least mortality recorded in MPI score < 21(0.8%). In another study done by Shakya et al6 mortality rate was 2.4% with scores <21, 8.9% with 21–29 and 20.9% with >29 respectively.

In our study ROC curve showed mortality in approximately 83.3% of the patients (sensitivity, 83.3%, 95% CI: 72.3 -94.3; specificity, 84.2%, 95%CI: 73.5 – 94.9) and the predictive

power was 0.906. The finding was similar to study conducted by S. K. Pattanaik et al[8] where MPI score of< 21, 21-29 and > 29 had mortality of 0%, 27.2% and 50% respectively. ROC curve showed highest sensitivity and specificity of 79% and 70% respectively at MPI of 25. Study conducted by Sitaram Yadav et al[9] also revels mortality was higher among patients with MPI Score more than 29 (95.65%). Another study conducted by Koppad et al[10] showed MPI score of 29 had sensitivity of 87.21%, specificity of 78.57% and predictive power of 0.945 in predicting mortality.

Sreenidhi GM et al[11] conducted the study also shows that MPI scores of ≤ 20, 21-29, and ≥ 30 had a mortality of 0%, 4%, and 15% respectively. MPI score of >29 had highest sensitivity of 100% and specificity of 91.43% in predicting mortality, which was similar to our study.

Peritonitis is the most common complication of hollow viscous perforation. Early diagnosis and management can help in preventing peritonitis hence decreasing morbidity and mortality. MPI scoring can help in the early diagnosis and management. Further studies are required to see if the predictive power of MPI score is better than other scoring system.

## CONCLUSION

Our study showed high predictive power of MPI score in predicting mortality of patients presenting with hollow viscous perforation. MPI scoring system is required to predict the outcome in peritonitis patients and whether the line of management taken is appropriate or needs to be changed.

## CONFLICT OF INTEREST

None

## ACKNOWLEDGEMENTS

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