



EFFICACY OF MANNHEIM PERITONITIS INDEX IN PREDICTION OF MORTALITY AND MORBIDITY IN PATIENTS WITH SECONDARY PERITONITIS

General Surgery

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ABSTRACT

Background: Acute generalized peritonitis following hollow viscus perforation is a potentially life threatening condition leading to a cascade of infective processes, sepsis, disseminated intravascular coagulation, multi organ failure and death in the presence of irreversible damage to the vital organs. Grading the severity of acute peritonitis can contribute in better management of patients with perforation peritonitis. The Mannheim Peritonitis Index (MPI) scoring system takes into account various characteristics like age of the patient, gender, duration of peritonitis, organ failure, Malignancy, colonic sepsis, extent of spread and character of the peritoneal fluid. The Objective of this study was to determine the Prognostic value of MPI in patients with Secondary Peritonitis. **Methods:** In this study conducted at SMI Hospital, Dehradun, Over a period of 1 year, all patients presenting with features of Peritonitis due to hollow viscus perforation were included. MPI score of all the patients were calculated and categorized into three groups; less than 21, 21-29 and more than 29. Mortality of patients from each group was calculated and predictive value of each factor was determined. **Results:** Total 150 patients were included in this study. There were total 21 mortalities. For patients with a score <21, the mortality rate was 0%; for score 21-29, it was 4.3%; and for score >27, it was 67.9% ($P < 0.001$). Age > 50 years, presence of organ failure, malignancy, presentation after 24 hours, generalized peritonitis and Fecal exudate were associated with higher mortality rates. **Conclusions:** MPI is a simple and useful scoring system to determine the prognosis and complications in patients with perforation peritonitis.

KEYWORDS

Hollow Viscus perforation, Mannheim Peritonitis Index, Mortality, Peritonitis.

INTRODUCTION

Peritonitis is inflammation of the peritoneum and peritoneal cavity, usually caused by a localized or generalized infection^[1]. Generalized peritonitis is a serious condition that still is a significant issue for specialists and their patients, throughout the world. Until the finish of the recent century, peritonitis was dealt with a mortality of 90%^[2]. The outcome of perforation peritonitis depends on the complex interaction of many factors and the success rate greatly depends on the early recognition of the seriousness of the disease and an accurate assessment of the patient's risks^[3].

For facilitation in identification and early assessment of patient in high risk group, a lot of prognostic scoring system have been developed over a period of time like SAPS (Simplified Acute Physiology Score), SIS (Supports Intensity Scale), Revised MOFS (Revised Multiple Organ Failure Score), Sepsis Severity Score (SSS), Ranson score, Imrie score, Acute Physiology and Chronic Health Evaluation (APACHE) II score and Mannheim Peritonitis Index (MPI). Mannheim Peritonitis Index was developed by Wacha et al in 1983^[4] and was based on a retrospective analysis of data from 1253 patients with peritonitis. Out of 20 factors considered, 8 factors were found to be of prognostic relevance and were arranged according to their predictive power. Main Objective of this study was to determine the Prognostic value of MPI in patients with Secondary Peritonitis.

METHODS

The Study was conducted in Department of Surgery, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun (Uttarakhand) from November 2018 to December 2019. This Study was a Prospective Observational study conducted after approval from Institutional Ethical Committee. A total of 150 patients diagnosed with peritonitis secondary to hollow viscus perforation and treated surgically were included in this study after informed written consent.

Inclusion criteria

- Patients presenting with features of Peritonitis due to hollow viscus perforation who were later confirmed by Intra Operative findings.

Exclusion criteria

- Patients with primary peritonitis
- Post-Traumatic Peritonitis
- Post-Operative Peritonitis

- Age less than 15 years
- Associated injuries to other organs

Initial preoperative work up and resuscitation with intravenous fluids, antibiotics, analgesics, nasogastric decompression was done in all the cases. Appropriate Surgical Management was done depending on the pathology.

During Laparotomy, extent of peritonitis and character of exudates was noted. Other than perforation entire bowel was inspected for malignancy (growth) or any signs of malignancy. Further ICU care and supportive management was continued as needed. Individual MPI score of all patients were calculated according to various parameters and risk factors as mentioned in MPI score. All patients were divided into 3 groups of MPI < 21, 21-29 and >29. Morbidity during the hospital stay was determined by occurrence of one or more of the following complications: chest infection, surgical site infection, superficial wound gape, wound dehiscence, deep vein thrombosis, pulmonary embolism etc. Final outcome of the patient was noted as discharged or death. Each variable in the scoring system was analysed as an independent predictor of morbidity or mortality and the scoring system as a whole.

Statistical analysis

The data was entered into the Microsoft excel and the statistical analysis was performed by statistical software SPSS version 21.0. The Quantitative (Numerical variables) were present in the form of mean and SD and the Qualitative (Categorical variables) were present in the form of frequency and percentage.

The student t-test was used for comparing the mean values between the 2 groups whereas chi-square test was applied for comparing the frequency. The p-value was considered to be significant when less than 0.05.

Table 1 : Mannheim Peritonitis Index Score

Risk Factors	Weightage if present
1.Age more than 50 years	5
2.Female Sex	5
3.Organ Failure*	7
4.Malignancy	4

5.Pre-operative duration of Peritonitis > 24 hours	4
6.Origin of Sepsis not Colonic	4
7.Diffuse Generalized Peritonitis	6
8.Exudate	
Clear	0
Purulent	6
Fecal	12

*Definitions of organ failure: Kidney: creatinine >177 µmol/L, urea >167 µmol/L, oliguria<20ml/hr; Lungs:pO₂<50mmHg, pCO₂> 50 mmHg; Shock: hypodynamic or hyperdynamic; Intestinal obstruction (only if profound): Paralysis>24 h or complete mechanical ileus.

RESULTS

In this study conducted from November 2018 to December 2019, a total of 150 patients were included, out of which 102 were < 50 years of age and 48 were > the age of 50 years. The age of patients ranged from 18 to 86 years with mean age of 41.72 years. Out of 150 patients, 100 were male and 50 were female.

The most common cause (Table-2) of perforation was found to be duodenal ulcer perforation (33.3%) and Ileal perforation (20%), which was presumed to be due to enteric fever.

Table 2: Showing Anatomical site of perforation in study patients

Site of Pathology	Frequency	Overall Deaths
Duodenal	50	7
Gastric	11	2
Ileal	30	5
Appendix	23	0
Colon	19	5
Gall bladder	12	1
Jejunal	5	1
Total	150	21

Most Common procedure done was Exploratory Laparotomy with Omental patch repair in 50 patients (33.3%) followed by Closure with Proximal diversion and Appendicectomy in 31.3% and 15.3% patients respectively. Cholecystectomy was done in 12 (8.0%), Primary repair for enteric and gastric perforation was done among 11 (7.3%) and Resection Anastomosis among 7 (4.7%) patients.

Outcome is summarized in (Table 3)

Table 3: Mortality Distribution according to MPI risk factors

MPI Criteria	Total	Death
Age > 50 years	48	16
Female	50	6
Organ Failure	25	19
Malignancy	10	6
Duration > 24 hrs	126	21
Origin of sepsis not colonic	131	16
Generalized Peritonitis	130	21
Exudates		
Clear	30	1
Purulent	93	11
Fecal	27	9

In our study we encountered 21 deaths (14%). In all the three MPI groups studied, the influence of MPI score was statistically significant with regard to mortality and morbidity. Mortality of 19 patients (90.48%) was seen in patients with MPI score of more than 29.

Table 4: Final Outcome according to the MPI

MPI	Final Outcome		Mortality according to MPI score
	Death	Discharge	
<21	0	75	0
	0.0%	100.0%	0%
21-29	2	45	2
	4.3%	95.7%	9.52%
>29	19	9	19
	67.9%	32.1%	90.48%
p-value < 0.001*			

In this study higher mortality rates were associated with presence of multi- organ failure, duration of symptoms of more than 24 hours, faecal peritonitis and presence of malignancy. In our study no

significant difference was found for the distribution of final outcome between males and females. In our study, out of 131 patients with non-colonic origin of sepsis 16 patients (12.2%) died while mortality was seen in 5 patients (26.3%) out of 19 patients with colonic origin of sepsis and hence non colonic origin of sepsis was not found to be a significant risk factor for poor prognosis as described in MPI. MPI score evaluation for morbidity showed an overall 30.66% morbidity in our study.

DISCUSSION

The outcome in patients with perforation peritonitis particularly when multi organ dysfunction develops remains poor despite improvement in diagnosis and management, especially in developing world which have scarcity of resources and Intensive care units. Therefore there was a need of scoring system to stratify patients based on risk factors, determine the prognosis and the need for aggressive surgical approach with requirement of post-operative ICU care. The Mannheim Peritonitis Index (MPI) is an easy scoring system which helps in identifying patients with high risk of mortality and significant morbidity based on pre-operative symptoms and intra operative finding. Effective preoperative management, timely surgery and proper post-operative care will decide the outcome. Different studies have mortalities ranging from 6.4% to 17.5%. In a meta-analysis of results from 7 centres involving 2003 patients, Billing et al reported an average group mortality rate of 2.3% for MPI score <21, 22.5% with score of 21-29 and 59% with score >29^[5]. 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 MPI score of 26 or less had mortality of 3.8%, where as those with a score more than 26 had mortality of 41.0%^[6].

In our study, the patients with MPI scores of < 21, 21-29, >29 had a group mortality of 0%, 9.52%, and 90.48% respectively. This clearly suggests increasing risk of mortality with increasing MPI score. In our study higher mortality and morbidity was associated with presence of age > 50 years, generalized peritonitis, multi-organ failure, duration of symptoms more than 24 hours, faecal peritonitis and presence of malignancy. Wabwire et al found female gender, age above 50 years, presence and number of organ dysfunction, character of exudate and extent of peritonitis as significant factors in prediction of complications and mortality^[7]. In our study, the female sex and non colonic origin of sepsis were not found to be associated with higher mortality. Melero reported gender was not a significant factor^[8] and Seiler et al concluded preoperative duration significantly influences the outcome in addition to other factors mentioned^[9].

Various studies show overall mortality rates ranging from 6% to 42%^[4,5,9,10,11]. We encountered 14% overall mortality rate. With regard to etiology, studies from Western population show colonic perforation due to diverticular disease and cancer (16-70%) as the leading cause followed by gastro duodenal peptic ulcer perforation (16%) and perforated appendicitis (8%)^[5,9,10,11]. In our study, the most common cause of peritonitis was secondary to duodenal ulcer perforations (33%) followed by ileal perforation(20%) secondary to enteric fever.

CONCLUSION

This is a study to evaluate the efficacy of Mannheim peritonitis index in predicting the mortality and morbidity in patients with peritonitis due to hollow viscous perforation. The results of this study proves that Mannheim Peritonitis Index is a useful scoring system to determine the prognosis and complications in patients with perforation peritonitis. Risk factors postulated in MPI namely Age> 50 years, presence of organ failure, malignancy, presentation after 24 hours, generalized peritonitis and type of exudates were associated with poor prognosis and increased morbidity of the patient whereas Female sex and Non colonic origin of sepsis were not found to be associated with adverse outcome. There is a need for further studies of factors in MPI such as Organ Failure for sequential scoring of the severity of disease process to better classify the patients and determine the mortality and morbidity.

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