International Journal of Medical Science and Education

An official Publication of Association for Scientific and Medical Education (ASME)

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: 21/12/2016 ***Revised: 31/03/2017*** ***Accepted: 11/04/2017***

ABSTRACT

Background: Mannheim peritonitis Index is among many scoring system that provides objective descriptions of patient's condition at specific point in the disease process. This study aims to evaluate the validity of Mannheim peritonitis index scoring system and the various prognostic factors which determine the outcome of the disease. **Materials and method:** This study, carried out at the Department of Surgery at R.N.T. Medical College, Udaipur. Diagnosis were made by history and clinical examination, x-ray chest PA view and confirmed by exploratory laprotomy. Patient with perforation due to trauma and have other significant illness which is likely to affect the outcome is excluded. **Results:** In this study 50 cases of hollow viscous perforation were selected over a period of one year(2014).Mean age of patients were 48.94 years, most of patients, 31 (62%) belong to age group of 31-60 years (range 18-85) with male preponderance 40(80%). Majority of patient 36(72%) presented to hospital after 24 hrs of onset of symptoms and the mortality of those patient who presented within 2 to 5 days and after 5 days was 23.3%(7) and 33.3(2) respectively as compared to 8.2%(2) in patient who presented within 24 hrs. Out of 50 patients 36%(18) had MPI score<21, 40%(20) had MPI score 21-29 and 24%(12) had MPI score>29 morbidity and mortality rate were 11.1%(2) and 0%, 45%(9) and 15%(3), 33.3%(4) and 66.7%(8) respectively. Out of 50 patient duodenal perforation was seen in 56%(28), gastric in 24%(12),ileal in 14%(7),colonic in 4%(2) and appendicular perforation in 2%(1).**Conclusion:** Delay in surgical intervention is associated with morbidity and mortality. In the management of patient with generalized peritonitis scoring system is beneficial. MPI scoring system easy to scores and to apply.

Key Words: Mannheim Peritonitis Index, Perforation peritonitis.

INTRODUCTION:

Peritonitis continues to be one of the major infectious problems and one of the most common surgical emergencies to be attended by a surgeon on call duty. The various risk factors among the general population which can cause perforation peritonitis are like H. pylori infection, non-steroidal anti-inflammatory drugs, enteric fever and many others. This condition most of the

times needs an emergency surgical intervention. Despite many advances in medical treatment, surgeries and intensive care, the mortality rate of diffuse suppurative peritonitis remains unacceptably high. The treatment and the evaluation of different therapeutic approaches are hampered by lack of precise classification. So it is the need of hour to develop a scoring system for stratification of patients to personalize their management. **(1)**

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).**(2,3)** Later was developed by Wacha and Linder in 1983,**(4)** developed based on the retrospective analysis of data from 1253 patients with peritonitis, in which 20 possible risk factors were considered. Only 8 of them 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. **(4)**

Many studies were done to know the significance of Mannheim Peritonitis Index (MPI) for prediction of the individual prognosis of patients with peritonitis but the pertinent questions like- Do the etiology of peritonitis influence the outcome? Do delays in presentation matter? Could this patient been better off without surgery? Continue to dog the minds of most surgeons. I seek to find the answers to some of these through this study.

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Table 1: MPI Score **(5, 6)**

Study Variable	**Adverse Factors**	**Points**	**Favourable Factors**	**Points**
Age	>50 years	5	<50 years	0
Sex	Female	5	Male	0
Organ Failure	Present	7	Absent	0
Malignancy	Present	4	Absent	0
Evolution Time	>/=24 hours	4	<24 hours	0
Origin	Non-colonic	4	Colonic	
Extension of peritonitis	Generalized	6	Localized	0
Character of peritoneal fluid	Fecal Purulent	12 6	Clear	0

Also, as only few studies have been published regarding significance of MPI score in such patients in India, which will make finding of our study more valuable.

Aims and objectives: To study the validity of Mannheim peritonitis Index 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. To study various factors which determine the morbidity and mortality of these patients.

MATERIAL AND METHODS:

Patients who presented to RNT Medical College, Udaipur from January 2014 to December 2014 with peritonitis due to hollow viscous perforation were selected for the study.

Diagnosis was made by history, clinical examination, X-ray, relevant biochemical / microbiological and pathological investigations.

Standard operative protocols were followed for different causes of perforative peritonitis.

Inclusion Criteria: Patients with clinical suspicion and investigatory support, who later were confirmed by intra-operative findings.

Exclusion Criteria: 1) Patients with hollow viscus perforation due to trauma.

2) Patients with any other significant illness which is likely to affect the outcome more than the disease in study.

MPI score were grouped into three : <21 points, 21-29 points and > 29 points.

Organ dysfunction was defined as Creatinine level >177 µmol/l, urea >167 m mol/l, oliguria < 20 ml/hour, PO2 <50 mm hg, PCO2 >50 mm hg, shock and paralytic ileums.

Patient evolution is followed as occurance of complications and discharge due to improvement or death. Outpatient follow up is continued for 30 days to establish perioperative morbidity or mortality.

RESULTS:

Total 50 patients with diagnosis of peritonitis were included. The mean age of patients was 48.94 years ranging from 18-85 years and majority of patients (62%) belonged to age group of 31-60 years. There was male preponderance (80%) with male to female ratio of 4:1.

Majority of patients (60% and 12%) presented to hospital after 24 hours of onset of symptoms, between 2-5 days or> 5 days respectively and the mortality of these patients was 23.3% and 33.3% respectively as compared to mortality (8.2%) in patients who presented on the first day of onset of symptoms. The chi square value of these patients is 0.97 with a non significant p value of 0.61.

Duodenal perforation was seen in 56% of patients followed by gastric (24%), ileal (14%), colon (4%) and appendicular perforation (2%) as etiologies of peritonitis.

Table 2: Distribution of study subject and MPI Score

MPI Score	Dead (%)	WI (%)	Survivors (%)	Total (%)
<21	0 (0)	2 (11.1)	16 (88.9)	18 (36)
21-29	3 (15)	9 (45)	8 (40)	20 (40)
>29	8 (66.7)	4 (33.3)	0(0)	12 (24)
Total	11 (22)	15 (30)	24(48)	50 (100)

Chi square value- 31.26, p value- 0.000

As shown in table no 2, MPI score <21 has a significant impact in long terms with 0% mortality.

Table 3: Morbidity and MPI Score

MPI Score	Morbidity	Normal	Total
>21	18 (85.7)	3 (14.3)	21 (53.8)
<21	4 (22.2)	14 (77.8)	18 (46.2)
Total	22 (56.4)	17 (43.6)	39 (100)

PPV- 85.71%, Sensitivity- 81.81%, Specificity- 82.35%

Table 4: Mortality and MPI Score

MPI Score	Mortality (%)	Normal (%)	Total (%)
>21	11 (78.6)	3 (21.4)	14 (50)
<21	0 (0)	14 (100)	14 (50)
Total	11 (39.3)	17 (60.7)	28 (100)

PPV- 78.57%, Sensitivity- 100%, Specificity- 82.35%

Table 5: MPI Score and Organ Failure on admission

MPI Score	Organ failure (%)	Normal (%)	Total (%)
>21	20 (62.5)	12 (37.5)	32 (64)
<21	2 (11.1)	16 (88.9)	18 (36)
Total	22 (44)	28 (56)	50 (100)

Chi square- 12.35 p value- 0.001

In the study group, 85.7% of the patients had morbidity (wound infection, pulmonary infection, ICU stay) with MPI score >21 as compared to 22.2% of the patients with MPI score < 21.

Table 6: Organ Failure and ICU stay

Organ failure (%)	ICU stay (%)	Normal (%)	Total (%)
Present	19 (61.3)	12 (38.7)	31 (62)
Absent	3 (15.8)	16 (84.2)	19 (38)
Total	22 (44)	28 (56)	50 (100)

Chi-square= 9.89 p value= 0.001

DISCUSSION:

Preoperative duration of symptoms is a significant contributing factor for the prognosis of the patient. With time the disease progresses to become generalized peritonitis followed by multi system involvement which adversely affects the outcome of the patient.

The mean age of presentation (in years) in various studies done by Ohmann C et al **(7)**, Corroea et al **(8)**, Tushar Dani et al **(5)** and Murlidhar V A et al**(9)** were 56, 58.9, 43.7 and 43.8 respectively.

In concordance with our study Tushar Dani et al had maximum patients in age group between 31-60 years. **(5)**

Ohmann et al **(7)** and Tushar Dani et al **(5)** also reported duodenal ulcer as most common cause of perforation peritonitis like we found.

In our study 44 % patients presented with organ failure while seeking admission. Data on this feature are variable. Tushar Dani et al **(5)**, MM

Correia et al **(8)** Rodolf L et al **(10)**, Murut Kologlu et al **(11)** found the same as 22.5%, 48.5 %, 11.5 %, 20 % respectively.

A total of 72% cases presented after 24 hours of perforation and this delayed presentation can be because of illiteracy among the study population, lack of proper referral services or diagnostic dilemmas due to unavailability of sophisticated investigations at peripheral hospitals. This also explains the high rate of organ dysfunction at the time of admission.

Overall mortality rate in our study was 22%. Same was 16%, 14%, 8% and 16% respectively in studies done by Tushar Dani et al **(5)**, Muralidhar VA et al **(9)**, Sanchit Jain et al **(6)**, and Murugappan Nachiappan et al **(1)**.

Billing A et al **(12)** did their studies separately in 3 European countries from seven centres in 2003 patients. The prevalence of risk factors varied considerably between groups. They found a mortality rate ranging from 0-2.3%, 65% and >80% for MPI score of <21, 21-29 and >29 respectively. Overall the mean index score and mean mortality rate correlated in different groups reflecting homogenous standard therapy for peritonitis.

Table 7: Correlation MPI Score and mortality in various studies

Author	**Year**	**MPI cut off**	**Mortality %**	**MPI cut off**	**Mortality %**
Fugger R et al (3)	1988	>29	100	21-29	29
Ermolov AS et al (4)	1996	>29	100	21-29	42%
Liverani A et al(5)	1998	>26	40.5	<26	2
Notash AY et al(6)	2005	>29	100	21-29	60%
Qureshi AM et al(7)	2005	>29	28.1	21-29	21.9
Malik AA et a(18)	2010	>25	82.3	16-25	4
Muralidhar VA et al(9)	2014	>29	50	21-29	14
Vinayak et al(19)	2016	>29	50	21-29	17
Sanchit Jain(6)	2016	>26	8.6	<26	0
Present study	2017	>21	39.3	<21	0

Billing A et al **(12)** found that for a threshold index score of 26, sensitivity was 86%, specificity 74% and accuracy 83% in predicting death.

Regarding sensitivity and specificity in predicting mortality, our findings were also in concordance with Barrera Melgarejo E et al **(20)** with PPV, sensitivity and specificity being 98.9%, 95.9% and 80% respectively.

CONCLUSION:

MPI scoring system is easiest score to apply, the determination of risk is available during operation and surgeon can know about the possible outcome and appropriate management can be decided.

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