



Original Article

Analysis of Manheim Peritonitis Index Scoring in Predicting Outcome in Patients with Perforation Peritonitis

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ABSTRACT

Scoring systems are essential to calibrate the severity of abdominal sepsis for adequate management. Disease specific scoring system based on easy to handle clinical parameters can help the cause. **Objective:** To study the role of Manheim peritonitis index scoring in predicting outcome and prognosis in patients with perforation peritonitis. **Methods:** This prospective study was carried out in Surgical Unit 1, Nishtar Hospital, Multan from 20th of August 2019 to 31st of December, 2019. It includes both sexes aged 20 years and above diagnosed at laparotomy after confirmation of peritonitis due to perforated viscus regardless of the etiology. Data were analyzed using SPSS version 19.0 Software. The outcome (death vs discharge) was compared separately to different predictors using Chi-square test. Fischer Exact test was used where assumptions of Chi-square were not met. **Results:** Advance age, female gender, colonic perforation, organ failure and fecal contamination were associated with high mortality. The mean MPI Score was 25.06 ± 4.96 . The lowest score was 16 and the highest was 37. Overall, the in-hospital mortality rate was 14.3% in patients with $MPI \geq 26$ compared to 6.4% in patients with $MPI < 26$, implying over a twofold higher risk in the former group. For a score of 26 or greater as a predictor of mortality, the sensitivity was 75.0%, specificity was 38.2% at an accuracy of 94%. **Conclusion:** MPI enables us to categorize patients into different groups so as to tailor management according to individual needs.

INTRODUCTION

Peritonitis has been defined as the inflammation of peritoneum [1]. It can be localized or generalized and has been divided into primary, secondary and tertiary peritonitis with regards to the cause of this inflammation. Primary peritonitis is usually due to a bacterial translocation or a hematogenous spread. There is no macroscopic defect in the gastrointestinal tract as compared to the secondary peritonitis which almost always results from the spillage of gastrointestinal contents in the peritoneal cavity. Tertiary peritonitis refers to a secondary peritonitis that has persisted for more than

48 hours even after an attempt has been made to surgically treat it [2, 3]. Peritonitis causes significant morbidity and mortality. It has been the second leading cause of admission to ICU after pneumonia [4]. Perforation of a viscus leading to peritonitis has always been a life-threatening situation despite the recent advances in the field of surgery. The scenario becomes worst in extremes of age. This has put emphasis on the segregation of patients based on their critical condition for a more aggressive approach [5]. Empirical assessment of certain clinical events in the course of disease using various

scoring systems has been of critical importance in making decisions and planning management [6]. A great number of scoring systems are in use to predict the outcome of patients who present in ER department with a suspected diagnosis of perforation peritonitis. MPI takes into account 8 factors of prognostic significance and gives a very specific score. This not only enables us to assess clinical parameters but also allows us to determine the individual prognosis of patients with peritonitis [7, 8]. Manheim peritonitis index was developed using a data of 1253 patients treated for peritonitis. A total of 17 risk factors were assessed in these patients, with only 8 of them being significant. All the information for these eight factors could be gathered pre operatively and at laparotomy enabling easy classification of patients [9, 10]. In this study we have employed Manheim peritonitis index as to evaluate the severity of peritonitis and to develop a system to assess the prognosis, survival and mortality considering the important risk factors analysed in the index.

METHODS

The study was a prospective, descriptive and observational study that was carried out in Surgical Unit 1 in Nishtar Hospital, Multan from 20th of August 2019 to 31st of December, 2019. Both sexes were included in the study with age more than 20 years and older with diagnosis of peritonitis confirmed during surgery regardless of etiology. Patient was included in the study only once operative findings have confirmed the diagnosis of perforated viscus. MPI score of all the study patients were calculated and categorized into two groups depending upon the score; less than 26 and more than 26. Mortality of patients from each group was calculated and predictive value of each factor was determined. Clearance was taken from Ethical review committee and written consent was obtained from all the patients. All the data obtained were analyzed using SPSS 19.0.

RESULTS

The descriptive statistics of this study are shown in Table 1. 53 patients have been included in this study with a greater proportion of male population. A description of diagnosis, post-operative complications and outcome has been demonstrated.

Variable	N (Percentage)
Age	
≤ 50 years	27 (50.9%)
> 50 years	26 (49.1%)
Gender	
Male	45 (84.9%)
Female	8 (15.1%)
Diagnosis/Site of perforation	
Duodenal	17 (32.1%)

Jejunal/Ileal	17 (32.1%)
Colonic	8 (15.1%)
Appendicular	4 (7.5%)
Miscellaneous causes	7 (13.2%)
Post-op Complications	
None	25 (47.2%)
Overall	26 (51.0%)
Infected wound	12 (23.5%)
Burst abdomen	8 (15.7%)
Atelectasis	6 (11.8%)
Outcome	
Discharged	47 (88.7%)
Expired	6 (11.3%)

Table 1: Descriptive Statistics

Of note in our study, a significantly higher mortality was observed in females with a mortality rate of 50% compared to only 4.4% in males ($p=0.003$, $OR=11.25$). Advanced age was also associated with a higher mortality with almost a twofold risk in patients aged >50 years; the mortality rate in this group being 15.4% as opposed to 7.4% in patients aged ≤50 years ($p=0.41$, $OR = 2.08$). Colonic perforation was associated with over a fivefold higher mortality rate of 28.6% vs. 5.1% in non-colonic perforations ($p=0.042$, $OR = 5.57$). No deaths were observed in patients without organ failure while a mortality rate of 42.9% was seen in patients with organ failure ($p<0.001$). Purulent and faecal exudate was associated with a higher mortality rate, 11.1% and 15.3% respectively, compared to 0% in those with a clear exudate. We note that all patients in our study had delayed presentation to healthcare with >24 hours since the onset of perforation to their attendance at the hospital. We also note that all patients had generalized as opposed to localized peritonitis (Table 2).

Risk Factor	Subgroup	No. of patients	Death (%)	Statistics
Age	>50 years	26	4 (15.4%)	$p=0.41$
	≤50 years	27	2 (7.4%)	$OR=2.08$
Gender	Female	8	4 (50%)	$p=0.003$
	Male	45	2 (4.4%)	$OR=11.25$
Organ Failure	Yes	14	6 (42.9%)	$p<0.001$
	No	39	0 (0%)	$OR= N/A^*$
Malignancy	Yes	4	0 (0%)	$p=0.48$
	No	49	6 (12.2%)	$OR= N/A^*$
Time	>24 hours	53	6 (11.3%)	$p=N/A$
	< 24 hours	0	0 (0%)	$OR= N/A^*$
Origin	Non-Colonic	39	2 (5.1%)	$p=0.042$
	Colonic	14	4 (28.6%)	$OR=5.57$
Peritonitis	Generalized	53	6 (11.3%)	$p=N/A^*$
	Localized	0	0 (0%)	$OR= N/A^*$
Exudate	Clear	4	0 (0%)	-
	Purulent	36	4 (11.1%)	$p=0.50$
	Faecal	13	2 (15.3%)	$p=0.44$

*N/A refers to incalculable ratios

Table 2: Analysis of the risk factors of Manheim Peritonitis Index

In our study the mean MPI Score was 25.06 ± 4.96 . The lowest score came out to be 16 and the highest was 37. Overall, the mortality rate was 14.3% in patients with MPI ≥ 26 compared to 6.4% in patients with MPI < 26 , implying over a twofold higher risk in the former group ($p=0.054$, OR=2.55). Table 3 indicates the correlation of MPI score with incidence of mortality. For a score of 26 or greater as a predictor for mortality, the sensitivity was 75.0%, specificity was 38.2% at an accuracy of 94%.

MPI		Outcome	
		Expired	Discharged
≥ 26	N (%)	4 (14.3%)	24 (85.7%)
< 26	N (%)	2 (6.4%)	29 (93.5%)

Table 3: Correlation of MPI score with incidence of mortality

DISCUSSION

Generalized peritonitis has been a commonest clinical presentation in our hospitals for a long time. It places burden not only on the resources but the delayed presentation of patients to the hospital poses a threat to the overall survival [11, 12]. The recognition of risk factors and adequate pre- and post-operative care is of vital importance in these patients. This becomes all the more important in developing countries where the critical care units are less developed due to economic crunch. In our study, age has not been a significant risk factor in predicting mortality. Patients over 50 years of age had twice the mortality than the younger age group. The p-value was however, insignificant. Contrary to the findings of our study, A good amount of literature is available that had shown age as a significant factor in predicting mortality. The researchers indicate that age of 60 years and above plays a vital role in recovery of patients from a major surgery [13-16]. The mortality has been higher in the patients who had to be operated in emergency as opposed to the ones who were stable enough to be operated upon electively [13]. Female gender has been given a score of 5 on the MPI chart. This implies that females presenting with peritonitis are associated with relatively higher risk of mortality than the male patients. This risk factor has been pronounced in our research with females having approximately 11 times high mortality rate than the male patients ($p=0.003$). This result is comparable to the data available in some other studies [14]. In Krishna et al., the mortality of female patients was 5 times as compared to the male patients [15]. Organ failure has been attributed 7 points in the MPI and rightly so. All the 6 patients in our study that passed away suffered from organ failure, amplifying the need of intensive management in patients who present with features of organ failure. This is a finding that is consistent with other studies [16]. Another research showed that the patients without organ failure had an 86%

better survival than patients with evidence of organ failure [17, 18]. Timing of presentation has been a critical factor in the management of patients presenting in emergency department. Unfortunately, all the patients in our study presented late and this factor couldn't be assessed for p value. There is no scarcity as to the literature available that enables us to figure out the importance of timing of onset of symptoms of patients presenting in ER. Afridi et al., have emphasized that delayed presentation to the hospital is responsible for an increase in mortality [19, 20]. Kocer et al., reported that patients who presented 24 hours after the onset of symptoms had a 3.4 times higher morbidity risk than patients who presented early [21, 22]. Saravanan et al., have reported that a delay of more than 24 hours increases lethality from sevenfold to eight-fold, complication rate to three-fold, and length of hospital stay to two-fold, compared to a delay of six hours or less. Fecal peritonitis and Colonic perforation have poorer prognosis according to MPI [23, 24]. In our study p value for colonic perforation was significant for prediction of mortality, whereas fecal peritonitis had an insignificant p value. The odds ratio however showed that a patient with colonic perforation had a 5.5 times greater mortality than a patient with a non-colonic perforation. Literature mentioned the high mortality with fecal peritonitis contrary to our observations. In a study carried out in India, it was shown that patients with fecal peritonitis had a hundred percent morbidity rate [25]. Similarly, patients with a purulent peritonitis had a higher morbidity rate than those with clear peritoneal exudate. There were 4 patients with a malignancy in our study but they all survived making the p value insignificant for this factor. We presume that early stage of malignancy may be a contributing factor in their recovery in our study. However, in some studies it had a significant p value making it an important factor to consider in post-operative management of the patient [26]. In our study, people with a MPI score of > 26 had a considerable higher mortality than the ones with a score of less than 26. MPI is a peritonitis specific score and all the parameters in this study are the ones that are routinely considered. It enables for an intra operative evaluation of the patient to provide a better assessment of the final prognosis.

CONCLUSIONS

MPI enables us to categorize patients in different groups prompting us to tailor management according to individual needs. Current study showed that MPI has a good predictive value when it comes to predicting prognosis of the patients. However, a large sample size and a variety of patients could endorse the data further. A routine calculation of MPI scoring should be implemented in

Emergency Room department.

Conflicts of Interest.

The authors declare no conflict of interest.

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