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Research Article

Evaluation of Mannheim's peritonitis index in predicting mortality in perforative peitonotis patients

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ABSTRACT

Background: The prognosis of peritonitis and intra-abdominal sepsis, especially if there is a multi-organ dysfunction is poor in spite of improved surgical and medical management. Therefore, an early prognosis of the severity of the disease is essential for reducing the mortality. Manheim peritonitis index (MPI) is based on measuring very simple clinical parameters, which are routinely performed at the admission to the hospital and preoperatively. This study was conducted to assess the efficacy of MPI system for prognosis of peritonitis.
Methods: 200 patients who presented with acute abdominal pain were evaluated and erect X-ray abdomen and CT abdomen were done. Blood was collected and sent to the lab for complete blood count, hemoglobin levels, BUN, serum creatinine, blood urea, total bilirubin and direct bilirubin. Mannheim's peritonitis index score of each patient was calculated at the first laparotomy.
Results: The mortality rate were higher in the patients with MPI >29 with 61.5%, with a preponderance of males (77.5%). Cardiovascular complications were common in the patients with MPI scores >29, followed by pulmonary complications. In the MPI score 21-29, the most common complication was surgical site infections. The most common origin of sepsis was the 1st part of duodenum followed by ileum.
Conclusions: It is very easy to perform and very reliable. Patients above the age of 50 years were found to be more susceptible with many having organ failures.

Keywords: Mannheim's peritonitis index, Perforative peritonitis, Mortality

INTRODUCTION

The outcome of a surgery does not solely depend on the surgeon's abilities, but also on the physical status, the disease and the nature of operation. It also depends on the pre and post-operative services.[1] Peritonitis is inflammation of the peritoneum and/or peritoneal cavity due to localized or generalized infections, with most of the times the cause is bacteria which invade the peritoneal cavity.[2-4] The prognosis of peritonitis and intra-abdominal sepsis, especially if there is a multi-organ dysfunction is poor in spite of improved surgical and medical management.[4,5] Therefore, an early prognosis of the severity of the disease is essential for reducing the mortality.[2-5]

India is said to have a larger incidence of upper gastrointestinal tract perforation than the Western world.[6] Until the end of last century, peritonitis was treated medically, with a resultant mortality of over 907. In the early 1920s Krishner reported that with strict adherence to surgical principles, this rate could be brought down to 50%.[7] Since then many interventions have been made to reduce the incidence of mortality due to peritonitis, and is presently reported to be 13-43%.[8]

With such high prevalence of mortality, management chiefly depends on early detection of peritonitis. In order to identify the high risk group in these patients, many simple scoring systems have been developed. One of them, which is very simple to apply, is Manheim Peritonitis Index (MPI). This index is based on measuring very simple clinical parameters, which are outinely performed at the admission to the hospital and preoperatively.

MPI was developed by Wacha and Linder in 1983 based on retrospective analysis of 1253 patients with peritonitis. 20 possible risk factors were taken into consideration, out of which 8 were found to be of prognostic value.[9]

The maximum possible value was 47 while the minimum was zero. The patients was divided into 3 categories based on the MPI score.

- Score less than 21
- Score between 21 to 29
- Score equal to or more than 309

This study was conducted to assess the efficacy of MPI system for prognosis of peritonitis.

METHODS

This prospective and observational study was conducted by the Department of General Surgery at Lokamanya Tilak Municipal Medical College and Hospital. 200 patients with radiologically proven peritonitis who underwent emergency exploratory laparotomy were included in the study. Patients under12 years of age and those who were unwilling to enter into the study were excluded from the study.

This study was conducted after the clearance from the Institutional Ethical Committee and obtaining Informed consent from the patient or their closest relative.

All patients who presented with acute abdominal pain were evaluated in the emergency services of our hospital. Erect X-ray abdomen and CT abdomen were done for all the patients. Blood was collected and sent to the lab for complete blood count, hemoglobin levels, BUN, serum creatinine, blood urea, total bilirubin and direct bilirubin. Patients with proven peritonitis due to hollow viscous perforation were taken for emergency exploratory laparotomy after checking for blunt trauma, retroperitoneal organs.

Preoperative management such as wide bore peripheral intravenous access, central venous catheter insertion, per-urethral catherization, nasogastric tube insertion and decompression of the stomach, antibiotic administration and starting the intravenous fluids to the patients was done in all the cases.

The size and site of perforation at the time of insertion was noted. The type of perforation whether it was localized or generalized was also looked into. Other intra operative findings such as type of contamination-serous, purulent, or fecal, the state of gastrointestinal tract and the solid organs were also noted.

After the procedure, a thorough abdominal wash was given with warm saline. Depending on the site and contamination, one or two drains were kept in the pelvis and hepatorenal pouch of Morrison. Post operatively, the patients were followed up until discharge of the patient or death.

The oral feeds were kept nil by mouth for 72 hours and started once nasogastric aspirate has decreased and return of bowel sounds. Drains were removed after the oral feeds were started or after 24 hours drain output is decreased. Parenteral antibiotics and analgesics were continued until the oral feeds were tolerated.

Eight prognostic variables included in the Mannheim's peritonitis Index were entered and the MPI score of each patient was calculated according to the Table 1.

Table 1: Mannheim's peritonitis index.

Risk factor	Weightage
Age >50	5
Female gender	5
Organ failure	7
Malignancy	4
Preoperative duration of peritonitis >24	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Exudates	
Clear	0
Cloudy, purulent	6
Fecal	12

Chi-square test, Pearson chi-square, Fisher's exact test were used for statistical analysis of the data.

RESULTS

Most of the cases among the 200 patients were males with 155 (77.5%) (Figure 1). The mean patient age was 42.9±6.1 years. The mean age of patients who survived and those who died were similar. Many of the women were in the MPI category 3 (>29).

The mortality rate were higher in the patients with MPI >29 with 61.5% of the patients dying while only 38.5% survived. Out of the patients who had MPI above 29, 18 (69.2%) were above 50 years of age and 13 (72.2%) of them died (Table 2).

Table 2: MPI scores versus outcome.

MPI Scores	Discharged		Expired		Total
	≤50 years	>50 years	≤50 years	>50 years	
Count <21	124 (94.7%)	6 (4.6%)	1 (0.8%)	0 (0)	131 (100%)
Count 21-29	21 (48.8%)	13 (30.2%)	5 (11.6%)	4 (9.3%)	43 (100%)
Count >29	5 (19.2%)	5 (19.2%)	3 (11.5%)	13 (50%)	26 (100%)
Total	150 (75%)	24 (12%)	9 (4.5%)	17 (8.5%)	200 (100%)

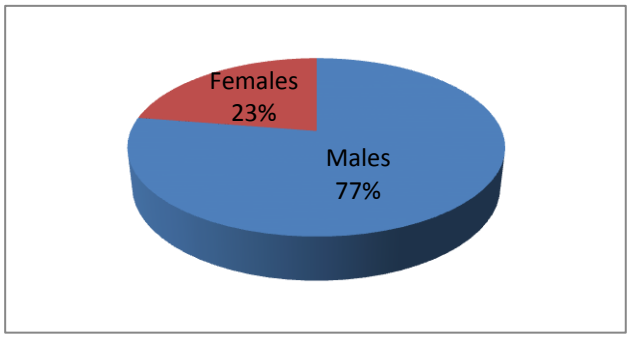

Figure 1: Gender wise distribution of patients.

Most of the patients had no complications, but the most common complication was cardiovascular, especially in the patients with MPI scores >29, followed by pulmonary complications. In the MPI score 21-29, the most common complication was surgical site infections (Table 3).

Table 3: Post-operative complications vs MPI scores.

Complications	MPI score			Total
	<21	21-29	>29	
Cardiovascular	6	17	20	43
GIT	0	2	0	2
No complications	109	14	6	129
Pulmonary	6	6	13	25
Renal	1	7	9	17
SSI	8	13	6	27

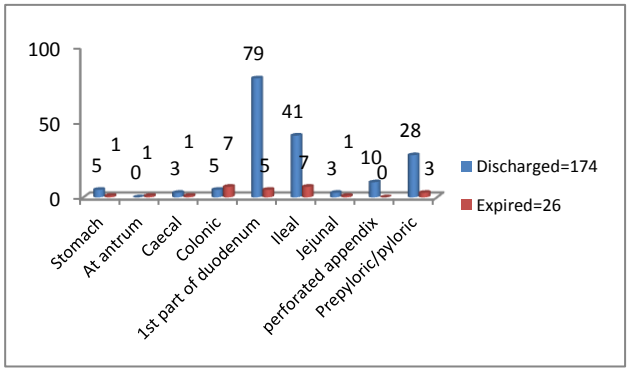

Figure 2: Origin of sepsis.

The most common origin of sepsis was the 1st part of duodenum followed by Ileum. These two types of perforation dominated the origin of sepsis. This was followed by prepyloric and pyloric sepsis (Figure 2).

It was observed that age >50 years, organ failure, duration of peritonitis, generalized peritonitis and cloudy purulent exudates were significantly associated with death (Table 4).

Table 4: Outcome of patients according to MPI variables.

Risk factor	Discharged	Expired	Total
Age >50	24	17*	41
Female gender	37	8	45
Organ failure	12	24*	36
Malignancy	1	4	5
Preoperative duration of peritonitis >24	111	24*	135
Origin of sepsis not colonic	169	19	188
Diffuse generalized peritonitis	114	21*	135
Exudates			
Clear	56	3	59
Cloudy, purulent	106	16*	122
Fecal	12	7	19

p<0.001

DISCUSSION

The rate of death in patients with peritonitis is still very high with the mean being 19.5% and reaching upto 60% in some studies.[2-5] The factors responsible for this could be due to many factor including underlying pathology, patient's condition, the nature of treatment of the patient. Therefore, prognosis of the patient is a very difficult task.[10] Early stratification of the patients based on the severity of their condition is important so as to enable the clinician to take proper steps in treatment and reduce the mortality rate.

In the present study, the mortality rate was 13% overall. Out of them, 34.6% were below the age of 50 years and the rest were equal to or above 50 years of age.

Mannheim's peritonitis index is very simple and effective predictor of mortality among the patients with peritonitis.[11-15]

MPI score was found to be a good tool for identifying poor prognosis. Most of the patients who died were in the 3rd category, with the MPI score >29 (61.5%), with 50% of them aged over 50 years of age.

88.9% of the patients with an MPI >29 had complications, most of them being cardiovascular. High rate of morbidity was also found in the MPI score 21-29 with very few of them with no complications. The most common complication observed was cardiovascular as well as surgical site infections.

Our results were in accordance to a similar study by Patil et al who also observe a very high mortality rate especially among the patients with an MPI above 29.[16] Complications were seen in majority of the cases in this score group and also among the patients with a score between 21-29. Similar was the case in another study by Qureshi et al, where a mortality rate of 28.1% was observed in patients with secondary peritonitis.[17] Notash et al have shown a cut off to be 21 and 29, with mortality 60 and upto 100% for scores of more than 29.[18]

The commonest cause of peritonitis was seen in the first part of duodenum, most often due to an ulcer followed by those in the ileum. Ohmann et al reported an incidence of duodenal ulcer to be the most common cause of peritonitis which was in accordance to our study, while Kachroo et al found appendicular perforation to be the most common cause.[19,20]

CONCLUSION

The Mannheim's peritonitis index was a very useful tool for prognosis of the morbidity and mortality of patients with peritonitis. It is very easy to perform and very reliable. Patients above the age of 50 years were found to be more susceptible with many having organ failures. MPI score above 29 years was a sign for very poor prognosis while that <21 was found to be of a better prognosis.

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