

Original Research Article

Clinical study of perforative peritonitis and the role of manheim peritonitis index in predicting its mortality

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ABSTRACT

Background: A scoring system which can compare patient populations and severity of illness, objectively predict mortality, morbidity and can help to evaluate the treatment strategy is the dire need for evaluative research of intensive care.

Methods: The study is done after obtaining a detailed history, complete general physical examination and systemic examination. The patients are subjected to relevant investigations like X-ray erect abdomen, CXR, USG and routine investigations like Hb, TC, urea, creatinine, serum electrolytes.

Results: The study was conducted in a population of 50 patients who had been diagnosed as having peritonitis secondary to hollow viscous perforation. It was observed that perforated appendix was most common cause of peritonitis in our study accounting for 26 percent of the cases.

Conclusions: Despite advancements in the realm of medical science, the management of patients with peritonitis continues to be demanding. In our study it was found that appendicular perforation was the most common cause followed by gastro duodenal perforation.

Keywords: Multi organ failure, MPI scoring system, Peritoneum, Perforation peritonitis

INTRODUCTION

Perforation peritonitis has been found to be a common surgical emergency in India. The causes of perforation in India have been found to be quite different from that in western countries Dorairajan et al.¹ But there is a lack of data about the etiology and the morbidity and mortality patters in cases of perforation peritonitis from India Sharma et al.² It has been found that the prognosis of patients with peritonitis and intra-abdominal infections is poor. This is especially so when multi organ failure sets in despite advancements in antimicrobials and supportive care, mortality associated with diffuse suppurative peritonitis is high.³⁻⁵ Accurate diagnosis and management of suppurative peritonitis is a challenge. Complex

surgical interventions, multifaceted treatment aspects and difficulties of ICU support make evaluation of new therapeutic advances very difficult in this field. In these situations scoring systems which provide accurate assessment of the patient's conditions at a specific point in the disease simplifies the understanding of these problems. These scoring systems serve as a prognostic marker and help us evaluate our line of management.

Of the many scoring systems the Mannheim peritonitis index which was developed by Wacha et al was found to be one of the simplest scoring systems that easily allow the surgeon to predict the outcome in patients with peritonitis.⁶ The MPI score was based on the analysis of retrospective data from 1253 patients with peritonitis. A

total of 20 possible risk factors were considered. Of these only 8 proved to be of prognostic relevance and were entered into the Mannheim peritonitis index. The Mannheim peritonitis index is a specific score, which has a good accuracy and has ease of handling of clinical parameters. It allows for easy prediction of the prognosis in patients with peritonitis. Understanding the pathophysiology of peritonitis, the concept of sepsis and multi organ failure has furthered the management of peritonitis.⁷ In patients who have progressed to multi-organ failure conservative treatment and newer modalities of treatment such as immune-modulation and programmed re-laparotomy are being tried.⁸⁻¹⁰

The objective of this study was to assess the effectiveness of the Mannheim peritonitis index in predicting the outcome of patients with peritonitis, to assess the significance of each risk factor of the Mannheim index in predicting the prognosis. And to assess the morbidity and mortality rates in patients with peritonitis, evaluate various conditions leading on to peritonitis.

- Mannheim peritonitis index (MPI)
- MPI was originally devised from a study conducted in 1253 patients with peritonitis by Wacha et al. The study was conducted between 1963 and 1979. A total of 20 factors which affect the prognosis of the patients were considered⁶
- 8 out of the 20 factors were found to be of significance in determining the prognosis of patients with peritonitis
- The information is collected at the time of admission and first laparotomy
- Each risk factor is assigned a score based on its influence in determining the outcome and a final score is arrived at. The maximum possible score by applying MPI index is 47. Those patients who had scored more than 29 were deemed to be at high risk for mortality
- Detailed study of MPI was done by A. Billing in 7 different centres and their data compared. They considered patients of perforated or post-operative peritonitis, peritonitis caused by pancreatitis, appendicitis and mesenteric ischemia for study
- Fugger et al divided patients into three groups based on their MPI score. Patients were classified as having scored less than 21, between 21 and 29 and those with score greater than 29. Those with score of less than 21 had the least risk for developing morbidity and mortality, whereas those with score greater than 29 had a high mortality chance. Patients with score between 21 and 29 were designated as having intermediate risk.¹¹

The study was done in 50 patients with peritonitis due to hollow viscous perforation who presented to PSG hospitals, Coimbatore during the period 2012-2014. The study is a clinical, prospective, observational and open study.

METHODS

Method of collection of data

The study is done after obtaining a detailed history, complete general physical examination and systemic examination. The patients are subjected to relevant investigations like X-ray erect abdomen, CXR, USG and routine investigations like Hb, TC, urea, creatinine, serum electrolytes. All investigations and surgical procedures were carried out with proper informed written consent. The data regarding patient particulars, diagnosis, investigations, and surgical procedures is collected in a specially designed case recording form and transferred to a master chart. The data is subjected to statistical methods like mean, proportion, percentage calculation and wherever necessary chi square test for proportion are used.

Inclusion criteria

- Age > 15 years
- Diagnosed to have peritonitis and on whom surgical intervention is planned.

Exclusion criteria

- Conservatively managed patients - pancreatitis, spontaneous bacterial peritonitis, patients on peritoneal dialysis
- Abdominal injuries with associated solid organ or vascular injuries
- Poly-trauma patients
- Peritonitis secondary to anastomotic leak.

Mode of study

The detailed history and proper clinical findings were entered in a case recording form. Patients were subjected to methodical physical examination to assess their general condition. Local examination of abdomen was done and relevant findings were recorded. Rectal examination was done in all cases; the required and routine investigations were done to establish the diagnosis. Pre-operatively all patients received supportive treatment for correction of hypotension and electrolyte abnormalities. During laparotomy, intra-abdominal examination of all organs was made in addition to the specific pathology. MPI scoring was done in all patients and patients were classified as those with score less than 21, between 21 to 29, and more than 29. The nature of surgical procedure was planned preoperatively based on the suspected pathology and the general condition of the patient. But the final choice of the procedure was decided upon the merit of each case and the intra-operative finding. The issue of placing a drain in the peritoneal cavity was left to the discretion of the operating surgeon. Post-operative period was monitored; intake output charts and vital charts were maintained. Patients were

followed up for a period of one month post - surgery to assess for development of complications.

RESULTS

The study was conducted in a population of 50 patients who had been diagnosed as having peritonitis secondary to hollow viscous perforation.

It was observed that perforated appendix was most common cause of peritonitis in our study accounting for 26 percent of the cases. This followed by perforation of peptic ulcer which was 20% of the cases. Trauma was found to be a significant cause of gastrointestinal perforation accounting for 16% of the cases in our study.

Enteric illness, inflammatory bowel disease, ischemia, malignancy and tuberculosis were each found to constitute 4 per cent of the cases. Cholecystitis, colonic diverticulum, GISTs, perforation following bowel obstruction, each formed 1 percent of the cases. No

identifiable cause of perforation could be found in 10 percent of the cases.

The study was conducted in patients over 15 years of age. It has been found that perforation peritonitis is more common among the elderly population. 44 percent of cases occurred in patients who were aged 50 and above. 38 per cent of cases were seen in the middle aged (25-50 years of age). Only 18 percent of cases were seen to occur in the age group of 15-25 years. It is seen that with increasing age, there is an increase in the morbidity rate. The average MPI score also shows an increase with increasing age. The average MPI scores for the age groups 15-25 years, 25 -50 years and >50 years were found to be 14.66, 17.26 and 21.50 respectively.

80 percent of patients in the study were found to be males. Females accounted for 20 percent of the cases. The morbidity rate in men was found to be 53.84 percent where as in women it was 30/33.33 percent.

Table 1: Etiology.

| Etiology | Number of patients | Percentage | Morbidity | Avg mpi score |
|-----------------------------------|--------------------|------------|-----------|----------------|
| Appendicitis | 13 | 26 | 2 | 13.0769 |
| Cholecystitis | 1 | 2 | 1 | 20.0000 |
| Colonic diverticulum | 1 | 2 | 1 | 21.0000 |
| Enteric | 2 | 4 | 2 | 20.5000 |
| GIST | 1 | 2 | 1 | 18.0000 |
| Inflammatory bowel disease | 2 | 4 | 2 | 21.0000 |
| Ischaemia | 2 | 4 | 1 | 24.5000 |
| Malignancy | 2 | 4 | 2 | 22.5000 |
| Non specific | 5 | 10 | 5 | 25.2000 |
| Obstruction | 1 | 2 | 0 | 31.0000 |
| Peptic ulcer | 10 | 20 | 2 | 17.9000 |
| Trauma | 8 | 16 | 4 | 18.2500 |
| Tuberculous | 2 | 4 | 1 | 22.5000 |
| Total | 50 | 100 | 24 | 18.6600 |

Table 2: Site or perforation.

| Site of perforation | Number | Percentage | Morbidity | Avg MPI score |
|---------------------|-----------|------------|-----------|----------------|
| Appendix | 14 | 28 | 3 | 13.5000 |
| Colon | 7 | 14 | 6 | 23.8571 |
| Duodenum | 9 | 18 | 3 | 17.7778 |
| Gall bladder | 1 | 2 | 1 | 20.0000 |
| Ileum | 10 | 20 | 7 | 22.5000 |
| Jejunum | 6 | 12 | 4 | 20.8333 |
| Stomach | 3 | 6 | 0 | 15.6667 |
| Total | 50 | 100 | 24 | 18.6600 |

Fourteen percent of patients presented within a day of onset of symptoms. These patients had a morbidity rate of 28.5 percent and the average MPI score for these groups

of patients was 13.2. 68 percent of patients presented within 24 to 72 hours after onset of symptoms. The morbidity rate in these patients was 43.75 percent and the

average MPI scores 18.58. The percentage of patients who presented after 72 hours was 18. These patients had a morbidity rate of 88.88 percent and the average MPI score was higher than the other two groups at 23.¹¹

In the study population 18 percent presented with organ failure at admission. These patients had a morbidity rate of 57.14 % and average MPI score of 25. Both the patients who had mortality in the study presented with organ failure on admission. 82 percent of patients did not have any organ failure at the time of presentation. The patients had a morbidity rate of 48.78 and the average MPI score was 17.26. The p value is 0.008.

In our study, it was found that 40 percent of the patients presented with localized peritonitis. The patients had a morbidity rate of 25 percent and a low average MPI score of 14.65. 60 percent of patients came with generalized peritonitis. These patients had a higher average MPI score of 21.33 and the morbidity rate was 67.85 percent. The p value is 0.007.

62 percent of patients in our study had purulent peritoneal fluid. These patients had a morbidity rate of 58.06 percent and an average MPI score of 18.70. 10 percent of patients had faecal peritonitis. These patients had a high average MPI of 27.80 and the highest morbidity rate. Twenty eight percent of patient had no pus or faecal contamination of the peritoneal fluid. These patients had a morbidity rate of 15.38 percent. The p value is 0.004. In finality, it was found that 64 percent of patients had MPI score of less than 21. These patients had a morbidity rate of 34.37. 30 percent had MPI score within 21 to 29. These patients had a morbidity rate of eighty percent. There were three patients who had MPI score of above 29. Two of these patients died and the remaining one had post op morbidity. The mortality rate was 66.66 percent in this group. There was no mortality in the other two groups. The association of increasing MPI score with mortality and morbidity is found to be significant. The p value is <0.001.

DISCUSSION

Peritonitis resulting from perforation of the gastrointestinal tract is a common surgical emergency in India.^{1,12}

In our study conducted at PSG hospitals in a group of 50 patients who have been diagnosed to have perforation peritonitis, it was found that appendicular perforation was the most common cause of perforation peritonitis.¹³ patients out of the study population of 50 patients had appendicular perforation. The next most common was perforation due to peptic ulcer disease. Trauma was the third most common cause of perforation peritonitis.¹³

During observation appendicular perforation was the most common. This was followed by gastro-duodenal perforation. In the elderly age group perforation

peritonitis were more in common. Also, it was noted that these patients had a higher mortality rate compared to patients of younger age. The average MPI score for patients over 50 years of age was also found to be higher than those patients less than 50 years. The lowest morbidity rate was seen in patients between 15 to 25 years of age. The mortality rate in our study is to increase with increase in age. The average MPI score has a linear relationship with increasing age.

The MPI scoring system attributes a higher risk for the female sex. In our study, it was found that 80 percent of the patients were males and only 20 percent were females. The morbidity rate among male patients was found to be higher than in female patients. However, this was found to be not significant statistically. The digression could be from the fact that there was lesser number of female patients in the study.

In supervising the admitted patients, it was found the lowest morbidity rate within 24 hours of onset of symptoms. A majority of the patients in the study presented between 1 to 3 days after onset of the symptoms. It was found that the morbidity rate was higher with more delay in presentation. The morbidity rate is only 28.5 percent in patients presenting within 24 hours and increases to 88.88 percent in those patients who presented after 3 days. The rise in morbidity correlates with higher MPI score in those who have delayed presentation.^{6,14}

In this study, it was found that those patients who had organ failure at the time of presentation had a higher morbidity rate. There were two mortalities noted in the study. Both the patients had organ failure at the time of presentation. That the MPI scoring system accords a higher risk to those with organ failure seems justified.^{10,15}

Even though appendicular perforation was found to be the most common cause of perforation peritonitis in our study, it was found that the number of patients with diffuse peritonitis numbered more than those with localized peritonitis. The MPI scoring system attributes a higher risk to those with generalized peritonitis and likewise these patients were found to have a higher morbidity rate.

According to the MPI scoring system patients with faecal contamination had a poorer prognosis. In our study, we found this to be justified since patients with faecal peritonitis had a hundred percent morbidity rate. One of the mortalities in the study also had faecal contamination of the peritoneal cavity. The correlates with the fact that colonic perforations carried a high morbidity rate as compared to gastro duodenal perforations.^{5,16-18}

Patients with purulent peritoneal exudate had a higher morbidity rate than those with clear peritoneal exudate, justifying the scores accorded to peritoneal fluid exudates as per the MPI system. The Mannheim peritonitis index is

a peritonitis specific index which is easily applicable. It is based on clinical parameters that are routinely assessed. It also allows for intra operative evaluation of the patient to provide a better assessment of the final prognosis. Numerous studies have been done which have validated its accuracy and applicability in predicting the prognosis in patients with peritonitis. Higher Mannheim index score has a strong association with increased mortality.^{6,19} Over the years, there has been a fall in the mortality rates in cases of peritonitis. This has been attributed to better intensive care support, a better understanding of the patho-physiology of the peritonitis. More appropriated surgical techniques have been devised in the management of peritonitis.⁷

In high risk cases, definitive procedures are deferred and the focus is on clearance of source of infection. The concept of staged laparotomy has gained popularity in recent times in the management of severely ill patients in whom re-exploration is expected.²⁰ In our study a total of 50 patients with perforation peritonitis were followed. Only two mortalities were noted in the study. It has been found that the Mannheim peritonitis index has been a good predictor of mortality as well morbidity in patients with peritonitis. The patients were grouped as those having score less than 21, score between 21 and 29 and those with score greater than 29.

It was found that morbidity rate was the least in those with scores less than 21. Patients whose score was between 21 and 29 had a higher morbidity rate, but no mortalities were noted in this group. Those patients whose MPI score was more than 29 had the highest morbidity rate. Both the mortalities that occurred during the study had scored more than 29. It was also found in our study that with the exception of sex based risk assessment, all other parameters of the Mannheim peritonitis index were closely associated with the prognosis of the patients.⁶

CONCLUSION

Despite advancements in the realm of medical science, the management of patients with peritonitis continues to be demanding. In our study it was found that appendicular perforation was the most common cause followed by gastro duodenal perforation. Trauma was found to be a significant cause of perforation peritonitis. It was found that ileal perforations constitute a major proportion of cases of secondary peritonitis and the causes of ileal perforations to be varied. More males were found to present with perforation peritonitis than women. It was found that perforation of the gastrointestinal tract is more common among the elderly and that these patients also have a poorer prognosis.

The mortality rate over the years have come down due to better supportive care and by implementing appropriate operating protocols in these patients. Nevertheless, the challenges presented remain remarkable. A specific

scoring system which is easy to apply, simple to calculate and accurate in prediction will be of great use in the management of patients with peritonitis. It has been found that the Mannheim peritonitis index duly fulfils these criteria.

The individual parameters of the index with the exception of sex based risk assessment were found to positively correlate with the prognosis in our study.

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Ethical approval: The study was approved by the institutional ethics committee

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