Evaluation of predictive power of Mannheim Peritonitis Index

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ABSTRACT

INTRODUCTION: To evaluate Mannheim Peritonitis Index (MPI) in predicting outcome of patients requiring relaparotomy and to assess each risk factor independently regarding its contribution towards final outcome.

METHODE: A prospective analytical study was done from June 2008 to November 2009 , in Department of Surgery, National Academy of Medical Sciences, Bir Hospital and Patan Academy of Health Sciences, Patan Hospital A total of 50 consecutive cases operated either on elective or emergency basis and needing relaparotomy were taken for the study. MPI score was calculated for each patient on a pre-designed performa and the patients were followed-up till discharge from the hospital or death and the results were analyzed.

RESULTS: Forty nine yielded positive findings on relaparotomy. 39 of these patients survived, while 11 patients expired. Mannheim Peritonitis Index was higher in the deceased group.

CONCLUSION: Increasing Mannheim Peritonitis Index predicts poor prognostic outcome. Paying close attention in these patients to maximally support vital systems and to prevent complications seems crucial for their eventual prognosis.

KEY WORDS: Intraperitoneal sepsis, relaparotomy, Mannheim Peritonitis Index

INTRODUCTION

Complications from abdominal surgery may necessitate reoperation and can be associated with significant morbidity and mortality [1]. Despite advances in diagnosis, surgery, antimicrobial therapy and intensive care support, tertiary peritonitis remains a potentially fatal affliction. This potentially life – threatening condition presents a 90% mortality rate if untreated [2]. Tertiary peritonitis has been conceived as a later stage in the disease, when clinical peritonitis and systemic signs of sepsis (e.g., fever, tachycardia, tachypnea, hypotension, elevated cardiac index, low systemic vascular resistance, leucopenia or leukocytosis, and multi organ failure) persist after treatment for secondary peritonitis and either no organisms or low virulence pathogens, such as enterococci and fungi, are isolated from the peritoneal exudate. These organisms may gain access to the peritoneal cavity by contamination during operative interventions, by selection from the initial polymicrobial peritoneal inoculum by antibiotic therapy, or by translocation of bowel flora. Translocation may be promoted by intestinal ischemia, endotoxemia, malnutrition, anemia or proliferation of resistant bowel flora by antibiotic pressure [3].

Many scoring systems have been created for assessing patient risks of death during an event of peritonitis, nevertheless equal results have been achieved with the Mannheim Peritonitis Index (Table 1) which was developed by Wacha and Linder in 1983. It was developed based on the retrospective analysis of data from 1253 patients with peritonitis, in which 20 possible risk factors were considered. Of these only 8 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]. The Mannheim

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Peritonitis Index is a specific score, which has a good accuracy and provides an easy way to handle with clinical parameters, allowing the prediction of the individual prognosis of patients with peritonitis [5]. The Mannheim Peritonitis Index is one of the most simple scoring systems in use that allows the surgeon to easily determine outcome risk. The recollection of retrospective data is possible and valid, because Mannheim Peritonitis Index only requires information routinely found in surgical registers [6].

Table 1. The Mannheim Peritonitis Index	
Risk Factor	Scores
Age > 50 years	5
Female Sex	5
Organ Failure*	7
Malignancy	4
Preoperative duration of peritonitis > 24 hours	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Exudate	
Clear	0
Cloudy, purulent	6
Fecal	12

* Kidney failure = creatinine level > 177 umol/L or urea level > 167mmol/L or oliguria < 20ml/ hour; pulmonary insufficiency = PO2 < 50 mmHg or PCO2 > 50 mmHg; intestinal obstruction / paralysis > 24 hours or complete mechanical ileus, shock hypodynamic or hyperdynamic.

METHODE

We conducted a prospective analytical study in the patients who underwent relaparotomy for suspected intraperitoneal sepsis in general surgical department of National Academy of Medical Sciences, Bir Hospital and Patan Academy of Health Sciences, Patan Hospital in between June, 2008 and November 2009. Patients who underwent relaparotomy for non – infectious etiology e.g. reoperation for primary hemorrhage following any elective or emergency operation were excluded from the study.

All patients included in the study were scored according to the Mannheim Peritonitis Index and followed up either until discharge from the hospital or death. The individual variables in the index were also analyzed.

RESULTS

Total number of 50 consecutive cases of relaparotomy were included, out of which 49 yielded positive findings on relaparotomy. Only 1 negative reexploration was performed. 39 patients survived and were subsequently discharged from the hospital while 11 patients expired.

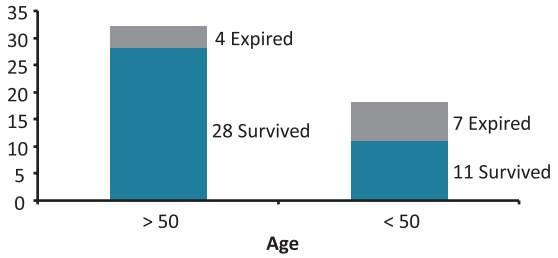


Figure 1. Age Distribution and outcome

Out of 11 patients who expired, 7 were aged 50 or less, while 4 patients who were of age 50 or more and required relaparotomy expired. In this study, age was not found to significantly correlate with mortality (p = 0.257)

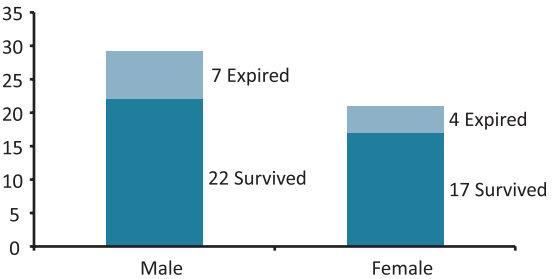


Figure 2. Sex distribution and outcome

Out of the 50 patients included in the study, 21 (42 %) were female and 29 (58%) were male. 24.1 % of the males and 19 % of females requiring relaparotomy expired in the study, making female sex not a bad prognosticator in the present study. (p = 0.100)

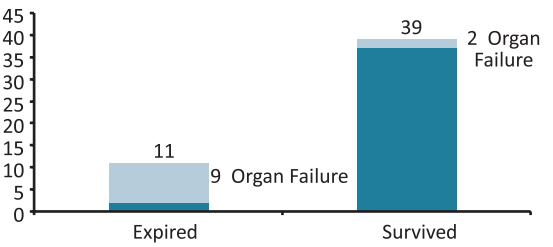


Figure 3. Outcome in patients with organ failure

26 patients had features of organ failure before relaparotomy was undertaken. 9 out of 11 patients who expired had a single or multiple failing organ, making organ failure a predictor of bad prognosis in case of peritonitis (p = <0.001)

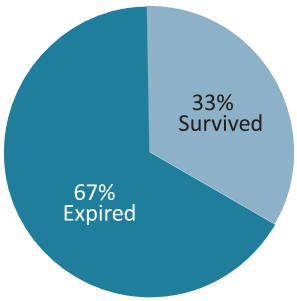


Figure 4. Outcome in patients with malignancy

3 patients in the study group had malignancy of some organ system, out of which 2 expired, making it also a predictor of mortality (p = 0.04)

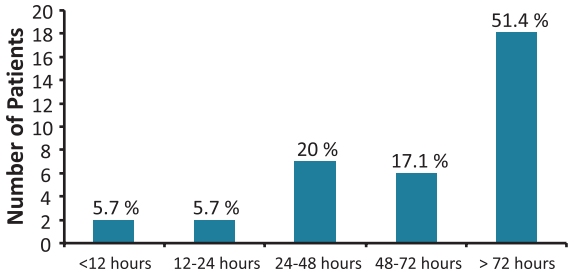


Figure 5. Preoperative duration before the index operation (emergency cases)

51.4 % of the patients either presented late (>72 hours) or were operated after 72 hours of initial symptoms. Only 11.4 % patients who were operated within 24 hours of initial symptoms developed features of intraperitoneal sepsis requiring relaparotomy. The mean duration of presentation was 3.03 ± 1.65 days

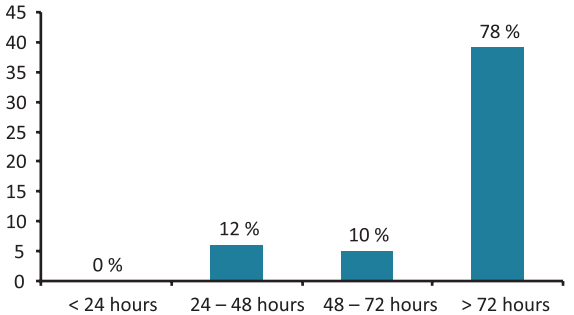


Figure 6. Interval between index operation and relaparotomy

All the patients included in the study had interval of more than 24 hours after index laparotomy, so this variable could not be used in the analysis.

Origin of sepsis

Table 2. Findings on index operation

Reason for index operation	No. of Patients	Percentage
Acute appendicitis / Perforation	8	16 %
Perforated peptic ulcer	3	6 %
Small bowel pathology	13	26 %
Large bowel pathology	10	20 %
Hepatobiliary pathology	9	18 %
Solid viscus injury	1	2 %
Gynecological Surgery	5	10 %
Others	3	6 %

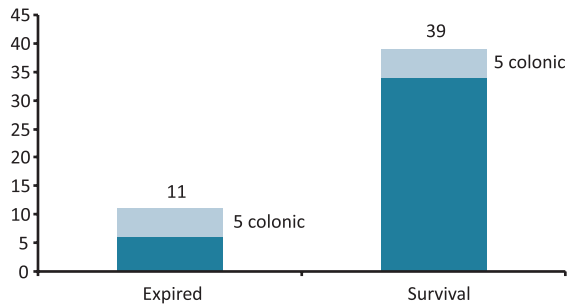


Figure 7. Fate of patients with colonic etiology

20 % of the patients had origin of sepsis of colonic in origin, out of which 10 % survived and 10 % expired, making this variable also not a bad prognosticator.

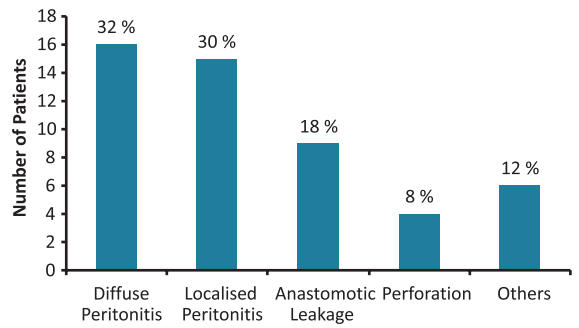


Figure 8. Findings on relaparotomy

Out of 16 patients who had diffuse peritonitis, 3 patients expired. Finding of diffuse peritonitis on laparotomy was found to be of predictive value in prognosis (p = 0.015)

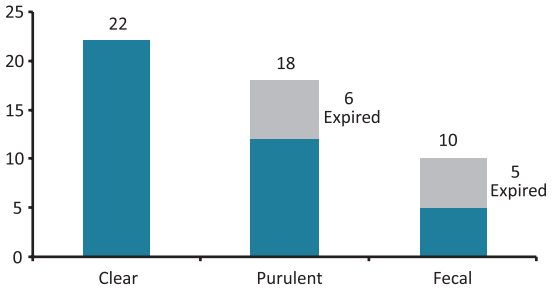


Figure 8. Fate of patients according to colour of exudate

50 % of the patients with fecal exudate expired while 33 % of the patients with purulent exudate expired, making both bad prognosticators.

Mannheim Peritonitis Scoring

Table 3. Summary of Mannheim Peritonitis Index and Scoring

	Expired (n=11)	Survivors (n=39)	p value
Age > 50	4	28	0.257
Female sex	4	17	0.100
Organ Failure	9	17	< 0.001
Malignancy	2	1	0.040
Preop >24 hours	11	39	-
Sepsis not colonic	6	34	0.106
Diffuse peritonitis	3	13	0.015
Maximum score	40	37	
Minimum score	11	4	
Mean ± SD	28.82 ± 7.99	20.83 ± 7.74	

All patients who underwent relaparotomy were scored according to the Mannheim Peritonitis Index. Maximum score among the survivors was 37 and minimum of 4 while it was 40 and 11 respectively in the deceased group. A mean of 28.82 ± 7.99 in the deceased group and 20.83 ± 7.74 in the survivors was found.

DISCUSSION

Among the most widely known prognostic score indices used for classifying patients with abdominal sepsis are the Acute Physiology, Age and Chronic Health Evaluation (APACHE) and the Peritonitis Index Altona (PIA) . The APACHE II system is based upon physiological findings and it is adjusted according to the patient's evolution. It has a large range of scores with small increments, each of them contributes to the risk calculation, and the score value defines the mortality risk level, and correlates with the observed mortality.[5] The demerit is that many variables are used and require various invasive investigations, which may not be possible in all hospital settings. The Peritonitis Index Altona (PIA) is based upon history and clinical examination derived data, intraoperative findings, and physiologic information. Qualitative variables are transformed into quantitative data and it has proved to be predictive for death [5]. The MPI is a specific score, which has a good accuracy and provides an easy way to handle with clinical parameters, allowing the prediction of the individual prognosis of patients with peritonitis[5].

Our study showed the MPI to be an accurate and reliable predictor of surgical mortality. Although in our patients, presence of organ failure, malignancy, diffuse generalized peritonitis showed a statistical significant difference between survival and deceased group and age over 50 years, female sex, non colonic origin of sepsis were not statistically significant, they showed a good predictive power when all the MPI variables were considered together.

CONCLUSION

Increasing Mannheim Peritonitis Index predicts poor prognostic outcome. Paying close attention in these patients to maximally support vital systems and to prevent complications seems crucial for their eventual prognosis. A similar multi – institutional study involving more number of cases is recommended.

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