

ORIGINAL RESEARCH

Evaluation of prognosis in patient's with perforation peritonitis using Mannheim's peritonitis index

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ABSTRACT

Background: Peritonitis is one of the most common infections, and an important problem that a surgeon has to face. Objectives: To evaluate the prognosis of patients with perforation peritonitis using Mannheim Peritonitis Index. **Materials and Methods:** This study was conducted from cases attending our institute in which diagnosis of peritonitis is established by operative findings or surgical interventions during management.

Results: 87 patients had MPI score of less than 21, 70 patients had MPI score between 21 to 29 while 43 patients the MPI score was more than 29. There was no mortality in the patient's with MPI score of less than <21. The mortality was 4.3% in patients with MPI scores between 21-29. The mortality was 67.4 % in the patients with MPI score more than 29.

Conclusion: MPI is accurate to be used with patients with peritonitis and should be considered reliable and simple reference for estimating their risk of death.

Keywords: Perforation peritonitis, Mannheim's peritonitis index, prognosis

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INTRODUCTION

Peritonitis is defined as inflammation of the serous membrane that lines the abdominal cavity and the organs contained therein. Most cases of peritonitis are caused by an invasion of the peritoneal cavity by bacteria, so that when the term peritonitis is used without specification bacterial peritonitis is implied.

Despite the surgical treatment, sophisticated intensive care units, last generation antibiotics and a better understanding of pathophysiology, the mortality rate of perforation peritonitis are still high. The outcome of an abdominal infection depends on the complex interaction of many different factors and the success obtained with the early institution of specific therapeutic procedures. It also depends upon the exact recognition of the seriousness of the diseases and an accurate assessment and classification of the patients risks. Early prognostic evaluation of peritonitis is desirable to select high risk patients for more aggressive therapeutic procedure such as radical debridement, lavage system, open management and planned relaparotomy. An accurate risk index classification is the only way to settle a standard of comparison between group of patients and different treatment methods which would allow prospective adequate comparative studies.

There is no single, easily available laboratory test that predicts severity or prognosis in patients with peritonitis. Despite controversial discussion, there is agreement that prospective controlled clinical trials are necessary in the field of intra abdominal infections. Randomised controlled clinical trials are the preferred methods for comparing clinical efficacy of

treatment strategies. They remain a vital bridge between advances in basic science on one hand and improvement in health care on the other. Therefore all measures should be undertaken to perform clinical trials with a high quality in this field. Many of the problems such as terminology and definitions, assessment of severity of disease, case selection, and exclusion of patients, confounding factors, end point, and generalised ability of a study result can be dealt adequately with the help of scoring systems. Scoring systems have been advocated as prognostic predictors, they reduce all the clinical problems including lots of variables to a simple number.^[1]Hence this study was conducted to evaluate the prognosis of patients with perforation peritonitis using Mannheim Peritonitis Index.

MATERIALS & METHODS

This study was conducted from cases attending our institute in which diagnosis of peritonitis is established by operative findings or surgical interventions during management. Therefore nonrandomized sampling technique was used. Duration of study was from 2009 to 2011. Permission for the study was obtained from the College authorities prior to commencement.

INCLUSION CRITERIA

Cases of peritonitis secondary to hollow viscous perforation attending our institute in the study period were included in the study.

EXCLUSION CRITERIA

- Patients absconded or discharged against medical advice (DAMA) during hospital admission.
- All patients with primary peritonitis (Spontaneous bacterial peritonitis)
- All patients with tertiary peritonitis - Patients with peritonitis due to anastomotic dehiscence or leak
- Patients with acute appendicitis (without perforation)
- Diagnosis was made by a combination of history, clinical examination and on the basis of the reports of the radiological examinations after which the patients is posted for emergency laparotomy.
- Once the diagnosis of peritonitis was confirmed by the operative findings of the patients, the patients were accepted for the study.

The following parameters were recorded meticulously for the calculation of the Mannheim Peritonitis Index :

1. Age
2. Sex
3. Organ Failure
 - ❖ The criteria which were used for the presence of organ failure are as follows published by *Deitch⁴ (1992)*:
 - **Renal failure**: serum creatinine >177mmol / L (> 2 mg/dl) or serum urea >16.7 mmol/L (>46.78 mg/dl) {conversion factor is 88.40 and 0.3570 respectively} or oliguria < 20 ml/ hour.
 - **Shock**: Hypotension is defined as a systolic BP of <90 mmHg or a reduction of >40 mmHg from baseline, in the absence of other causes for the fall in blood pressure.
 - **Intestinal obstruction** (only if profound): paralysis >24 hours or complete mechanical ileus.
 - **Respiratory failure**: pO₂ <50 mmHg or pCO₂ >50 mmHg.
4. Malignancy

Patients with known malignancy or with features of malignancy on gross examination e.g. malignant gastric perforations, perforation of a colonic growth suspicious of malignancy, perforation of proximal bowel due to distal obstruction by malignant growth on gross examination were included in the study.

5. Evolution time

Patients were divided into two groups (<24 hour / >24 hour) on the basis of history and timing of surgery.

6. Origin of sepsis (colonic / noncolonic)

This parameter is recorded on the basis of findings of laparotomy.

7. Extension of peritonitis (Diffuse/ localized)

8. Character of exudates or peritoneal fluid

- a) Clear
- b) Cloudy/purulent
- c) Faecal

Bilious collections in cases of recent perforation without superadded infection were grouped as clear. Serohaemorrhagic collection of recent origin is taken as clear in traumatic peritonitis.

The individual score of each parameter is added to calculate Mannheim peritonitis index score of each case. Patients were divided into three categories according to the score:

1. Score less than 21.
2. Score between 21 to 29.
3. Score more than 29.

Statistical analysis:

Diagnostic tests used were sensitivity, specificity, positive predictive value, negative predictive value and analysis of results using ROC Curves. SPSS for windows, version 17.0 was used to do analysis. Numerical parameters were compared using chi-square test. P-value < 0.05 was considered as the level of significance.

RESULTS

The mean age of the study group was 43.74 years and the age group of 46-60 contains maximum (28.5%) patients followed by 31 – 45 years. Oldest patients was 84 years and youngest was of 9 days. 59.5 % patients belong to < 50 years age group and 40.5 % patients belong to >50 years age group Total no. of male patients in the study was 136 i.e. 68 % and Total no. of female patients in the study was 64 i.e. 32 %

As the table shows maximum number of patients had duodenal perforation 67 (33.5 %) followed by Ileal perforation 51 (25.5 %). Colonic, appendicular and gastric perforations were 25 (12.5 %), 16(8 %) and 13(6.5%) respectively. Rectal, hydatid cyst of liver and combined ileal - uterine perforations were among the least common perforations i.e.1 (0.5 %).

Table 1: Showing anatomical site of perforation in study patients

Site of perforation	Frequency (n = 200)	Percent
DUODENAL PERFORATION	67	33.5
COLONIC PERFORATION	25	12.5
ILEAL PERFFORATION	51	25.5
APPENDICULAR PERFORATION	16	8.0

GASTRIC PERFORATION	13	6.5
JEJUNAL PERFORATION	7	3.5
GALL BLADDER PERFORATION	7	3.5
MECKEL'S DIVERTICULUM PERFORATION	3	1.5
URINARY BLADDER PERFORATION	3	1.5
CBD PERFORATION	2	1.0
ILEAL AND UTERINE PERFORATION	1	.5
UTERINE PERFORATION	3	1.5
HYDATID CYST PERFORATION	1	.5
RECTAL PERFORATION	1	.5

Table 2: Showing various clinical features in patients with peritonitis

Symptoms		Frequency	Percent
Abdominal pain	Absent	6	3.0
	Present	194	97.0
Distension	Absent	94	47.0
	Present	106	53.0
Not passed Flatus	Absent	118	59.0
	Present	82	41.0
Not passed Stools	Absent	119	59.5
	Present	81	40.5
Fever	Absent	84	42.0
	Present	116	58.0
Vomiting	Absent	77	38.5
	Present	123	61.5

The commonest symptom was abdominal pain seen in 194 (97 %) patients followed by vomiting & abdominal distension seen in 123 (61.5 %) & 106 (53%) respectively.

Most common procedure performed was exploratory laparotomy with omental patch repair in 63 (31.5 %) patients followed by primary closure and resection and anastomosis in 57(28.5%) and 27 (13.5%) patients respectively 1(0.5%) patient underwent laparoscopic closure of duodenal perforation 1(0.5%) patient underwent tube duodenostomy with feeding jejunostomy.

In present study 45 i.e.22.5 % patients showed presence of organ failure. In our study 32 (16%) patients presented within 24 hours & 168 (84%) patients presented after 24 hours after onset of peritonitis. In our study 14 i.e. 7 % patients had malignancy. In our study 25 i.e.12.5 % patients origin of sepsis was colonic while in 175 i.e. 87.5 % patients origin of sepsis was noncolonic. In our study 174 i.e. 87 % patients had Diffuse peritonitis while 26 i.e.13 % had localised peritonitis

In our study 124 (62%) patients had purulent exudates while clear & fecal exudates were present in 40 (20%) & 36 (18%) patients respectively. In 87 (43.5 %) patients total MPI score was < 21 while 70 (35%) patients total score was 21-29 & it was > 29 in 43 (21.5%) patients In our study out of 200 patients with peritonitis 32 i.e.16 % patients expired. The highest mortality was in the age group 61 years & above followed by 46 - 60 years. The lowest mortality was in the age group < 15 years followed by 15-30 years.

Table 3: Showing correlation between type of peritonitis with incidence of mortality

Peritonitis	Outcome		Mortality according to Peritonitis	X ²	Df	p-value
	Discharged	Death				
Localised (n)	26	0	0	5.692	1	0.017
%	100.0%	.0%	0			
Diffuse (n)	142	32	32	5.692	1	0.017
%	81.6%	18.4%	100			

$$X^2 - 5.692 \quad d(f) - 1 \quad p - <0.017$$

In correlation between type of peritonitis with incidence of mortality, our study showed statistically significant result with **p <0.017**

In our study most of the patients i.e. 125 (62.5 %) stay in the hospital for 10 - 20 days while 8 (4 %) patients stay in the hospital for > 30 days.

Table 4: Showing correlation of MPI score with incidence of mortality

MPI	Outcome		Mortality according to MPI	X ²	Df	p-value
	Discharged	Death				
<21 (n)	87	0	0	108.38	2	<0.001
%	100.0%	.0%	0			
21-29 (n)	67	3	3	108.38	2	<0.001
%	95.7%	4.3%	9.4%			
>29 (n)	14	29	29	108.38	2	<0.001
%	32.6%	67.4%	90.6%			

$$X^2 - 108.38 \quad d(f) - 2 \quad p - <0.001$$

In our study mortality rate among patients with MPI score > 29 was 67.4% and with MPI < 21 was 0, which is statistically significant with **p <0.001**

Table 5: Showing distribution of MPI variables and outcome of patients

Variables	Outcome		p-value	
	Discharged	Death		
50 or more years (n)	56	25	<0.001	
%	69.1%	30.9%		
Female (n)	56	8	0.354	
%	87.5%	12.5%		
Organ failure (n)	15	30	<0.001	
%	33.3%	66.7%		
24 hours or more duration (n)	136	32	0.007	
%	81.0%	19.0%		
Malignancy (n)	5	9	<0.001	
%	35.7%	64.3%		
Diffuse peritonitis (n)	142	32	0.017	
%	81.6%	18.4%		
Exudate	Clear (n)	38	2	<0.001
	%	95.0%	5.0%	
	Purulent (n)	108	16	

	%	87.1%	12.9%	
	Fecal (n)	22	14	
	%	61.1%	38.9%	
Noncolonic (n)		150	25	0.08
	%	85.7%	14.3%	

In our study correlation between noncolonic origin of sepsis and female sex with outcome did not showed statistically significant results while other factors showed statistically significant results.

DISCUSSION

In a study by Rajendra Singh Jhobta^[2] et al (2006) the mean age was 36.8 years and the age range was 3 years to 90 years. In a study by Aijaz A Memon^[3] (2008) in which the spectrum of acute abdomen was studied the age range was from 13 years to 87 years.

The increased prevalence of the perforation in the age group of 31- 60 years in our study can be attributed to the fact that gastro duodenal perforations due to peptic ulcer disease is a major cause of perforation peritonitis in our study and the increased prevalence of the etiological risk factors such as smoking, alcoholism and NSAID abuse in this age group.

It is also attributed to the increased numbers of traumatic perforations in the younger age group leading to parallel increase in the overall prevalence of perforation peritonitis in this age group. Also appendicular perforation is more common in the age group of 20-30 years but no age is exempted. Majority of the ileal perforations are seen in the age group of 10-30 years, typhoid being the main etiological factor.

In a study by Rajender Singh Jhobta^[2] (2006) regarding the spectrum of perforation peritonitis in India 84% patient's were male. In a study by Rajender Singh Jhobta^[2] regarding the spectrum of perforation peritonitis in India , 422 of the 504 patients studied were males i.e.84%.

In a study by Shantanu Kumar Sahu et al^[4] the commonest presenting symptom was abdominal pain (100%), followed by distension of abdomen (82%), constipation, vomiting and fever. In a study by Rajender Singh Jhobta et al^[2] pain was present in 98% of patients, followed by vomiting (59%), abdominal distension (44%), constipation (58%), fever (35%), and diarrhoea (7%).

In the study by Rajender Singh Jhobta^[2] 304 patients i.e. 60% were managed by simple closure of perforations, 46 patients i.e. 9% were managed by resection and anastomosis. Resection without anastomosis was done in 64 patients, ileostomy /colostomy with mucous fistula / Hartmann's procedure was done in these patients. Definitive procedure in the form of Billroth I and II gastrectomy with truncal vagotomy and drainage procedure was done in 33% patients and appendicectomy in 57 patients.

In our institute the cause of delayed presentation i.e. a preoperative duration of peritonitis more than 24 hours was mainly related to the

- ▶ Illiteracy among the study population
- ▶ Lack of proper referral services
- ▶ In some patients the delay was due to diagnostic dilemma which demands early use of more sophisticated investigations like CT scan, which is not available at the peripheral hospitals
- ▶ In a study by Rodolf L^[5] 2 patients had malignancy.

In the study by Rajendra Singh Jobhta^[2] 3.76% of patient's had colonic origin of sepsis.

- ▶ In a study by Rodolfo L^[5] 69.5% has clear exudates and 21.8% had purulent exudates.
- ▶ In a study by Rajender Singh Jhobta^[2] 15% had clear exudates, 71% had purulent and 13% had faecal exudates.
- ▶ In the original study by Wacha and Linder^[6] the cut off point of 26 MPI point was used. But in our study many patients had attended higher values in the range of 40 (due to presence of malignancy and faecal contamination) so a lower cut off value of 21 MPI point was used so that the sensitivity and the specificity of the study could be increased.

Atsushi Hourichi^[7] in their study of perforation peritonitis had a mortality of 23.1%.

Koperna T^[8] et al in their study of secondary bacterial peritonitis had a average total mortality rate of 18.5%.

The mortality rate in various studies on perforation peritonitis ranges between 20 to 30%.

In a study by Rodolfo L Braco^[5] the mean age of the survivors was 32.7 years (SD ± 16.64), among non-survivors mean age was 63 years (SD ± 18.94).

Pacelli F et al^[9] confirms age as a decisive factor related with mortality. They showed that patients with age of less than 70 years had a mortality rate of 17.2% compared to mortality rate of 37.7% in patients with age more than 70 years.

Ali Yaghoobi Notash et al^[10] confirms that the risk of in hospital death was higher in patients aged above 60 years.

Kusumoto Yoshiko et al^[11] in their study of patients operated on for intraabdominal infection found that there was no mortality in less than 50 years age group, while mortality occurring only in patients older than 50 years.

Cecilie Svanes^[12] et al in their study found that among 581 patients with age < 49, 18 patients died i. e. a mortality of 3.09% , while in patients with age >49 years the mortality was 11.94%.

In the study by Pacelli F^[9] generalized peritonitis corresponded to 30.66% of the study group.

In the study by Rodolfo L^[5] generalized peritonitis corresponded to 34%.

- ▶ In the study of Rodolfo L^[5] clear fluid had a mortality of 5.8% (7/121), purulent fluid had a mortality of 6.3% and faecal fluid had a mortality of 25%.
- ▶ In a study by Chao-Wen-Hsu^[13] in fecal peritonitis the mortality was 57.10% while in purulent peritonitis it was 30.25%.

Studies like Pacelli et al^[9] have shown that factors related to host overshadow type and source of infection in evaluation of patients with intra abdominal infection. This is consistent with result of our study.

CONCLUSION

The MPI cutoff points should be adjusted for each hospital on individual basis as in our study it was divided into 3 groups, <21, 21-29, >29. Death rate in patients with MPI score < 21 was 0%, 21-29 was 4.3% and >29 was 67.4%. The simplicity of MPI makes ideal for hospitals with serious shortages of staff and resources.

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