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TO STUDY PROGNOSTIC FACTORS IN PERFORATION PERITONITIS AND EVALUATING THE OUTCOME OF PATIENTS WITH PERFORATION PERITONITIS USING MANNHEIM PERITONITIS INDEX

S. Jackison Singh	Post Graduate Trainee, Final Year, Department Of General Surgery, JNIMS, Imphal, Manipur
Dhanabir Thangjam*	Senior Resident, Department Of General Surgery, JNIMS, Imphal, Manipur *Corresponding Author
T. Arun Kumar Singh	Professor, Department Of General Surgery, JNIMS, Imphal, Manipur
N. Somorjit Singh	Professor & HOD, Department Of General Surgery, JNIMS, Imphal, Manipur

ABSTRACT

BACKGROUND: Perforation peritonitis constitutes one of the commonest surgical emergency operation encountered by surgeons all over world as well as in India. There is no single, easily available laboratory test that predicts severity or prognosis in patients with perforation peritonitis. The aim of this study is to study prognostic factors in perforation peritonitis and evaluating the outcome of patients with perforation peritonitis using Mannhein Peritonitis Index.

MATERIALS AND METHOD: The study was a prospective analytical study done in the Department of General Surgery, JNIMS, Imphal from 1st September 2017 to 31st august 2019 comprising of 100 consecutive patients in which diagnosis of perforation peritonitis were established by operative findings or surgical interventions during management were included in the study as per the inclusion and exclusion criteria.

RESULTS: Among the various prognostic factors of the scoring system, age >50 years, nature of peritoneal fluid exudates and presence of organ failure had a significant role in predicting the eventual outcome of the patients. Colonic origin of sepsis was associated with worse outcome probably due to presence of faecal exudates which is commonly associated with colonic origin of sepsis. MPI < 21 was associated wih complications in 25% of patients whereas complications increases as MPI score increases with 34.5% of patients having complication in MPI ranging from 21-29.

CONCLUSION: MPI is disease specific, easy scoring system for predicting outcomes in patients with perforation peritonitis.

BACKGROUND

Peritonitis is simply defined as inflammation of the peritoneum and may be localised or generalised. Most cases of peritonitis are caused by an invasion of the peritoneal cavity by bacteria, so that, when the term 'peritonitis' is used without qualification, acute bacterial peritonitis is often implied.[1] Primary peritonitis is an infection of the peritoneal cavity usually occurring in patients with preexisting ascites that is not related to diseases of the abdominal or retroperitoneal viscera. Secondary peritonitis, the most common form of peritonitis, can occur due to spontaneous perforation of the gastrointestinal tract, intestinal ischemia, or following an operation. Tertiary peritonitis is a recurrent infection of the peritoneal cavity that follows an episode of either primary or secondary peritonitis.[2]

Perforation peritonitis constitutes one of the commonest surgical emergency operations encountered by surgeons. Despite advances in surgical therapy, diagnostic techniques and antibiotics, prognosis of perforation peritonitis remains poor.

Various scoring systems have been used to indicate prognosis of patients with colonic perforation. These systems can be broadly divided into 2 groups-

A) Disease independent scores for evaluation of serious patients requiring stay in ICU:
- APACHE II score
- Simplified Acute Physiology Score (SAPS II)
- Sepsis Severity Score (SSS)
- Multiple Organ Dysfunction Score

B) Peritonitis specific score:
- Mannheim Peritonitis Index (MPI)
- Peritonitis Index Altona II (PIA)
- Left colonic Peritonitis Severity Score (PSS)

MPI has been reported to be strongly associated with prognosis of patients with colonic perforation.[3]

Amongst the various scoring systems, MPI is a specific, simple with a good accuracy and provides an easy way to handle with clinical parameters, allowing the prediction of the individual prognosis of patients with peritonitis.[4] MPI allows the surgeon to easily evaluate the outcome during initial surgery. The collection of the retrospective data is possible and valid because MPI only requires information routinely found in surgical registers.[5]

MPI was developed by **Wacha and Linder**[6] 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 MPI, classified according to predictive powers.

The study of patients of peritonitis offer a number of queries like what causes peritonitis, what is the extent, what is the mortality rate and factors affecting outcome in these patients and so on. The condition is associated with highly variable mortality rates, ranging from 0-60% depending upon the severity of septic state.[7]

Amongst the present scoring systems, Mannheim Peritonitis Index is one of the easiest to apply. It has been compared with other well-known scoring systems like APACHE II, Peritonitis Index Altona and Sepsis Severity Score in several studies and has been termed equal to or superior to these in predicting prognosis.[8,9]

METHODOLOGY:
The prospective analytical study was conducted in the Department of General Surgery, Jawaharlal Nehru Institute of Medical Sciences, Porompat, Imphal from 1st September 2017

to 31st August 2019.

Hundred (100) consecutive patients attending JNIMS hospital in which diagnosis of perforation peritonitis were established by operative findings or surgical interventions during management were included in the study as per the inclusion and exclusion criteria. Follow up duration was 3 months from date of discharge. Informed consent was taken from all the patients. Approval of the Institute's Ethics Board was taken and ICMR guidelines for conducting a study were followed.

INCLUSION CRITERIA:
Cases of peritonitis secondary to hollow viscus perforation treated in the Department of General Surgery, JNIMS, Porompat, Imphal during the study period were included.

EXCLUSION CRITERIA:
1) All patients with primary peritonitis (spontaneous bacterial peritonitis).
2) All patients with tertiary peritonitis.
3) Peritonitis patients with laparotomy done elsewhere.
4) Patients absconded or discharged against medical advice during hospital admission.
5) Patients who were managed conservatively.

PARAMETERS WHICH WERE RECORDED FOR CALCULATION OF THE MANNHEIM PERITONITIS INDEX:
1) Age
2) Sex
3) Organ failure
• The criterias which were used for the presence of organ failure are as follows:
• **Renal failure:** serum creatinine>177mmol/L (>2mg/dl) or serum urea>16.7mmol/L (46.78mg/dl) or oliguria <20ml/hour.
• **Shock:** Hypotension is defined as a systolic BP of <90mm Hg or a reduction of >40mmHg 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<50mmHg or pco2>50mmHg.
4) Malignancy
5) Evolution time: Patients were divided into 2 groups (<24hour/>24hour) on the basis of history and timing of surgery.
6) Origin of sepsis (colonic/non colonic): This parameter was recorded on the basis of findings at laparotomy.
7) Extension of peritonitis (Diffuse/localized)
8) Character of exudates or peritoneal fluid
• Clear
• Cloudy/Purulent
• Faecal

PATIENTS WERE DIVIDED INTO THREE CATEGORIES ACCORDING TO THE SCORE:
• Score less than 21
• Score between 21 to 29
• Score more than 29

MANNHEIM PERITONITIS INDEX SCORE

Study Variable	Adverse factors	Points	Favourable factor	Points
1.Age	0years	5	< 50 years	0
2.Sex	Female	5		0
3.Organ Failure	Present	7		0
4.Malignancy	Present	4		0
5.Evolution time	>24 hrs	4		0
6.Origin of sepsis	Non-colonic	4		0
7 Extension of peritonitis	Generalized	6		0
8.Character of exudate	Purulent Faecal	6 12	Clear	0

STATISTICAL ANALYSIS:
Data entry and management was done in excel sheet. Statistical analysis were done using the SPSS 21 version software. Chi square test was used for intergroup comparisons. 95% confidence interval applied as necessary. The level of significance was fixed at p value of <0.05. Morbidity and mortality rates for the stratified MPI scores were calculated.

RESULT

Table 1a: Number of patients in each age group

Age group(years)	Frequency	Percentage
<15	10	10.0
15-30	29	29.0
31-45	20	20.0
46-60	23	23.0
61 and above	18	18.0
Total	100	100.0

The mean age of study group was 40.07 years and the age group of 15-30 years contain maximum (29%) patients followed by 46-60 years.
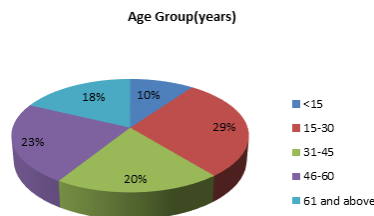
Figure 1: showing number of patients in age group

Age Group(years)

Table 1b: Showing age distribution of the patients (<50 years & >50 years)

Age group(years)	Frequency	Percentage
<50	61	61.0
50 or more	39	39.0
Total	100	100.0

Table 2: Showing sex distribution of the patients

Sex	Frequency	Percentage
Female	26	26.0
Male	74	74.0
Total	100	100.0

Table 3: Showing correlation between origin of sepsis with incidence of mortality

Diagnosis	Outcome		Mortality according to origin of sepsis	X^2	Df	p-value
	Discharged	Death				
Non-colonic (n)	94	2	2	22.96	1	**0.0001**
%	97.9%	2.1%	50%			
Colonic (n)	2	2	2			
%	50%	50%	50%			

In correlation between origin of sepsis (colonic / noncolonic) with incidence of mortality, p value in this study is 0.0001, which is statistically significant.

Table 4: Showing distribution of MPI variables and outcome of patients

Variables	Outcome		P value
	Discharged	Death	
50 or more years	35	4	0.01
%	89.7%	10.3%	
Female (n)	24	2	0.26
%	92.3%	7.7%	
Organ failure (n)	7	2	**0.003**

%	77.8%	22.2%				
24 hours or more duration (n)	76	4	0.30			
%	95%	5.0%				
Malignancy (n)	1	0	0.83			
%	100%	0.0%				
Diffuse peritonitis (n)	75	4	0.29			
%	94.9%	5.1%				
Exudates	Clear (n)	4	0	**0.007**		
	%	100%	0.0%			
	Purulent (n)	86	2			
	%	97.7%	2.3%			
	Feculent (n)	6	2			
	%	75%	25%			
Non colonic (n)	94	2	**0.0001**			
%	97.9%	2.1%				

In this study, correlation between female sex, 24 hours or more preoperative duration, presence of malignancy and presence of diffuse peritonitis does not shows statistically significant results while other factors shows statistically significant results. Non colonic origin of sepsis was associated with favourable prognosis than the colonic origin of sepsis.

Table 5: Showing number of postoperative complications

Post operative complications	Number of cases	Percentage
Wound infection	22	22%
Burst abdomen	3	3%
Electrolyte imbalance	2	2%
Fecal fistula	1	1%
Septic shock with Acute Kidney Injury (AKI)	1	1%
Respiratory infection	1	1%

Table 6: Showing correlation between MPI score with incidence of mortality

MPI	Outcome		Mortality according to MPI score	X^2	Df	p-value
	Discharged	Death				
<21 (n)	56	0	0	23.61	2	**0.0001**
%	100%	0.0%	0.0%			
21-29 (n)	29	0	0			
%	100%	0.0%	0.0%			
>29 (n)	11	4	4			
%	73.3%	26.7%	100%			

Figure 2: Showing correlation between MPI score with incidence of mortality

Mortality as per MPI
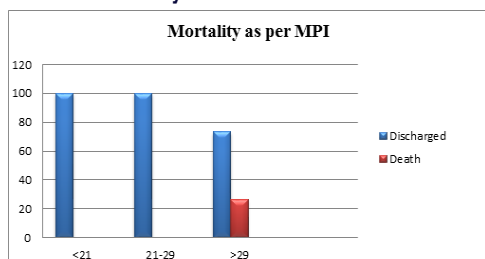
Df=2   F=12.557   pValue= 0.001

Table 7: Showing correlation between MPI score with postoperative complications

MPI	Outcome			X^2	Df	p-value
	No complication	Complication	Death			
<21 (n)	42	14	0	9.15	2	0.01
%	75.0%	25.0%	0.0%			
21-29 (n)	19	10	0			
%	65.5%	34.5%	0.0%			
>29 (n)	5	6	4			
%	33.3%	40%	26.7%			

DISCUSSION

This study comprises 100 (hundred) consecutive cases of perforation peritonitis due to various causes treated in the Department of General Surgery, Jawaharlal Nehru Institute of Medical Sciences, Porompat, Imphal from September 2017 to August 2019 with age ranging from 8 years to 85 years, mean age is 40.07 years. The highest incidence of patients were found in age group of 15-30 years (29%), followed by 46-60 years (23%) (Table 1a, Figure 1).

There was male preponderance (74%) in this study with male : female of 2.8:1(~ 3:1) (Table 2). Several studies also reported male preponderance. In a study by **Corriea MM at al**[4] **(2001)** out of 89 patients, 65 patients were male (73.3%). Similar finding (73.3%) was observed by **Joshi P et al**[10] **(2016)** in a study of 60 patients. The increased prevalence of male sex in our study is mainly due to increased number of male patients in the category of appendicular and duodenal perforation.

In this study, most common etiology of peritonitis was appendicular perforation 43% followed by duodenal perforation 37% and gastric perforation 10%. In a study by **Rodolfo L et al**[11] appendicular perforation constitute 48.28% of total patients.

Among the 100 patients studied, 4 patients died thus placing the mortality rate at 4% . **Koperna T et al**[12] in their study of secondary bacterial peritonitis had an average total mortality rate of 18.5%. **Joshi P et al**[10] in their study of perforation peritonitis had a mortality of 8.33%. Different studies have mortalities ranging from 6.4% to 17.5%. Thus inspite of improvement in the medical management, availability of new broad spectrum antibiotics and vast development in the field of intensive care with easy availability of intensive care and life support measure the mortality from perforation peritonitis remains high.

In this study, MPI scoring system done in all patients depending on preoperative and intra-operative findings and patients were categorized into three categories those <21, 21 to 29, >29. Majority (56%) of patients had MPI less than 21, 29% of patients had MPI between 21-29 and 15% patients had MPI >29 (Table 6).

There was no mortality in patients with MPI less than 21, whereas those patients with MPI score more than 29 had the highest mortality rate of 26.7%. Patient with MPI score from 21 to 29 also had mortality rate of 0.0%. The outcome of the study is statistically significant by chi square test with p value =0.0001 (Table 6, Figure 2). The results of this study is comparable with other studies.

CONCLUSION

MPI is disease specific, easy scoring system for predicting mortality in patients with perforation peritonitis.

Among the various prognostic factors of the scoring system, age >50 years, nature of peritoneal fluid exudates and presence of organ failure had a significant role in predicting the eventual outcome of the patients. Colonic origin of sepsis was associated with worse outcome probably due to presence of faecal exudates which is commonly associated with colonic origin of sepsis.

Prognosis of patients were assessed by using MPI scoring system. In this study, MPI <21 was associated with compli cations in 25% of patients whereas complications increases as

MPI score increases with 34.5% of patients having complication in MPI ranging from 21-29. Correlation of MPI with complication was significant when chi square test was applied.

In this study, mortality was 0% in MPI group of <21 and 21-29. However when MPI was more than 29, the mortality rate increases to 26.7%. Correlation of MPI with mortality was significant when chi square test was applied.

Increasing MPI scores are associated with poorer prognosis, needs intensive management and hence it can be concluded that MPI is a simple and effective tool for assessing the severity of cases of perforation peritonitis as well as estimating the outcomes of the patients.

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