

CLINICAL ASSESSMENT OF PERITONITIS USING MANNHEIM'S PERITONITIS INDEXPradeep Kumar Chitumalla¹, Venkata Ramana Nandagiri², Suryanarayana Reddy Vonterl³¹Associate Professor, Department of General Surgery, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar.²Assistant Professor, Department of General Surgery, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar.³Professor, Department of General Surgery, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar.**ABSTRACT****AIM**

To assess prognosis in patients of peritonitis using Mannheim's Peritonitis Index.

MATERIALS AND METHODS

This is a prospective study which consisted of a total of 60 cases studied in Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar between November 2013 to September 2015. The patients studied were between age of 13 and 83 years and both males and females were included in the study. The patients taken into the study were those who had clinical symptoms and signs like pain abdomen, distension, vomiting, fever, tenderness, guarding, rigidity, absent bowel sounds and obliteration of liver dullness.

INCLUSION CRITERIA

Only cases of secondary peritonitis were taken into study.

EXCLUSION CRITERIA

Peritonitis due to other causes like Primary peritonitis, Post-operative peritonitis, Pancreatitis were excluded from study.

RESULTS

In present study, mean MPI score of survivors was 21.27, mean score of non-survivors was 31.96. Mean age of all patients was 37.25 years, mean age of survivors was 32.17, mean age of non-survivors was 53.16 years. 97.5 was observed in mortality <50 years and 100 in mortality >50 years. Mortality in male and female was 0% and 10%. Mortality% with organ failure was 1.6 and mortality% without organ failure was 98.4. Mortality% with malignancy was 0 and mortality% without malignancy was 98.4. Mortality% if >24 hours was 2.2 and mortality% if <24 hours was 0. Mortality% with colonic origin was 0 and mortality% without colonic origin was 0. The nature of peritoneal contamination fluid is an important determinant of the index. Our results are as follows: Clear fluid in 3 cases, Purulent in 57 cases, Faeculent in 0 cases.

CONCLUSION

The Mannheim Peritonitis Index is a specific, simple, reliable and accurate index in assessment of prognosis in patients of peritonitis.

KEYWORDS

Mannheim peritonitis, Multiorgan failure, Peritonitis.

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INTRODUCTION: The incidence of secondary peritonitis is decreasing in many parts of the world.¹ However, in India, it remains the most common cause of intra-abdominal sepsis² with unacceptably high mortality. Despite aggressive surgical techniques, the prognosis of peritonitis and intra-abdominal sepsis is still poor, especially when multiorgan failure develops.⁽³⁻⁸⁾ The outcome of an abdominal infection depends on the complex interaction of many different

factors and the success obtained with the early onset of specific therapeutic procedures.⁹

The outcome also depends upon exact recognition of the seriousness of the disease and an accurate assessment and classification of the patient's risks. In the recent past, many scoring systems have been developed for assessing risk of mortality in peritonitis, nevertheless excellent results have been achieved with the Mannheim Peritonitis Index (MPI) which was developed by Wacha and Linder in 1983.

These reproducible scoring systems that allow a surgeon to determine the severity of the intra-abdominal infection are essential to namely ratify the effectiveness of different treatment regimens, scientifically compare surgical intensive care units, help indicate individual risk to select patients who may require a more aggressive surgical

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approach and be able to inform patient's relatives with greater objectivity.¹⁰

The present study is done to assess the prognosis of patients of peritonitis using Mannheim's Peritonitis Index.

MATERIALS AND METHODS: This is a prospective study which consisted of a total of 60 cases studied in Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar between November 2013 to September 2015. The patients studied were between age of 13 and 83 years and both males and females were included in the study. The patients taken into the study were those who had clinical symptoms and signs like pain abdomen, distension, vomiting, fever, tenderness, guarding, rigidity, absent bowel sounds and obliteration of liver dullness.

Inclusion Criteria: Only cases of secondary peritonitis taken into study.

Exclusion Criteria: Peritonitis due to other causes like Primary peritonitis, Post-operative peritonitis, pancreatitis were excluded from study.

Table 1 Shows the Mannheim's Peritonitis Index (MPI): Interpretation: Maximum Score=47.

Minimum Score =0, An MPI Score >26 indicates a very high mortality rate may be expected.

Criteria Used are		
Parameter	Finding	Points
Age	>50	5
	<50	0
Gender	Female	5
	Male	0
Organ Failure	Present	7
	Absent	0
Presence of Malignancy	Present	4
	Absent	0
Preoperative Duration for >24 hours	Present	4
	Absent	0
Primary Focus	Non Colonic	4
	Colonic	0
Diffuse Generalised Peritonitis	Present	6
	Absent	0
Nature of Exudate	Clear	0
	Viscous Purulent	6
	Faeculent	12

Table 1

Age	No. of Cases	Deaths	Percentage
<20 years	4	0	0
20-34	20	1	5
35-49	18	0	0
50-64	9	0	0
65-80	8	0	0
>80	1	0	50

No. of Deaths and Survival					
Age	No. of Cases	Deaths	%	Survival	%
<50 years	42	1	23	41	97.6
>50 years	18	0	0	18	100
Sex and its Association with Mortality					
Sex	No. of cases	Deaths	%	Survival	%
Male	50	0	0	50	100
Female	10	1	10	9	90

Table 2: Shows Age, Sex and its Association with Mortality

Table 2 shows that age is an important criterion to assess the outcome of patients. Ageing is a process during which the biochemical composition of tissues changes with age; physiologic capacity decreases, the ability to maintain homeostasis in adapting to stressors declines, and vulnerability to disease processes increases with age. After maturation, mortality rate increases exponentially with age. Hence the mortality is high in patients who are older than 50 yrs. when compared to younger individuals. In present study age >50 yrs. given 5 points against 0 points for <50 yrs. and it also shows the sex and its association with mortality. The points given for female sex in this score is 5 points and for males it is 0 points. P value for age was 0.70 which was not significant. P value for sex was 0.16 which was not significant.

Table 3 shows organ failure, primary focus, diffused generalised peritonitis, nature of exudate, malignancy and preoperative duration and its association with mortality.

Organ Failure and its Association with Mortality					
Organ Failure	No. of Cases	Deaths	%	Survival	%
Present	1	0	0	1	100
Absent	59	1	1.6	58	98.4
Primary Focus and its Association with Mortality					
Primary Focus	No. of Cases	Deaths	%	Survival	%
Colonic	0	0	0	0	0
Non Colonic	60	0	100	60	100
Diffused Generalised peritonitis and its association with mortality					
Generalised Peritonitis	No. of Cases	Deaths	%	Survival	%
Present	57	1	1.75	56	98.3
Absent	3	0	0	3	100
Nature of exudate and its association with mortality					
Exudate	No. of cases	Deaths	%	Survival	%
Clear	3	0	0	3	100
Purulent	51	1	1.75	56	98.3
Faecal	0	0	0	0	0
Malignancy and its association with mortality					

Malignancy	No. of cases	Deaths	%	Survival	%
Present	0	0	0	0	0
Absent	60	1	1.6	59	98.4
Pre-operative duration and its association with mortality					
Duration	No. of cases	Deaths	%	Survival	%
>24 years	44	1	2.2	43	97.8
<24 years	16	0	0	16	100

Table 3

Table 3 shows that the organ failure is a process of altered organ function in a patient who is acutely ill such that homeostasis cannot be maintained without intervention. Organ dysfunction is a continuum, with incremental degrees of physiological derangements in individual organs, it is a process rather than an event. Alteration in organ function can vary widely from a mild degree of organ dysfunction to completely irreversible organ failure. It includes dysfunction of cardiovascular, pulmonary, hepatic, renal, gastrointestinal nervous and haematological dysfunction. The presence of organ failure is given 7 points and absence is 0 points. It also shows the primary focus of sepsis is another important determinant of outcome. The prognosis is mainly dependent on the level of perforation because the number and type of microorganisms vary throughout GIT.

Stomach contains $<10^3$ bacteria/mm³, proximal small bowel contains 10^4 to 10^5 bacteria/mm³, terminal ileum contains more than 10^9 bacteria/mm³ and colon contains 10^{10} to 10^{12} bacteria/mm³. The type of bacteria also changes. In the upper GIT facultative Gram-ve aerobic bacteria predominate, whereas the colon contains many more anaerobic than aerobic bacteria like *Bacteroides fragilis* which has got an enhanced virulence by strong adherence capacity and by resistance against opsonisation and phagocytosis. The points given for non-colonic origin is 4 and colonic origin is 0. It also shows that the diffuse spread of contaminant fluid in the peritoneal cavity will adversely affect the prognosis as there will be increased plasma loss into the peritoneal cavity from large area of vasodilatation demanding increase in cardiac output, increased water and electrolyte loss into the distended bowel loop, greater toxic effects of bacteria, cardiopulmonary effects of distended abdomen.

The diffuse generalised peritonitis is given 6 points against and 0 points for localised peritonitis. As explained above, the type of bacteria varies drastically down the GI tract. The large bowel contains more number of anaerobes with high virulence levels causing severe septicaemia and high mortality. Clear exudates were given 0 points, purulent exudates were given 6 points and faeculent exudates were 12 points. The presence of coexisting malignancy will adversely affect the outcome of the patient by causing local effects like pressure effects, obstruction, infiltration and perforation and systemic effects like cancer, cachexia due to the release of TNF, and various paraneoplastic syndromes ultimately leading to drastically reduced functional and immune status of the host.

The presence of malignancy is given 4 points and 0 points for no malignancy. In the treatment of any patient with septicaemia, resuscitation is often futile without early and rapid treatment of source of sepsis. Thus, the survival depends on the early treatment of the sepsis (<24 hrs.) before the development of multiorgan failure. The preoperative duration >24 hrs. is given 4 points against 0 points if duration is <24 hrs. The P value for organ failure was 0.98 which was not significant, for malignancy it was not calculable, for preoperative duration it was 0.73 which was not significant, for primary focus it was not calculable, for generalised peritonitis and exudates, it was 0.95 which was not significant.

Sl. No.	Diagnosis	Total Cases	%	Deaths	%
1	Duodenal ulcer perforation	42	70	0	22.22
2	Gastric perforation	1	1.6	0	23.52
3	Small bowel perforation	2	3.3	0	8.69
4	Gangrene bowel	1	1.6	1	100
5	Colonic perforation	0	0	0	37.5
6	Appendicular perforation	13	21.6	0	7.69
7	Ruptured liver abscess	1	1.6	0	0

Table 4: Shows Causes of Peritonitis, it Shows that Most Common Cause of Peritonitis is Duodenal Ulcer Perforation (45%)

Score	No. of Cases	Deaths	%
<21	39	0	0
21-29	19	0	0
>29	2	1	50
<21 & <23	43	0	0
>21 & >23	17	1	5.8
<26	57	0	0
>26	3	1	33.3
Score	No. of Cases	Deaths	%
0-9	0	0	0
10-19	20	0	0
20-29	38	0	0
30-39	2	1	50
40-59	0	0	0

Table 5: Shows Relation of MPI Score with Mortality

DISCUSSION: Peritonitis is still one of most important surgical emergency. Despite of the progress in antimicrobial agents and intensive care treatment, the present mortality due to- diffuse peritonitis ranges between 10 to 20% and continues to be unacceptably high.^{11,12}

In an attempt to reduce the mortality in peritonitis by early identification of those who are at high risk, many scoring systems have been introduced so that early and objective classification of severity of peritonitis may help reduction of mortality.^{13,14} Various other scoring systems have been used to assess the prognosis and outcome of peritonitis. Those used include the Acute Physiological and Chronic Health Evaluation score (APACHE II), the Peritonitis Index Altona (PIA), the Sepsis Score, and the Physiological and Operative Severity Score for Enumeration of Mortality and Morbidity (POSSUM). Among all of these, the MPI scoring system and APACHE II found to be very useful. APACHE II, which was introduced by Knaus and co-workers,^{15,16} integrates various physiologic variables during the first 24 hours in the intensive care unit (ICU) with age and chronic health status of the patient.

This initial stratification of risk factors and a predictive equation estimates patient outcome. They are; however, complex, cumbersome and time consuming, maybe impossible to apply in the setting of intra-abdominal sepsis.^{17,18} and need a software to assess the mortality. And the APACHE II score has been found varyingly to underestimate or overestimate death, especially in high-risk patients and also found to have a lesser sensitivity and specificity than MPI score.¹⁹ MPI has got an advantage of being simple, rapid, peritonitis specific and easily applicable. The present study is done with aim of assessing the prognosis of patients of peritonitis using Mannheim's peritonitis index. The following observations were made from the study.

MPI Score: In present study, mean score of survivors was 21.27, mean score of non-survivors was 31.96. In study done by Rodolfo L et al, that of survivors was 13 and that of non-survivors was 29, In study done by Rodriguez et al, that of survivors was 21.5 and that of non-survivors was 30.69, In study done by Bruch HP et al, that of survivors was 25 and that of non-survivors was 31.

Age: The age appears to be a significant prognostic index. Mean age of all patients was 37.25 years, Mean age of survivors was 32.17, Mean age of non-survivors was 53.16 years. M.M. Correia et al observed mortality in >50 years was 85.2, Rodolfo et al observed mortality in < 50 years was 2.17, mortality in > 50 years was 22.22. In the present study, 97.5 was observed in mortality <50 years and 100 in mortality >50 years.

Sex: In the present study, mortality in male and female was 0 % and 10 %. When subject for statistical analysis the P value was 0.16 which is not statistically significant showing no correlation. In Rodolfo et al study, mortality% in males was 5.55 and mortality% in females 7.14. In M.M Correia et al study, mortality% in males was NA and mortality% in females 25.5.

Organ Failure: Because organ dysfunction and failure evolves in patients with sepsis, assessment of prognosis using this criteria is very useful.

In Rodolfo et al study, mortality% with organ failure was 73.34 and mortality% without organ failure was 0. In M.M Correia et al study, mortality% with organ failure was 56.4 and mortality% without organ failure was NA. In present study, mortality% with organ failure was 1.6 and mortality% without organ failure was 98.4.

Presence of Malignancy: In present study, mortality% with malignancy was 0 and mortality% without malignancy was 98.4. In Rodolfo et al study, mortality% with malignancy was 50 and mortality% without malignancy was 5.81.

Preoperative Duration: If preoperative duration exceeds 24 hrs., the chance of evolution of sepsis is high leading to multiorgan failure with irreversible changes which becomes unresponsive to the resuscitative therapy. In present study, mortality% if >24 hours was 2.2 and mortality% if <24 hours was 0. In Rodolfo et al study, mortality% if >24 hours was 12.7 and mortality% if <24 hours was 0. In M.M Correia et al study, mortality% if >24 hours was 74.5 and mortality% if <24 hours was NA.

Primary Focus of Sepsis: In present study, mortality% with colonic origin was 0 and mortality% without colonic origin was 0. In Rodolfo et al study, mortality% with colonic origin was 5.55 and mortality% without colonic origin was 16.66.

Generalised Peritonitis: When there is a diffuse peritonitis, the mortality is raised when compared to localised peritonitis. But the sample size in localised peritonitis group was very small. So it did not demonstrate a significant correlation (P value 0.95). Our study is not having similar results with the studies done by Rodolfo L et al and M. M. Correia et al.

Nature of Exudates: The nature of peritoneal contamination fluid is an important determinant of the index. Our results are as follows: Clear fluid in 3 cases, Purulent in 57 cases, Faeculent in 0 cases. These results are different from the studies done by Rodolfo L et al and M. M. Correia et al. because of variations in sample size and organ of sepsis. The P value (Measured by Chi Square test) was not showing significant (P value 0.95) correlation. This is explained by the small sample size in the study.

CONCLUSION: The Mannheim Peritonitis Index is a specific, simple, reliable and accurate index in assessment of prognosis in patients of peritonitis. It shows significantly high mortality when the score is >26. The predictive accuracy of the score can be increased by adding preoperative comorbid conditions like diabetes and hypertension to the criteria. It is a simple index for assessment when compared to APACHE II, etc.

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