

EVALUATION OF MANNHEIM'S PERITONITIS INDEX IN PERITONITIS

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**Abstract**

Background: The incidence of secondary peritonitis is decreasing in many parts of the world. However, in India, it remains the most common cause of intra-abdominal sepsis with unacceptably high mortality. Assessment of prognosis in patients of peritonitis using Mannheim's Peritonitis Index. **Materials and Methods:** It was a Prospective observational study. A total of 60 cases studied in MediCiti Institute of Medical Sciences, Ghanpur between June- 2010 to October - 2012. The patients studied were between age of 13 and 83years and both males and females were included in the study. The patients who 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. **Result:** 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 <50yrs. Organ dysfunction is a continuum, with incremental degrees of physiological derangements in individual organs, it is a process rather than an event. Most common of peritonitis- DU perforation (45%). There was no significant association of MPI with any risk factors- age, gender, organ failure, malignancy, generalized peritonitis. ($p>0.05$) which suggest that risk factors are comparable. **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 co morbid conditions like diabetes and hypertension to the criteria.

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 sepsis with unacceptably high mortality.^[2] Despite aggressive surgical techniques the prognosis of peritonitis and intraabdominal 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

intraabdominal infection are essential to: 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 approach, 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

It was a Prospective observational study. A total of 60 cases studied in MediCiti Institute of Medical Sciences, Ghanpur between June- 2010 to October - 2012. The patients studied were between age of 13 and 83years and both males and females were included in the study. The patients who 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 — excluded from study.

The Statistical significance (two tailed P value) calculated by Fischer's exact test in 2x2 contingency table and Chi square test with degree of freedom 2

Mannheim's peritonitis index (MPI):

| 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 Generalized Peritonitis | Present | 6 |
| | Absent | 0 |
| Nature Of Exudate | Clear | 0 |
| | Viscous Purulent | 6 |
| | Feculent | 12 |

Organ failure is considered to be present if the above criteria are met.

MPI = SUM of points parameters present
Interpretation: Maximum score=47, Minimum score =0. An MPI Score >26 indicates a very high mortality rate may be expected.

RESULTS AND DISCUSSION

As per [Table 1] 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 <50yrs.

The points given for female sex in this score is 5 points and for males it is 0 points. [Table 2]

As per [Table 3] 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. The degree of organ dysfunction has a major clinical impact on survival of patient. It includes dysfunction of cardiovascular, pulmonary, hepatic, renal, gastrointestinal nervous and hematological dysfunction. The presence of organ failure is given 7 points and absence is 0 points.

Table 1: Association of Age with Mortality

| Age | No. Of cases | Deaths | % |
|-----------|--------------|--------|----|
| <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 |

| Age | No. of cases | Deaths | % | Survival | % |
|--------|--------------|--------|----|----------|------|
| <50YRS | 42 | 1 | 23 | 41 | 97.6 |
| >50 | 18 | 0 | 0 | 18 | 100 |

Table 2: Sex and association with mortality

| Sex | No.of cases | Deaths | % | Survival | % |
|--------|-------------|--------|----|----------|-----|
| Male | 50 | 0 | 0 | 50 | 100 |
| Female | 10 | 1 | 10 | 9 | 90 |

The points given for female sex in this score is 5 points and for males it is 0 points.

Table 3: Organ failure and association with mortality

| Organs failure | No. of cases | Deaths | % | Survival | % |
|----------------|--------------|--------|-----|----------|------|
| Present | 1 | 0 | 0 | 1 | 100 |
| Absent | 59 | 1 | 1.6 | 58 | 98.4 |

Table 4: Primary focus and association with mortality

| Primary focus | No.of cases | Death | % | Survival | % |
|---------------|-------------|-------|-----|----------|-----|
| Colonic | 0 | 0 | 0 | 0 | 0 |
| Non colonic | 60 | 0 | 100 | 60 | 100 |

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 - < 10³ bacteria / mm³, Proximal small bowel — 10⁴ to 10⁵ bacteria / mm³, Terminal ileum — more than 10⁹ bacteria / mm³, Colon — 10¹⁰ to 10¹² bacteria / mm³. The points given for non-colonic origin is 4 and colonic origin is 0.

Table 5: Diffuse generalised peritonitis and association with mortality

| Generalized peritonitis | No. Of cases | Deaths | % | Survival | % |
|-------------------------|--------------|--------|------|----------|------|
| Present | 57 | 1 | 1.75 | 56 | 98.3 |
| Absent | 3 | 0 | 0 | 3 | 100 |

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 loops greater toxic effects of bacteria cardiopulmonary effects of distended abdomen.

Table 6: Nature of exudate and association with mortality

| Exudate | No.of cases | Deaths | % | Survival | % |
|----------|-------------|--------|------|----------|------|
| Clear | 3 | 0 | 0 | 3 | 100 |
| Purulent | 51 | 1 | 1.75 | 56 | 98.3 |
| Fecal | 0 | 0 | 0 | 0 | 0 |

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 septicemia and high mortality.

Table 7: Cause of peritonitis

| S.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 |

Most common of peritonitis- DU perforation (45%).

Table 8: MPI score and relation with mortality

| Risk Factor | Total No. | Death | | Survival | | Fischer's Exact test P value (two tailed) & Chi-square test | Significance |
|--|--------------|-------------|----------------|--------------|------------------|---|-----------------|
| | | No | % | No | % | | |
| Age <50 >50 | 42 18 | 1 0 | 23 0 | 41 18 | 97.6 100 | 0.70 | Not significant |
| Sex Male Female | 50 10 | 0 1 | 0 10 | 50 9 | 100 90 | 0.16 | Not significant |
| Organ failure Present Absent | 1 59 | 0 1 | 0 1.6 | 1 58 | 100 98.4 | 0.98 | Not Significant |
| Malignancy Present Absent | 0 60 | 0 1 | 0 1.6 | 0 59 | 0 98.4 | Not calculable | Not significant |
| Pre op duration <24hrs >24hrs | 44 16 | 1 0 | 22 0 | 43 16 | 97.8 100 | 0.73 | Not Significant |
| Primary focus in colon not in colon | 0 60 | 0 0 | 0 0 | 0 60 | 0 100 | Not calculable | Not significant |
| Generalized peritonitis present Absent | 57 3 | 1 0 | 1.95 0 | 56 3 | 98.3 100 | 0.95 | Not significant |
| Exudates clear purulent fecal | 3 59 0 | 0 1 0 | 0 1.75 0 | 3 56 0 | 100 98.3 0 | 0.95 | Not significant |

As per [Table 8] there was no significant association of MPI with any risk factors- age, gender, organ failure, malignancy, generalized peritonitis. ($p>0.05$) which suggest that risk factors are comparable.

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.^[18,19]

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.^[20]

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 (PTA), 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 integrates various physiologic variables during the first 24 hours in the intensive care unit (ICU) with age and chronic health status of the patient.^[12,13] 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,^[16,17] and need a software to assess the mortality. And the APACHE II score has been found varying to underestimate or overestimate death, especially in high-risk patients and also found to have a lesser sensitivity and specificity than MPI score 16. MPI has got an advantage of being simple, rapid, peritonitis specific and easily applicable.

In our study mortality in male and female was Males – 00 %, Female – 10 %. When subject for statistical analysis the P value was 0.16 which is not statistically significant showing no correlation. Similar results found in the studies done (Brazil).^[13,14] Because organ dysfunction and failure evolves in patients with sepsis, assessment of prognosis using these criteria is very useful. When compared with study done our results did not correlate. 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.^[15,16] Their studies also did not demonstrate any correlation between focus of non-colonic origin and mortality. The statistical analysis also did not demonstrate significant correlation. When there is a diffuse peritonitis the mortality is raised when compared to localized peritonitis. But the sample size in localized peritonitis group was very small.^[19,20] So it did not demonstrate a significant correlation (P value 0.95). 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, Feculent in 0 cases 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 co morbid conditions like diabetes and hypertension to the criteria.

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