

## Usefulness of Mannheim's Peritonitis Index Screening System in Predicting Outcome in Patients with Peritonitis

Vipul P. Gurjar<sup>1</sup>, Honeypalsinh H. Maharaul<sup>2</sup>

<sup>1,2</sup>Department of Surgery, Smt. B.K. Shah Medical Institute and Research Center, Sumandeep Vidyapeeth, Vadodara, Gujarat 391760, India.

### How to cite this article:

Vipul P. Gurjar & Honeypalsinh H. Maharaul. Usefulness of Mannheim's Peritonitis Index Screening System in Predicting Outcome in Patients with Peritonitis. *New Indian J Surg.* 2018;9(4):507-12.

### Abstract

"Peritonitis is an inflammation of the peritoneum, the thin tissue that lines the inner wall of the abdomen and covers most of the abdominal organs. Peritonitis may be localized or generalized, and may result from infection (often due to rupture of a hollow abdominal organ as may occur in abdominal trauma or inflamed appendix) or from a non-infectious process." Early prognostic evaluation of patients with peritonitis is desirable to select high-risk patients for intensive management and also to provide a reliable objective classification of severity and operative risk. This study attempts to evaluate the use of scoring Mannheim Peritonitis Index (MPI) in patients with peritonitis. This prospective study was conducted between July 2016 to September 2017 on patients with abdominal pain admitted to S.B.K.S. & M.I.R.C. Dhiraj Hospital Piparia Vadodara.

**Keywords:** Peritonitis; Mannheim Peritonitis Index.

### Introduction

Generalized peritonitis is a much of the time deadly condition. It keeps on being one of the significant issues going up against doctors, specialists and their patients all through the world. Until the finish of the most recent century, peritonitis was dealt with restoratively with a mortality of 90% [1].

In 1926, Krishna demonstrated that the mortality of peritonitis could be diminished by strict execution of

surgical standards, and the death rate dropped to underneath half. From that point forward, in spite of countless advances in surgical aptitudes, antimicrobial specialists and strong care, the mortality of peritonitis stays high and is by and by detailed as in the vicinity of 13 and 43% [2].

The visualization and result of peritonitis rely on the connection of many elements, including understanding related components, infection particular variables, and demonstrative and remedial mediations. Sorting patients into various hazard gatherings would help guess the result, select patients for serious care and decide agent chance, in this manner picking the idea of the agent strategy, e.g. harm control versus conclusive strategy.

Intense summed up peritonitis from gastrointestinal empty viscous perforation is a conceivably dangerous condition. The anticipation of peritonitis stays poor in spite of advancement in conclusion and administration. Early distinguishing proof of patients with extreme peritonitis may help in choosing patients for forceful surgical approach [3-5]. Reviewing the seriousness of intense peritonitis has aided no little path in basic leadership and has enhanced treatment in the administration of extremely sick patients [6].

Experimentally based hazard appraisal for critical clinical occasions has been to a great degree valuable in assessing new treatments, in checking assets for compelling use and enhancing nature of care [7,8].

The anticipation of peritonitis and intra-abdominal sepsis, especially when multi-organ dysfunction creates, stays poor in spite of enhancements in finding and surgical and therapeutic administration of this condition. Early and target arrangement of the seriousness of peritonitis may help in choosing patients for forceful surgical approach [9-11]. A few scoring

---

**Corresponding Author:** Honeypalsinh H. Maharaul, Department of Surgery, Smt. B.K. Shah Medical Institute and Research Center, Sumandeep Vidyapeeth, Vadodara, Gujarat 391760, India.

E-mail: [mailhanipal.19@gmail.com](mailto:mailhanipal.19@gmail.com)

Received on 15.05.2018, Accepted on 29.05.2018

frameworks have been created for this reason, for example such as the Acute Physiology and Chronic Health Evaluation (APACHE) II score that considers 12 physiological variables [12], Simplified Acute Physiology Score (SAPS), Sepsis Severity Score (SSS), Ranson score, Imrie score, and Mannheim Peritonitis Index (MPI).

The MPI takes into account age, gender, organ failure, cancer, duration of peritonitis, involvement of colon, and extent of spread and character of the peritoneal fluid. This score was initially created by discriminant investigation of information from 1253 patients with peritonitis [13]. It gives off an impression of being more reasonable than other scoring frameworks, for example, the APACHE II, [14] which is tedious and might be difficult to apply in the setting of intra-stomach sepsis [14,15]. Also, in a multicenter investigation of 2003 patients, the MPI had a satisfactory specificity and sensitivity [16].

Patients with a score surpassing 26 were characterized as having a high death rate [17]. The Mannheim Peritonitis Index (MPI) is a particular score, which has a decent exactness and gives a simple approach to deal with clinical parameters, permitting the expectation of the individual visualization of patients with peritonitis [18]. There are no distributed Indian investigations to survey the legitimacy of this scoring framework.

The present study was performed to predict outcome of patients with peritonitis using the MPI.

### ***Mannheim's Peritonitis Index [7]***

*Criteria: Tally scores of positive criteria*

- A. Organ Failure: 7
- B. Diffuse peritonitis: 6
- C. Age older than 50 years old: 5
- D. Female gender: 5
- E. Malignancy: 4
- F. Non-colonic Sepsis origin: 4
- G. Preoperative duration of peritonitis: 4
- H. Exudate
  - 1. Fecal: 12
  - 2. Cloudy or purulent: 6
  - 3. Clear: 0

*Interpretation*

- A. Score 0-5: 0% Mortality
- B. Score 6-13: 20% Mortality
- C. Score 14-21: 13% Mortality
- D. Score 22-29: 26% Mortality
- E. Score 30-39: 64% Mortality

### **Material and Methods**

*Type of Study:* Prospective Observational

*Study Design:* Cross Sectional Study

*Study Population:*

- *Age:* more than 18 years
- *Gender:* Both male & female

*Study Duration:* 12 Months

*Study Centre:* Department of Surgery, Dhiraj General Hospital

*Study Sample Size:* In present study we have enrolled total 50 patients.

*Inclusion Criteria*

- All the patients referred to or admitted under the departments of general Surgery with acute abdomen and diagnosed to have peritonitis.
- If patient is illiterate than the patient who can give oral consent and LAR can give written consent in presence of impartial witness.

*Exclusion Criteria*

1. Patient not willing for study.
2. Paediatric Patients will be excluded

### **Results and Discussion**

Mortality in patients with peritonitis remains high; various multi centric studies insist this reality. Numerous factors accountable for this are kind of fundamental pathology, condition of the patient, nature of treatment offered to the particular patient. Hence it is difficult to foresee the prognosis in these patients. The disease process of peritonitis is complex in nature, to understand this scoring system which provides objective description of patient's condition at point is needed [19]. The Mannheim's peritonitis index is one such exertion towards building up a comprehensive and dependable scoring system for peritonitis [19].

Investigation of the gathered material uncovered that division of patients in light of the acquired MPI score may help assess the risk of developing serious disturbances of the general condition the postoperative period and additionally the need of proceeded with treatment of the patient in an emergency unit relaparotomy. Sensible utilization of the score will encourage distinguishing proof of patients in the high-risk group, in this way perhaps bringing issues to light of their expanded danger of postoperative inconveniences, for example, cardiorespiratory failure, acidosis, electrolyte issue and postoperative wound complications [20].

Regardless of the way that the Mannheim score is easy to use and effective in predicting mortality, it

can't be utilized as a preoperative system utilized at admission to stratify patients in based on the risk of death, since it requires thought of intraoperative evaluation, for example, the nature of fluid in the peritoneal cavity and anatomical exit site and in addition histopathological assessment (a reason for neoplastic or non-neoplastic root). Other inconvenience of the score is the way that it doesn't consider chronic diseases and major systemic disorders, which are very important risk factors for death and serious complications. [20]. To sum up, stratification of patients with peritonitis to various risk groups is helpful. On account of it the administration, diagnostics and treatment of patients might be improved, shirking of genuine difficulties - more powerful, and a choice to begin concentrated treatment less demanding and quicker to take. Such division likewise encourages settling on a choice to play out the most useful surgical strategies for a given hazard - radical for bringing down hazardous patients and more limited or less loading on account of patients from the high-chance gathering. Moreover, utilizing an arrangement of allocating patients to various groups takes into account exact and dependable correlation of various symptomatic and remedial activities in clinical examinations. It is suggested, be that as it may, to build up an ideal cut-off point for each examined bunch contingent upon the statistic attributes of the considered populace keeping in mind the end goal to accomplish the most astounding conceivable prescient power [20].

Since the publication of MPI, every one of the examinations attempted to approve Mannheim peritonitis index including our investigation demonstrate a noteworthy ascent in death rate over the basic score of 26. At the point when ordered in three groups, the most reduced mortality was seen in <21 score and the most elevated with scores >29 ( $p < 0.001$ ). Although expanding score predicts expanding mortality, it ought to be noticed that still a death rate makes due with scores over 29 among deceased patients (81.81% in our investigation). This reflects that the quality of prediction is to such an extent that it can't be connected to singular patients for taking choices in regards to more forceful treatment or constraint of treatment. This has additionally been affirmed in the largest multicenter study to approve the utilization of MPI. In opposition to this a few examinations have demonstrated a right around 100% mortality above score and have recommended that MPI can be utilized as criteria for choosing the ideal treatment approach for peritonitis. Indeed, even laparoscopic sanitation of stomach cavity has been prescribed for patients having scores underneath. Curiously high MPI has additionally been appeared to be related with parasitic disease in patients with punctured peptic ulcer and it has been prescribed that a high MPI score in these patients ought to be utilized as a sign for prophylactic antifungal treatment.

MPI has likewise been utilized as a part of specific studies to stratify patients for correlation of various methods and has been appeared to be precisely associated with morbidity and mortality.

Considering each risk factor independently in our examination just age > 50 years, malignancy, organ failure and pre-operative length of peritonitis > 24 hours. Rest of the variables had insignificant effect on mortality

Age over 50 was related with a high mortality (72.00%), a fact demonstrated in every one of the investigations completed on peritonitis and mortality. Mean age of the all patients (41.40 years) and that of survivors (37.94 years) was like what was seen in different studies. However, the mean age of non-survivors is significantly not as much as that appeared in different studies (53.67 years contrasted with upto 66 years in other studies). This may be due to a generally lower life expectancy in our population. Nearness of organ failure at the time of first surgery was the most noteworthy hazard factor. It expanded the odds of mortality by 8.9 times, be that as it may, it is vital to take note of that of the considerable number of individuals who created organ failure just 37.5% died while 62.5% still survived. Among non-survivors 81.82% had at least one organ failure at the time of first surgery. Different investigations have indicated organ failure to be available in 100% of expiries, yet in those examinations likely organ failure as reason for death has been confused for the presence of this factor at the time of first surgery.

Pre-operative duration of peritonitis > 24 hours was additionally significantly associated with early outcome, like different investigations. This by implication likewise accentuates the significance of early basic decision making in regards to surgery in these cases.

#### *Comparasion of Mean Age of Mortality: (Table 1), Graph 1)*

- In our study mean age of male patients who were alive was 37.19 and mean age of 52.25 were dead while in study by Neil Boudville [87] it was 47.95 and 73.64 respectively. Female patient had higher mean age with 39.46 who were alive and 57.33 who were dead which is comparable to study by Neil Boudville et al.[87]. India being developing country with < 5% of GDP diverted towards health sector patients either neglect and presents late to our tertiary institute thus, lower mean age in our study compared to other study. Most of the patient in our study belongs to lower socio-economic status having poor nutritional status and there for having low healing power and health status.

#### *Comparison of MPI Index and Mortality Rate:*

In present study we have enrolled total 50 patients with peritonitis and assesses the effectiveness and

reliability of the Mannheim Peritonitis Index for the prediction of the outcome and also check the sensitivity and specificity of the index in that we have found mortality rate was 22.00% which similar to the other studies. We also found that MPI score more than 26 is highly associated with higher rate of mortality and among deceased patients we found that 81.81% patients had MPI score more than 29 and these results also similar to other studies. MPI score more than 26 have mortality rate of 68.75% whereas MPI Score less than 26 have mortality rate of 2.96.(Table 2, 3).

*Comparison of USG Findings:*

We have compared our USG findings data with the study done by P.Budzynski et al and we have found

that in his study they concluded that Acute Appendicitis was major cause of Peritonitis where as in present study Perforation and Obstruction were major cause of Peritonitis. In their study Intestinal Perforation was at second highest cause of peritonitis (Table 4, Graph 2).

*Comparison of Mean MPI Score and USG Findings:*

We have also compared mean MPI score and USG findings with study done by P.Budzynski et al and we have found that mean MPI score was found to be higher in patients with Perforation which is similar to the results found in the study done by P.Budzynski et al.

**Table 1:** Comparison of Mean age of Mortality

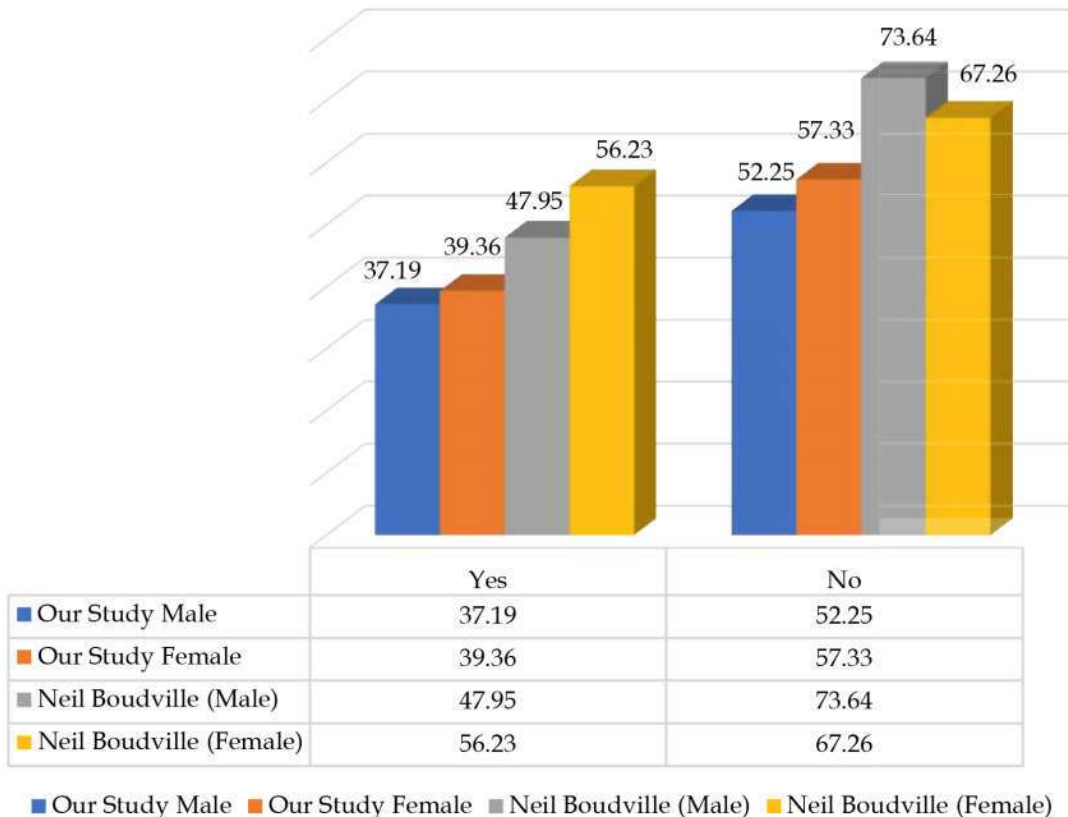
Alive	Our Study				Neil Boudville et al <sup>87</sup>			
	Male Mean Age	SD	Female Mean Age	SD	Male Mean Age	SD	Female Mean Age	SD
Yes	37.19	12.84	39.46	15.25	47.95	-	56.23	-
No	52.25	17.80	57.33	10.69	73.64	-	67.26	-

**Table 2:** Comparison of MPI score

Study	MPI Score	
	≥26	<26
Kusumotoyoshiko et al	41.00%	3.80%
Malik AA et al	82.30%	4.00%
Present Study	68.75%	2.96%

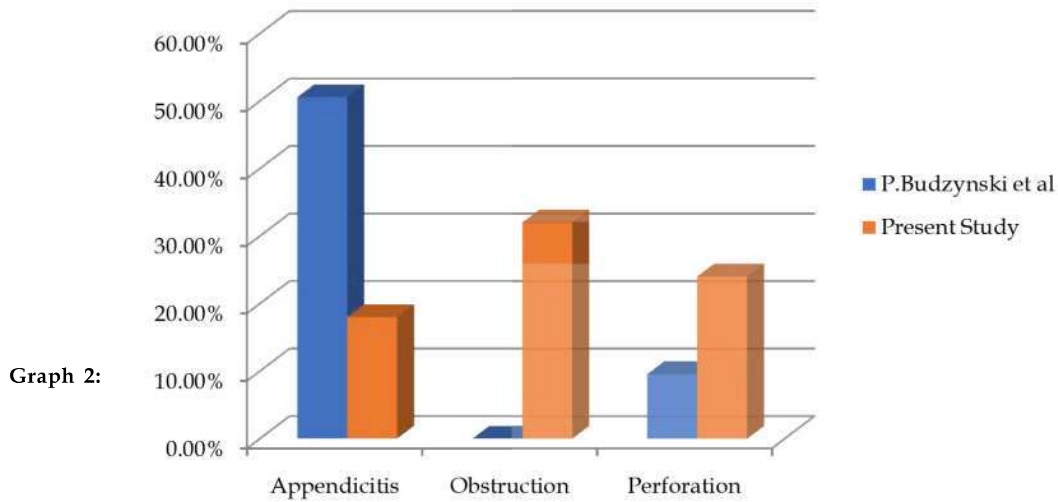
**Table 3:** Comparison of Mortality Rate

Study	Mortality Rate
Muralidhar V A	14%
G. Salamone et al	25.96%
Kusumoto	10.20%
Present Study	22.00%



**Graph 1:** Comparison of Mean age of Mortality

**USG Findings**



Graph 2:

Table 4:

USG Findings	P. Budzynski et al	SD	Present Study	SD
Appendicitis	11.5	17	17.89	7.17
Obstruction	NA	NA	20.06	9.63
Perforation	29.2	9.2	28.17	8.26

Table 5:

USG Findings	P. Budzynski et al	%	Present Study	%
Appendicitis	85	50.6%	9	18.00%
Obstruction	NA	NA	16	32.00%
Perforation	16	9.52%	12	24.00%

Following table is showing the comparison of the USG Findings and mean MPI score of present study and P. Budzynski et al. study (Table 5).

**Conclusion**

MPI is disease particular, simple scoring system for anticipating the mortality in patients with secondary peritonitis. Expanding scores are related with poorer prognosis, needs intensive management and henceforth it is ought to be utilized routinely in clinical practice.

**References**

- Hiyema DT, Bannion RS. Peritonitis and intraperitoneal abscess; In: Zinner MJ, Schwertz SI, Ellis H, Maingots Abdominal Operation. Vol 1. Edition 10. McGraw Hill: 2001.pp.633-53.
- Wittmen DH. Intraabdominal infections, pathophysiology & treatment intra abdominal infection. In; Wittman DH, Marcel Decker Inc: 1991.pp.6-11.
- Mekins JL, Solomkin JS, Allo MD, Dellinger EP, Howard RJ, Simmons RL. A proposed classification of intra-abdominal infections. Stratification of etiology and risk for future therapeutic trials. Arch Surg 1984;119:1372-8.

- Kneus WA, Drepar EA, Wagner DP, Zimmerman JE. APACHE II; severity of diseaseclassification system. Critical Care Med 1985;13;818-29.
- Biling A, FrohlichD, Schildbarg FW. Prediction of outcome using the Mannheim peritonitis indexin 2003 patients; British Journal of Surgery 1994;81;209-13.
- Bohnan J, Boulengar M, Makins JL, Mclen APH. Prognosis in generalized peritonitis-relation to cause and risk factors; Archives of Surgery. 1983;118;285-90.
- Giesling U, Peterson S, Freiteg M, Kline-Krnebrg H, Ludwig K. Surgical management of severe peritonitis. ZentralblChir. 2002;127;594-97.
- Farthman EH, Schoffel U. Principles and limitations of operative management of intra abdominal infections. World Journal of Surgery. 1990;14:210-17.
- Ponting GA, Sim AJW, Dudley HAF. Comparison of local and systemic Sepsis in predicting survival. British Journal of Surgery. 1987;74:75052.
- Bion J. Outcome in Intensive care. British Medical Journal. 1993;307:953-54.
- Knaus WA, Drapper EA, Wagner DP, Zimmerman JE. APACHE severity of disease classification system. Critical Care Medicine; 1985;13:818-29.
- Kologlu M, Elker D, Altun H, Seyek I. Validation of MPI and PIA II in two different groups of patients with

- secondaryperitonitis. *Hepatogastroenterology*. 2001; 48:147-51.
13. Bosscha K, Reijnders K, Hulstaert PF, Algra A, van der Werken C. Prognostic scoring systems to predict outcome in peritonitis & intra-abdominal sepsis. *British Journal of Surgery*. 1997;84(11):1532-34.
  14. Bosscha K, Reijnders K, Hulstaert PF, Algra A, van der Werken C. Prognostic scoring systems to predict outcome in peritonitis and intra-abdominal sepsis. *Br J Surg* 1997; 84;1532-4.
  15. Kologlu M, Elke D, Altu H, Sayek I. Validation of MPI and PIA II in two different groups of patients with secondary peritonitis. *Hepatogastroenterology* 2001; 48:147-51.
  16. Billing A, Frohlich D, Schildberg FW. Peritonitis Study Group. Prediction of outcome using the Mannheim Peritonitis Index in 2003 patients. *British Journal of Surgery*; 1994;81:209-213.
  17. Wach H, Lindr MM, Feldman U, Wsch G, Gundlach E, Steifensnd RA; "Mannheim peritonitis index - prediction of risk of death from peritonitis: construction of a statistical and validation of an empirically based index". *Theoretical Surgery*. 1987;1;169-77.
  18. Correia MM, Thuler LCS, Velasco E, Vidal EM, Schanaider A. Peritonitis Index in oncologic patients. *Revista Brasileira de Cancerologia*. 2001;47(1):63-68.
  19. Budzynski P, Dworak J, Natkaniec M, Pedziwiatr M, Major P, Migaczewski M, Matlok M, Budzynski A. The usefulness of the Mannheim Peritonitis index score in assessing the condition of patients treated for peritonitis; 2015 Jun;87(6):301-6.
  20. Predictive power of Mannheim Peritonitis Index (PDF Download Available). Available from: [https://www.researchgate.net/publication/7467383\\_Predictive\\_power\\_of\\_Mannheim\\_Peritonitis\\_Index](https://www.researchgate.net/publication/7467383_Predictive_power_of_Mannheim_Peritonitis_Index) [accessed Sep 17, 2017].
-