

# Predictive value of mannheim peritonitis index (MPI) for mortality in perforated peptic ulcer

N Sivaprahasam<sup>1\*</sup>, S Vijayalakshmi<sup>2</sup>, S Kalitathinam<sup>3</sup>, R Balasubramaniam<sup>4</sup>

<sup>1</sup>Professor, <sup>2</sup>Associate Professor, <sup>3</sup>Assistant Professor, <sup>4</sup>Post Graduate student, Department of Surgery, Gove. Rajaji Hospital, Madurai Medical College, Madurai 625020, Tamil Nadu, INDIA.

Email: [nsivaprahasam@yahoo.com](mailto:nsivaprahasam@yahoo.com)

## Abstract

**Introduction:** Perforated peptic ulcer is a life threatening emergency and a means to predict severity of disease is welcome. Many scoring systems to predict outcome in patients with peritonitis are available. **Materials and Methods:** To evaluate the usefulness of Mannheim Peritonitis Index, in patients with perforated peptic ulcer a prospective study was done from June 2003 to May 2004 at Govt. Rajaji Hospital attached to Madurai Medical College, Madurai. 37 patients were studied. **Results:** No patient with a score <15 died, whereas 3 out of 4 (75%) with a score >25 died. **Conclusion:** MPI is useful in prediction outcome in patients with perforated peptic ulcer. Increasing MPI score indicates poor prognosis and higher mortality.

**Keywords:** Mannheim peritonitis Index, perforated peptic ulcer, peritonitis, duodenal ulcer perforation.

## \*Address for Correspondence:

Dr. N. Sivaprahasam, Professor, Department of Surgery, Gove. Rajaji Hospital, Madurai Medical College, Madurai 625020, Tamil Nadu, INDIA.

Email: [nsivaprahasam@yahoo.com](mailto:nsivaprahasam@yahoo.com)

Received Date: 05/03/2019 Accepted Date: 03/06/2019

| Access this article online  |  |
|---|--|
| Quick Response Code:  | Website:<br><a href="http://www.statperson.com">www.statperson.com</a> |
|  | Volume 9<br>Issue 4  |

## INTRODUCTION

Perforated peptic ulcer is a life threatening surgical emergency. Early prediction of mortality and morbidity would greatly help in proper management of these sick patients. Many scoring systems are available for prediction of morbidity and mortality. In this study, we evaluated the usefulness of MPI in mortality in patients with perforated peptic ulcer.

## MATERIALS AND METHODS

All patients admitted with perforated peptic ulcer in one surgical unit from June 2003 to May 2004 were included in the study. perforation of other etiology were excluded from this study. Approval for the study was obtained

from the Ethical Committee of our institution. MPI score was calculated prospectively. Mannheim Peritonitis Index score was calculated as given in Table 1. All patients were followed up until discharge or death.

Table 1: Mannheim peritonitis index

| Risk factor                                      | Score     |
|--|-----------|
| Age >50 years                                    | 5         |
| Female sex                                       | 5         |
| Organ failure*                                   | 7         |
| Pre operative duration of peritonitis > 24 hours | 4         |
| Organ of sepsis not colonic                      | 4         |
| Exudate Clear                                    | 0         |
| Cloudy, purulent                                 | 6         |
| <b>Fecal</b>                                     | <b>12</b> |

## Definitions of Organ Failure

**Kidney:** Creatinine level >177 umol/L

Urea level >167 mmol/L

Oliguria <20 ml/h

**Lung:** PO<sub>2</sub> <50 mmHg

PCO<sub>2</sub> >50 mmHg

**Shock:** Hypodynamic or Hyperdynamic

**Intestinal obstruction:** Paralysis >24h or complete mechanical obstruction

## RESULTS

37 patients with perforated peptic ulcer were included in the study. 36 patients were males and 1 patient was

**Table 2**

| Age | Number of patients | Number of deaths Percentage in brackets |
|-----|--------------------|---|
| <50 | 29                 | 2 (7%)                                  |
| >50 | 8                  | 4 (50%)                                 |

**Table 3**

| Duration of symptoms | No. of patients | No. of deaths (Percentage) |
|----------------------|-----------------|----------------------------|
| <24 hours            | 7               | 1 (14.2%)                  |
| <72 hours            | 16              | 1 (6.2%)                   |
| >72 hours            | 21              | 6 (23.8%)                  |

MPI score was calculated for all patients. The lowest score is 4 and the highest is 32. Patients were grouped as follows: <15, 15 to 19, 20 to 24 and 25 and above and mortality was calculated for each group and the results are given in Table 3.

**Table 4**

| MPI Score | Number of patients | Deaths | Mortality rate |
|-----------|--------------------|--------|----------------|
| <15       | 19                 | 0      | 0%             |
| 15-19     | 8                  | 1      | 12.5%          |
| 20-24     | 6                  | 2      | 33.3%          |
| ≥25       | 4                  | 3      | 75%            |

## DISCUSSION

Many scoring systems have been devised for assessing mortality and morbidity in patients with peritonitis. Wacha and Linder<sup>1</sup> in 1983 devised Mannheim Peritonitis Index from the retrospective analysis of 1253 patients. They have studied about 20 possible risk factors, out of which only 8 proved to be of value and included in the index. Previous studies have shown that a score of less than 21 has a mortality rate of 0%-2.3%, and a score of more than 29 has the highest mortality rate, up to 100%. Scores between 21 and 29 has an approximate mortality rate of about 65%.<sup>2-4</sup> Multicenter studies have shown that mortality from perforated peptic ulcer is high, about 19.5%.<sup>5</sup> although in some studies the mortality is very high reaching up to 60%.<sup>6-9</sup> In our series the overall mortality rate was 16.2% which compares well with worldwide mortality rate. This is despite the fact that in our series 81% (30 out of 37) presented after 24 hours and only 19% presented within 24 hours after onset. As shown in Table 3, the mortality rate for all patients presented within 72 hours of onset (6.2%) is lower than mortality for patients presented within 24 hours of onset (14.2%). In the developing world many patients present late. In a study from east central Africa, F. Ntirenganya, G. Ntakiyiruta, and I. Kakande report<sup>10</sup> that out of 100

female. There were 6 deaths and hence the mortality rate is 16.2%. The age distribution and mortality is given in Table 2.

Of the 37 patients, only 7 presented within 24 hours, 16 patients presented within 72 hours and 21 patients presented after 72 hours. The earliest presentation was at 6 hours and the most delayed presentation was at 10 days. The mean duration was 3.56 days. Mortality in these groups is given in table 3

patients with peritonitis, no patient came within 24 hours, 81 patients came within 2-7 days, 17 patients came within 8-15 days and 2 patients came after 15 days of onset of peritonitis and yet their overall mortality was only 17%. In their classical article titled "Risk stratification in perforated duodenal ulcers"<sup>11</sup> Boey et.al, states that "Because we avoid definitive surgery in perforations exceeding 24 hours, this cut-off limit was selected to define a longstanding perforation." Currently, the need for a definitive ulcer surgery during the emergency procedure is being increasingly questioned<sup>12</sup>. With the availability of H.pylori eradication therapy, there is ample evidence to forgo definitive ulcer surgery during perforation closure. Ng EK, and Lam YH et.al.,<sup>13</sup> have shown that with simple closure of the perforation followed by post operative H.pylori eradication therapy the recurrence rate is 5% which is equivalent to the recurrence rate for those who undergo a definitive anti-ulcer procedure. Several investigators advocate omental patch closure alone with postoperative anti-*H. pylori* therapy<sup>14-20</sup>. These data provide good evidence for the practice of simple closure of perforated duodenal ulcers in the acute setting. Many other studies evaluating MPI score also have found that the 24 hour criteria is not very useful. M.M. Correia, L.C.S Thuler et.al., in their article titled "Prediction of death using the Mannheim Peritonitis index in oncologic patients"<sup>21</sup> have stated that preoperative peritonitis duration longer than 24 hours was slightly more frequent among patients who died than among survivors, but the difference was not significant (P = 0.06). Mishra. A *et al.*,<sup>22</sup> in their article describing the Jabalpur score for peritonitis state that the mortality rate for the preoperative duration of <24 hours and that of 25-72 hours are the same and the mortality increased progressively after 72 hours. Our series also has similar finding. Hence we think that a reconsideration about 24 hours as the criteria for delayed presentation in peritonitis may be required. MPI has been designed as risk predictor for all causes of peritonitis including fecal peritonitis and peritonitis due to malignant ulcer perforation. Previous studies have shown that MPI score <21 has about 0-3% mortality, scores between 21-29 had 65% mortality and scores above 29 had very high mortality, even up to 100% in some studies<sup>2,3,4,5</sup>. In our series scores above 25

had a 75% mortality rate which compares well with reported studies. Because of the multiples etiologies of peritonitis, the difference in individual biological response and development of unexpected complications, it is difficult to predict outcome in patients with peritonitis<sup>23</sup>. Even in this difficult situation, Mannheim Peritonitis Index predicts outcome fairly reliably.

## CONCLUSIONS

MPI predicts mortality in perforated peptic ulcer patients reliably with MPI scores above 25 predicting 75% mortality. The criteria of less than 24 hours of preoperative duration may be modified after analyzing larger group of patients.

## REFERENCES

1. Wacha H, Linder MM, Feldmann U, Wesch G, Gundlach E, Steifensand RA. Mannheims peritonitis index – prediction of risk of death from peritonitis. *Theoretical Surgery* 1987; 1:169-177.
2. Ermolov AS, Bagdat'ev VE, Chudotvortseva EV, Rozhnov AV. Evaluation of the Mannheim Peritonitis Index. *Vestn Khir Im I I Grek* 1996; 155:22-3.
3. Függer R, Rogy M, Herbst F, Schemper M, Schulz F. Validation study of the Mannheim Peritonitis Index. *Chirurg* 1988; 59:598-601.
4. Notash AY, Salimi J, Rahimian H, Fesharaki MH, Abbasi A. Evaluation of Mannheim peritonitis index and multiple organ failure score in patients with peritonitis. *Indian J Gastroenterol* 2005; 24:197-200.
5. Billing A, Fröhlich D, Schildberg FW. Prediction of outcome using the Mannheim peritonitis index in 2003 patients. *Peritonitis Study Group. Br J Surg* 1994;81:209-13
6. Bohnen J, Boulanger M, Meakins JL, McLean AP. Prognosis in generalized peritonitis. Relation to cause and risk factors. *Arch Surg* 1983; 118:285-90.
7. Giessling U, Petersen S, Freitag M, Kleine-Kraneburg H, Ludwig K. Surgical management of severe peritonitis. *Zentralbl Chir* 2002; 127:594-7.
8. Schein M, Saadia R, Freinkel Z, Decker GAG. Aggressive treatment of acute severe diffuse peritonitis from intestinal origin. *World J Surg* 1983; 7:762-6.
9. Farthmann EH, Schöffel U. Principles and limitations of operative management of intraabdominal infections. *World J Surg* 1990; 14:210-7.
10. F. Ntirenganya, G. Ntakiyiruta, I. Kakande: Prediction of Outcome Using the Mannheim peritonitis Index in Patients with Peritonitis at Kigali University Teaching Hospital. *East and Central African Journal of Surgery* 2012 vol17 (2): 52-64
11. John Boey, Samuel k.Y. Choi, T. Alagaratnam, A. Poon, Risk Stratification in Perforated Duodenal Ulcers 1987 *Annals of surgery* vol 201 (1): 22-26
12. Feliciano DV. Do perforated duodenal ulcers need an acid-decreasing surgical procedure now that omeprazole is available? *Surg Clin North Am.* 1992;72(2):369–380
13. Ng EK, Lam YH, Sung JJ, *et al*: Eradication of Helicobacter pylorus prevents recurrence of ulcer after simple closure of duodenal ulcer perforation: Randomized controlled trial. *Ann Surg* 231:153, 2000.
14. Matsuda M, Nishiyama M, Hanai T, *et al*. Laparoscopic omental patch repair for perforated peptic ulcer. *Ann Surg.* 1995; 221:236–240.
15. Lau W-Y, Leung K-L, Kwong K-H, *et al*. A randomized study comparing laparoscopic versus open repair of perforated peptic ulcer using suture or sutureless technique. *Ann Surg.* 1996; 224:131–138.
16. Dubois F. New surgical strategy for gastroduodenal ulcer: laparoscopic approach. *World J Surg.* 2000; 24:270–276.
17. Lagoo S, McMahon RL, Kakihara M, *et al*. The sixth decision regarding perforated duodenal ulcer. *JLS.* 2002; 6:359–368.
18. Donovan AJ, Berne TV, Donovan JA. Perforated duodenal ulcer: an alternative therapeutic plan. *Arch Surg.* 1998; 133:1166–1171.
19. Nirula R, Gastro duodenal perforation. *Surg Clin North Am.* 2014 Feb;94(1):31-4
20. Leeman MF, Skouras C, Paterson-Brown S. The management of perforated gastric ulcers. *Int J Surg.* 2013; 11(4):322-4.
21. M.M.Correia, L.C.S Thuler *et.al*. Prediction of death using the Mannheim Peritonitis index in oncologic patients. *Revista Brasileira de Cancerologia*, 2001, 47(1): 63-68
22. Arpan Mishra, Dhananjaya Sharma, V.K.Raina, A simplified prognostic scoring system for peptic ulcer perforation in developing countries. *Indian J Gastroenterology*, 2002, 22: 49-53
23. Christian Ohmann, Dietmar H. Wittmann, Hannes Wacha and the Peritonitis Study Group. Prospective evaluation of prognostic scoring systems in peritonitis *Eur J Surg* 159: 267-274, 1993.

Source of Support: None Declared  
Conflict of Interest: None Declared