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Research Article

Evaluation of the predictive value of Mannheim Peritonitis Index in Omdurman Teaching Hospital

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Abstract: Peritonitis is a common surgical problem, associated with high rates of morbidity and mortality. Risk stratification preoperatively help to determine plan of management and outcome. Manheim Peritonitis Index was developed by H.Wach in 1987 and is used in assessing severity and predicting outcome. This prospective cohort study included 73 consecutive patients operated on for secondary peritonitis in Omdurman Teaching Hospital over one year period. The aim of the study was to evaluate the predictive value of Mannheim Peritonitis Index (MPI) in the study group. Patients' informations were collected both on hospitalization and after surgical exploration; MPI was calculated for all patients. Morbidity observed in 43.8% and was significantly associated with female gender and high MPI score. The mortality rate was 8.2%, organ failure ,malignancy and high MPI scores were significantly associated with mortality with p value of <0.001 According to the MPI score, 21 score with a sensitivity of 83% and a specificity of 73% while a cut-off point of 26 showed sensitivity of 66% and a specificity of 95% in predicting the risk of death. Female gender is associated with increased rates of postoperative complications, Malignancy and Organ failure are predictors of mortality in peritonitis patients.MPI score influence outcome and complications and mortality rate are associated with high scores.MPI is effective tool in predicting outcome in peritonitis patients.
Keywords: peritonitis, MPI, mortality, morbidity, predictive value

INTRODUCTION

Peritonitis is defined as inflammation of the serosal membrane that lines the abdominal cavity and the organs contained therein [1,2] and is considered major cause of mortality especially in emergency surgery settings .Despite the advances in antibiotics usage it represents a major threat to health in surgical patients. In-hospital mortality due to peritonitis remains high with a mean of 19.5%in multicenter study, while it reaches up to 60% in some series[3].

Different scoring systems were developed for risk stratification and prediction of outcome, among them Mannheim peritonitis index was developed by Linder and Wacha 1987,they firstly proposed 20 factors to contribute to outcome,only 8 factors showed statistical significance in relation to morbidity and mortality [4].As shown in table 1.

Table-1: Mannheim Peritonitis Index scoring

Risk Factor	Weighting if present
Age >50 years	5
Female sex	5
Organ failure	7
Malignancy	4
Preoperative duration of peritonitis >24 h	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Exudates	
Clear	0
Cloudy, Purulent	6
Fecal	12

Definitions of Organ Failure: one of the followings

Renal: Creatinine level >177 umol/L
Urea level >167 mmol/L
Oliguria <20 ml/h

Respiratory: PO2 <50 mmHg
PCO2 >50 mmHg
Cardiovascular: Shock Hypo dynamic or Hyper dynamic

Gastrointestinal: obstruction Paralysis >24h or complete mechanical obstruction

MPI has been evaluated for its predictive value in different series and proved accuracy and ease of use [5,7].

PATIENTS AND METHODS

This study was conducted in Omdurman Teaching Hospital, Sudan in 1 year period from November 2013-November 2014, all patients in surgical department who were diagnosed with peritonitis and managed surgically were included, a total of 73 patients met the criterion of inclusion, MPI score calculated for every patients and outcome observed during hospital stay.

RESULTS

In the study males predominated accounting for 82.2% of the study population ,while female gender accounted for 17.8 %(number 13), male: female ratio 4.6:1.Age ranged between 12 to 85 , mean age 33.9±16.1.Main presenting symptoms are shown in table 2.

Table-2: Symptoms at presentation in patients with peritonitis in the study (n=73)

Symptom	*Frequency*	*Percent*
Abdominal pain	64	87.7
Vomiting	36	49.3
Abdominal distension	18	24.7
Fever	16	21.9
Constipation	13	17.8
Others	07	09.6

Perforated appendix was the most common cause of peritonitis in this study accounting for 36.5%, other etiologies are shown in table 3

Table-3: Intraoperative diagnosis (n=73).

Diagnosis	*Frequency*	*Percent*
Perforated appendix	26	35.6
Perforated peptic ulcer	16	21.9
Traumatic bowel perforation	10	13.7
Non traumatic small bowel perforation	07	09.6
Postoperative peritonitis	3	4.1
Colonic perforation non traumatic	2	2.7
Others	9	12.3
Total	**73**	**100**

In the study MPI scores ranged between 8-34 the mean was 18.6± 5.5 the highest scores were observed in patients with organ failure with scores ranging between 25-34.

Female gender significantly affected outcome with prolonged hospital stay (Figure 1) and development of complications (92.3%) of females developed complications compared to 33.3% in male gender *P value < 0.001*.

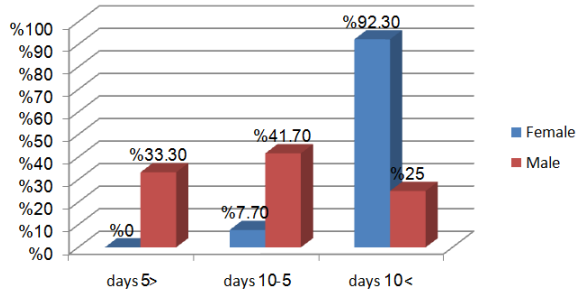

Fig-1: Relation of Gender to hospital stay in patients with peritonitis in the study

High MPI score influenced the postoperative course in terms of development of complications, need for ICU admission and mortality.

Table-4: MPI score in relation to outcome

MPI group	Outcome		
	morbidity	*mortality*	*ICU admission*
<26	39.4%	3%	7.6%
≥26	85.7%	57.1%	85.7%
<21	30%	2%	4%
21-29	72.7%	22.7%	36.4%
>29	100%	0%	100%

The mortality rate in this study was 8.2% (6 patients). Causes of death were sepsis in 66.7%(4) while 2 patients (33.3%) had respiratory complications that led to death, 50% of deaths occurred in patients with organ failure and this showed statistical significance with P value < 0.001 the two patients with malignant cause of peritonitis died and this has statistical significance with P value < 0.001 **,** also, MPI score was significantly associated with increased mortality and this was more evident when score of 26 was used as a cut-off point P value < .001 **.**All non survivors presented to hospital after 24 hours of onset of symptoms ,but, this did not show statistical significance P value 0.194**.**

MPI grouping

In our study morbidity was significantly associated with MPI scores >21 where it reached 72.7%, 100% for scores 21-29 and >29 while it was only 30% in scores <21and this had statistical significance with p value of .002 and when mortality is calculated for these groups it was statistically significant and rates were 2%, 22.7% and 0.0% in the scores grouping of <21, 21-29 and >29 respectively with P value 0.012. Sensitivity and specificity observed

for 21 score in relation to mortality was 83% and 73% respectively.

When the cut-off point of 26 score was used morbidity observed was 39.4% and 85.7% for scores <26 and ≥26 respectively with P value 0.019 and mortality rates were 3% and 57.1% for the two groups respectively.

DISCUSSION

In our study 73 patients were diagnosed with peritonitis and operated for in the study period. The mean age was 33.9±16.1 years, ranged between 12-85 years. This was lower than the results observed in three studies by Batra, Notash and Sivaprahasam [3,8,9]. There is male predominance in our study (82.2%) which is similar to different studies evaluating MPI in peritonitis patients [10–12].

The morbidity in the study group is 43.8% and this rate is similar to results of Ajaz Malik *et al*. in the comparative study of MPI and APACHE II score prediction of outcome in which morbidity for the study group was 36.6%[13] while mortality rate (8.2%) was lower than results of studies done in India, Turkey and, Iran where reported mortality rate was 14%, 16.8% and17.5% respectively [3,13,14].

Female gender significantly affected outcome in the study group, 92.3% developed complications in the postoperative period compared to 33.3% in the male gender and this proved statistical significance with P value <0.001 and, it also influenced the hospital stay where 92.3% of the females in the study sample had more than 10 days hospital stay in contrast to Ntirenganya et al results where gender and age were not significant predictors of outcome [5].

Malignancy is found to be significantly related to outcome where systemic inflammatory response and anastomtic breakdown was observed with the rate of 50% for each and mortality is 100% in the study group with P value <0.001 this finding is consistent with results by Basnet RB et al, Jain et al and, Muralidhar and colleagues where mortality was 67%, 50% and 100% respectively [14,6,7].

Organ failure either single or multiple influenced outcome in this study with 50% mortality in patients diagnosed with organ failure and P value <0.001 these results are similar to results by M M Correia, Muralidhar and Rodolfo L where mortality rate was 56.4%,22% and 100% respectively [14-16].

For 30 years since the introduction of MPI and its use in peritonitis patients many studies suggested different cut-off points for risk stratification , the two commonly used categories are the two staged grouping into scores <26 and ≥26 suggested by Billing *et al*. [17] and grouping into three categories ,<21, 21-29 and >29 adopted in different studies [5,16,18].

In our study morbidity was significantly associated with MPI scores >21 where it reached 72.7%, 100% for scores 21-29 and >29 while it was only 30% in scores <21and this had statistical significance with p value of .002 and when mortality is calculated for these groups it was statistically significant and rates were 2%, 22.7% and 0.0% in the scores grouping of <21, 21-29 and >29 respectively with P value 0.012 , these results support the rational of using three level MPI grouping [5,16,18]. In our study sensitivity and specificity observed for 21 score in relation to mortality was 83% and 73% respectively, when compared to results observed by Fugger et al where sensitivity and specificity were 65% for each it showed increased in the accuracy [19] but, this is lower than the results by Notash and colleagues where sensitivity approached 100% and specificity was 79% [3].

When the cut-off point of 26 score was used morbidity observed was 39.4% and 85.7% for scores <26 and ≥26 respectively with P value 0.019 and mortality rates were 3% and 57.1% for the two groups respectively, when compared to the results by Muralidhar et al, Ntirenganya, F and S Jain et al in which mortality rates in scores ≥26 were 29.4%, 17% and 34.2% respectively [14,5,7]. Specificity for score 26 was 95% which is similar to results obtained by CS Agrawal which was 94%(20), sensitivity for 26 score as a cut-off point was 66% which is lower than scores observed by Van *et al*. which was 74% [21].

Age over 50 years did not affect outcome and morbidity and mortality were 21.4 and 7.1 respectively for patients aged 50 years and above, despite its significance was emphasized in a recent study by Neri and colleagues which revealed the significant association between age >80 and mortality in different MPI scores [22].

REFERENCES

1. Borgonovo G, Amato A, Varaldo E, Mattioli FP; Definition and classification of peritonitis. Med Mal Infect, 1995; 25:7–12.
2. Kim S, Kim TU, Lee JW, Lee TH, Lee SH, Jeon TY, et al.; The perihepatic space: comprehensive anatomy and CT features of pathologic conditions. Radiographics. Radiological Society of North America, 2007; 27(1):129–43.
3. Notash AY, Salimi J, Rahimian H, Fesharaki MSH, Abbasi A; Evaluation of Mannheim peritonitis index and multiple organ failure score in patients with peritonitis. Indian J Gastroenterol, 2005; 24(1):197–200.
4. Wacha H, Linder MM, Feldmann U, Wesch G, Gundlach E, Steifensand RA. Mannheim

peritonitis index - prediction of risk of death from peritonitis: construction of a statistical and validation of an empirically based index. Theor Surg, 1987; 1(4): 169–77.
5. Ntirenganya F, Ntakiyiruta G, Kakande I; Prediction of Outcome Using the Mannheim peritonitis Index in Patients with Peritonitis at Kigali University Teaching Hospital. East Cent African J Surg, 2013; 17(2): 52–64.
6. Basnet RB SV. Evaluation of predictive power of Mannheim Peritonitis Index. Postgrad Med J NAMS, 2010; 10(2):10–13.
7. Jain S, Jain M, Jain R; Validation of Mannheim peritonitis index in a tertiary care center in Rajasthan. Int J Med Sci Public Heal, 2015; 4(5):1.
8. Batra P, Gupta D, Batra R, Kothari R, Deshmukh PR; Mannheim peritonitis index as an evaluative tool in predicting mortality in patients of perforation peritonitis. CIBTech J Surg, 2013;2(3):30–36.
9. Sivaprahasam N, Vijayalakshmi S, Kalitathinam S, Balasubramaniam R; Predictive value of mannheim peritonitis index (MPI) for mortality in perforated peptic ulcer. Int J Recent Trends Sci Technol, 2014;12(3):566–568.
10. Jhobta RS, Attri AK, Kaushik R, Sharma R, Jhobta A. Spectrum of perforation peritonitis in India--review of 504 consecutive cases. World J Emerg Surg, 2006;1:26.
11. Gupta S, Kaushik R. Peritonitis - the Eastern experience. World J Emerg Surg, 2006;1:13.
12. Memon AA, Siddiqui FG, Abro AH, Agha AH, Lubna S, Memon AS; An audit of secondary peritonitis at a tertiary care university hospital of Sindh, Pakistan. World Journal of Emergency Surgery, 2012; 6.
13. Malik AA, Wani KA, Dar LA, Wani MA, Wani RA, Parray FQ, et al.; Mannheim Peritonitis Index and APACHE II - Prediction of outcome in patients with peritonitis. Ulus travma ve acil cerrahi Derg Turkish J trauma Emerg Surg TJTES, 2010;16(1):27–32.
14. Va M; Efficacy of Mannheim Peritonitis Index (M PI) Score in Patients with Secondary Peritonitis. J Clin Diagnostic Res; 2014; 5.
15. Correia MM, Thuler LCS, Velasco E, EMV e AS; Prediction of death using the mannheim peritonitis index in oncologic patients Previsão de Morte Usando o Mannheim Peritonitis Index em Pacientes Oncológicos. Rev Bras Cancerol, 2001;47(21):63–68.
16. Mc RLB, C M, Mc AM, Mc AT; Mannheim Peritonitis Index Validation Study at the Hospital General de Durango (Mexico). Cir Cir, 2002;70(4):217.
17. 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(2):209–213.
18. Budzyński P, Dworak J, Natkaniec M, Pędziwiatr M; The usefulness of the Mannheim Peritonitis index score in assessing the condition of patients treated for peritonitis *. polish J Surg, 2015;87(6):301–306.
19. Rogy M, Függer R, Schemper M, Koss G, Schulz F; The value of 2 distinct prognosis scores in patients with peritonitis. The Mannheim Peritonitis Index versus the Apache II score. Der Chir Zeitschrift fur alle Gebiete der Oper Medizen, 1990;61(4):297–300.
20. Agrawal CS, Niranjan M, Adhikary S, Karki BS, Pandey R, Chalise PR. Quality assurance in the management of peritonitis: a prospective study. Nepal Med Coll J, 2009;11(2):83–87.
21. Van Laarhoven CJ, Hoofwijk AG, Van Vroonhoven TJ; The Mannheimer Peritonitis Index: a valuable method in predicting the outcome of severe peritonitis? Br J Surg, 1988;40(2):209–213.
22. Neri A, Marrelli D, Scheiterle M, Di G, Sforza S, Roviello F; Re-evaluation of Mannheim prognostic index in perforative peritonitis : Prognostic role of advanced age . A prospective cohort study. Int J Surg. 2015;13:54–59.