



TO PROGNOSTICATE THE OUTCOME IN PATIENT WITH PERFORATION PERITONITIS BY EVALUATING MANNHEIM PERITONITIS INDEX & APACHE-II SCORING SYSTEM

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ABSTRACT

Introduction: Peritonitis presents most commonly due to the localized or generalized infection. Studies have reported APACHE II to be a better system for prognostication of the outcome of patients with peritonitis, while others concluded that MPI provides a more reliable means of risk evaluation. The present study is conducted with the objective to find out efficacy of MPI in comparison to APACHE II to prognosticate the outcome in patients with perforation peritonitis.

Material and methods: This was a prospective hospital based analytical study conducted in department of surgery at Dr. BRAM Hospital, Raipur of Pt. JNMCH Raipur. Total 100 patients with peritonitis fulfills the inclusion criteria was included in the study. Both scoring system is applied for the individual patient at admission or within 24 hours. Data was analysed using SPSS version 20.0. Descriptive statistics; frequency, percentage statistical significance and p value were calculated.

Results: The mean age of study subjects was 43.89 ± 15.75 years. Of that (84%) were males. The chief complaint was abdominal pain and not passing flatus. The primary outcome shows that one third was died during treatment and rests were discharged. The mean APACHE-II and MPI score among death cases was 14.7 and 25.2. APACHE-II score has sensitivity of 83% and specificity of 94% whereas MPI score has sensitivity of 51% and specificity of 77%.

Conclusion: Though MPI did not prove to be as good as APACHE II in this study, there is definitely benefit in using the MPI scores in primary and secondary level hospitals where facilities are less and investigations such as blood gas may not be available. They can be used to ascertain a certain extent of the patient's present condition and the prognosis

KEYWORDS :

INTRODUCTION

Peritonitis presents most commonly due to the localized or generalized infection caused from various factors. It is often associated with significant morbidity and mortality [1]. Early prognostic evaluation is desirable so as to be able to select high-risk patients for more aggressive treatment especially in severe peritonitis [1]. Categorizing patients into different risk groups would help prognosticate the outcome [2]. Various scoring systems have been used to assess the prognosis and outcome of patients with peritonitis [3].

The mortality of intra-abdominal infection is related mainly to the severity of the patient's systemic response and his premonitory physiologic reserves, estimated best using the Acute Physiology and Chronic Health Evaluation II (APACHE-II) scoring system [4]. The Mannheim peritonitis index (MPI) emerged as a reliable marker for assessing the severity and prognosis of intra-abdominal infection with sensitivity and specificity comparable to APACHE II score which has been adopted as the gold standard by Surgical Infection Society. This score was designed specifically for peritonitis and it combines preoperative and operative data and is easy to apply [3, 5].

APACHE II is a disease independent scoring system used most commonly in ICU settings. MPI on the other hand is disease specific scoring system. APACHE II has a greater number of variables than MPI which makes it more time consuming and cumbersome calculation when compared to MPI which is relatively simple to calculate and less time consuming. In emergency settings, time is an important factor. So, we need a scoring system which is easy, less time consuming and also precise in assessing prognosis of the disease. Few studies in the past have indicated that MPI may be comparable or even better than APACHE II in emergency setting [7,8]. Various authors have reported APACHE II to be a better system for prognostication of the outcome of patients

with peritonitis, while others concluded that MPI provides a more reliable means of risk evaluation [2, 6]. The present study is conducted with the objective to find out efficacy of MPI in comparison to APACHE II to prognosticate the outcome in patients with perforation peritonitis.

MATERIAL AND METHODS

This was a prospective hospital based analytical study conducted in department of surgery at Dr. BRAM Hospital, Raipur of Pt. JNMCH Raipur from January 2020 to December 2020. Ethical clearance was obtained from the Institutional ethics committee of institute. Every patient who is coming to department of general surgery with perforation peritonitis during the above period and fulfills the inclusion criteria was included in the study. Thus 100 study subjects were included as sample size in the study. Patient excluded from the study sample were with peritonitis primary secondary to polytrauma, those managed conservatively and chemical peritonitis cases due to post surgical bile leak.

Detailed illness history suggestive of chronic health disorders and clinical examination findings were recorded in pre specified formats. All biochemical investigations done on admission and relevant clinical details were noted. both scoring system is applied for the individual patient at admission or within 24 hours.

MPI score used eight risk factors which were found to be significantly associated with prognosis in patients with peritonitis [3]. The maximum score was 47. APACHE II score had 2 parts. The first one dealt with acute physiology and the second with chronic health evaluation. It was primarily designed for Intensive Care Unit. It utilises 12 values and determines the outcome [11]. In this study primary outcome assessed was in-hospital death or discharge. Secondary outcomes assessed were morbidity and risk factors for mortality in peritonitis.

Morbidity was studied in terms of post operative local and systemic complications. The local complications studied were wound infection, wound dehiscence, intra-abdominal collection, anastomotic leak, reoperation, paralytic ileus and adhesional small bowel obstruction.

The Systemic complication were studied with following parameter; Patients requiring dialysis for >48 hrs postoperatively. Patients requiring mechanical ventilation > 48 hrs postoperatively and Septic shock /MODS

Data was entered in Microsoft excel and analysed using SPSS version 20.0. Descriptive statistics was done, frequency and percentage were calculated. Chi square test was applied to calculate the statistical significance and p value.

RESULTS

Of the 100 patients studied the mean age of study subjects was 43.89 ± 15.75 years. Of that (84%) were males and (26%) were females (p=0.80). The chief complain in study subjects shows that all cases had abdominal pain, 64% had not passing flatus and motion, 9% had abdominal distension and 7% had fever p=0.265). The past clinical history of study subjects shows that majority 83% had no past history, 7% had hypertension and 4% had diabetes (p=0.401). Whereas past surgical history shows that majority 98% had no surgical history, 1% had LSCS and 1% tubectomy (p=0.292). The primary outcome in study subjects shows that two third 66% were discharged after treatment whereas 34% died.

Table 1: Patient characteristics Vs Outcome

Patient characteristics	Primary Outcome			P value
	Death (N=34)	Discharge (N=66)	Total	
Age in years				
18-28 years	5 14.70%	17 25.80%	22 22.00%	0.076
29-38 years	1 2.90%	10 15.20%	11 11.00%	
39-48 years	10 29.40%	19 28.80%	29 29.00%	
49-58 years	8 23.50%	9 13.60%	17 17.00%	
>58 years	10 29.40%	11 17.70%	14 21.70%	
Sex				
Female	5 14.70%	11 16.70%	16 16.00%	0.800
Male	29 85.30%	55 83.30%	84 84.00%	
Chief complain				
Abdominal pain	6 17.60%	26 39.40%	32 32.00%	0.265
Abdominal pain, Not passing flatus and motion	22 64.70%	31 47.00%	53 53.00%	
Abdominal pain, Not passing flatus and motion, Abdominal distention	4 11.80%	4 6.10%	8 8.00%	
Abdominal pain, Not passing flatus and motion, Abdominal distention, Fever	0 0.00%	1 1.50%	1 1.00%	

Abdominal pain, Not passing flatus and motion, Fever	1 2.90%	3 4.50%	4 4.00%	
	1 2.90%	1 1.50%	2 2.00%	
Associated co-morbidity				
Cancer rectum	0 0.00%	1 1.50%	1 1.00%	0.401
	0 0.00%	1 1.50%	1 1.00%	
Diabetes mellitus	2 5.90%	2 3.00%	4 4.00%	
	0 0.00%	1 1.50%	1 1.00%	
Hepatitis B	1 2.90%	0 0.00%	1 1.00%	
	0 0.00%	1 1.50%	1 1.00%	
Hypertension	4 11.80%	3 4.50%	7 7.00%	
	1 2.90%	0 0.00%	1 1.00%	
None	26 76.50%	57 86.40%	83 83.00%	
	Surgical history			
LSCS	0 0.00%	1 1.50%	1 1.00%	0.292
	33 97.10%	65 98.50%	98 98.00%	
Tubectomy	1 2.90%	0 0.00%	1 1.00%	

Table 2: APACHE-II and MPI score Vs Primary Outcome

Score	Primary outcome		Total	P value
	DEATH	DISCHARGE		
APACHE-II score				
0-10	7 20.60%	62 93.90%	69 69.00%	0.001
	21 61.80%	4 6.10%	25 25.00%	
21-30	6 17.60%	0 0.00%	6 6.00%	
	MPI score			
0-20	11 32.40%	40 60.60%	51 51.00%	0.004
	18 52.90%	25 37.90%	43 43.00%	
>30	5 14.70%	1 1.50%	6 6.00%	

The mean APACHE-II score was 7.87 ± 6.49. Association b/w primary outcome and APACHE-II score in study subjects shows that out of 34 death cases maximum 61.8% had APACHE-II score b/w 11-20 and 17.6% had b/w 21-30 (p=0.001). The mean MPI score was 22.54 ± 4.65. Association b/w primary outcome and MPI score shows that out of death cases maximum 52.9% had MPI score b/w 21-30 and 32.4% had b/w 0-20 (p=0.004).

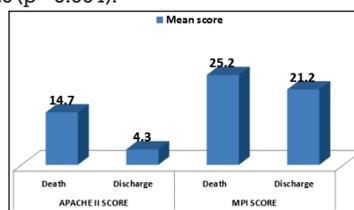


Figure 1: Mean APACHE-II and MPI score and Primary outcome

Table 3: APACHE-II and MPI score and preoperative duration of peritonitis >24 hour

Scores	Preoperative duration of peritonitis >24 hour		Total	P value
	NO	YES		
APACHE-II score				
0-10	17	52	69	0.399
	81.00%	65.80%	69.00%	
20-Nov	3	22	25	
	14.30%	27.80%	25.00%	
21-30	1	5	6	
	4.80%	6.30%	6.00%	
MPI score				
0-20	9	42	51	0.204
	42.90%	53.20%	51.00%	
21-30	12	31	43	
	57.10%	39.20%	43.00%	
>30	0	6	6	
	0.00%	7.60%	6.00%	

The association b/w APACHE-II and MPI score and preoperative duration of peritonitis >24 hour was assessed. Out of 79 cases with preoperative peritonitis >24 hour, maximum 65.8% had APACHE-II score b/w 0-10, 27.8% had b/w 11-20 and 6.3% had score b/w 21-30 (p=0.399).

Whereas out of 79 cases with preoperative peritonitis >24 hour, maximum 53.2% had score b/w 0-20, 39.2% had b/w 21-30 and 7.6% had score b/w >30 (pP=0.204).

The operative procedure performed in majority 70% of study subjects was Omentopexy, 9% each had CPL and Omentopexy, and 6% had Appendectomy.

Table 4: Surgical and Systemic complications in study subjects

Complications	Freq.	Percent
Surgical complication		
Intra abdominal collection	6	6
Wound infection	30	30
None	64	64
Systemic complications		
Mechanical ventilation	25	25
None	75	75
Total	100	100

Surgical complications in study subjects shows that 30% had wound infection, 6% had intra abdominal collection, whereas 25% were given mechanical ventilation.

Table 5: Diagnosis vs APACHE-II and MPI score

Diagnosis	SCORE				P value
	0-10	11-20	21-30	Total	
APACHE-II score					
Appendicular perforation	6	0	0	6	0.006
	100.00%	0.00%	0.00%	100.00%	
GB perforation	0	1	0	1	
	0.00%	100.00%	0.00%	100.00%	
Ileal perforation	1	5	3	9	
	11%	56%	33%	100%	
Perforation peritonitis	1	2	0	3	
	33.33%	66.67%	0.00%	100.00%	
Pre pyloric perforation	62	14	5	81	
	77.10%	17.10%	5.70%	100.00%	
MPI score					
Appendicular perforation	0-20	21-30	>30	Total	0.002
	2	4	0	6	
GB perforation	0	1	0	1	
	0.00%	100.00%	0.00%	100.00%	
Ileal perforation	1	6	2	9	
	11.11%	66.67%	22.22%	100.00%	

Perforation peritonitis	0	2	1	3	
		0.00%	66.67%	33.33%	100.00%
Pre pyloric perforation	37	40	4	81	
	45.68%	49.38%	4.94%	100.00%	

The association b/w diagnosis and APACHE-II score shows that, maximum 81 cases had Pre pyloric perforation of those 77.1% had score b/w 0-10, 9 had Ileal perforation of those 56% had score b/w 11-20 (p=0.006). Similarly the association b/w diagnosis and MPI score shows that, maximum 81 had Pre pyloric perforation of those 49.38% had score b/w 21-30, 9 had ileal perforation of those 66.7% had score b/w 21-30 (p=0.002).

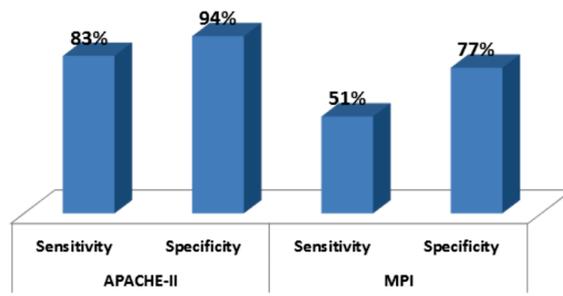


Figure 2: Sensitivity and Specificity of APACHE-II and MPI score

APACHE-II score has sensitivity of 83% and specificity of 94% whereas MPI score has sensitivity of 51% and specificity of 77%.

DISCUSSION

The present study conducted to evaluate the use of scoring system to prognosticate the outcome in patient with perforation peritonitis by using Mannheim peritonitis index & APACHE-II scoring system.

In present study the mean age of study subjects was 43.89 ± 15.75 years. The mean age of male study subjects was 42.76 years and mean age of female was 49.81 years. In present study of total mortality cases 70% were less than 50 years of age group. The mortality rate was similar in male and female study subjects. Studies reported the similar results that mortality rate in patients with age >60 years and those above 50 years age had higher risk for in hospital mortality. [9][10]

In present study the mean APACHE-II Score was 7.87 ± 6.49. The mean APACHE-II score in non-survivors was 14.73 ± 6.7 and in survivors it was 4.3 ± 6.5 and it was statistically significant (P=0.001). The mean MPI Score in study subjects was 22.54 ± 4.65. The mean MPI score in non-survivors was 25.21 ± 4.6 and in survivors it was 21.16 ± 4.6 and it was also statistically significant (P=0.004).

Similar studies have also reported the comparable findings as mean APACHE II scores in non survivors 19.7 ± 4.7 and 7.5 ± 5.3 in survivors. [11] Similarly another study reported mean MPI scores in non survivors 33.1 ± 4.8 and 19.4 ± 6.7 in survivors. [9] Another study also reported the comparable results as mean APACHE II scores in non survivors 19.3 ± 2.87 and Mean MPI scores in non survivors 28.6 ± 5.95.

A recent study reported that mortality was 100% in patients with a score of more than 20. Similarly, there was no mortality in the group of patients with MPI score less than 15, while it was 10% and 90% in the patients with scores 16 - 25 and more than 25, respectively. [12]

Findings from the present study show that APACHE-II score has sensitivity of 83% and specificity of 94% whereas MPI score has sensitivity of 51% and specificity of 77%. In present study APACHE-II score have better predictability of outcomes as compare to MPI score.

A similar study by Trinity P (2017) reported that, MPI had a sensitivity of 90% but specificity of 23.1% only. With regards to APACHE II score in predicting primary outcome in peritonitis, the sensitivity was only 40% but the specificity was as high as 78%. [10] A similar study by Sharma et al (2015) reported the comparable sensitivity and specificity of MPI score i.e. 92% and 78% [13]. Whereas Kulkarni et al (2007) reported that the sensitivity of APACHE-II score was 100% and specificity was 73.8%. [14] This study also had a comparable specificity but the sensitivity this study was poor. This could be attributed to the low death percentage in this study period.

Surgical complications in present study show that 5% had wound infection, 2% had intra abdominal collection whereas 25% were given mechanical ventilation. APACHE-II and MPI score in study subjects with wound infection shows that half of them had APACHE-II score b/w 11-20 and MPI score b/w 0-20 ($p=0.005$).

Analysis of systemic complication and APACHE-II and MPI score in study subjects shows that those had mechanical ventilation of those 56% had APACHE-II score b/w 11-20 and 64% had MPI score b/w 21-30 ($P=0.001$). Unlike present study other studies have found both the scores to be poor predictors of complications like wound infection and intra abdominal collection and mechanical ventilation [15]. A similar study by Trinity P (2017) reported that Patients with score >22 were 59 in number of which only 11 had wound infection. Hence there was no statistical correlation to the prediction and the $p=0.656$. With regards to MPI score and systemic complications, patients with score >22 required dialysis, mechanical ventilation and also had low GCS off sedation as expected and this was also not statistically significant [10].

In present study association between duration of presentation and both the scores had statistically not significant association $p=0.365$. Duration of symptoms has played an important role in predicting outcome in many studies in the past the longer the duration the poorer the outcome.

Khan et al (2013) studied the predictors of morbidity and mortality in patients with peritonitis and reported that no significant difference with regards to duration of symptom and outcome was found. [16]

CONCLUSION

APACHE-II score is the better among MPI & APACHE II score for prognosticate the outcome in patient with perforation peritonitis. APACHE II can be calculated preoperatively to categorise patients but it does not take into account peritoneal contamination which has a huge bearing on the final outcome. MPI is easy to apply but it does not consider underlying physiological disturbances. It also needs operative findings so in true sense; it cannot be used as a preoperative scoring system. This hampers its use to stratify patients into groups to decide whether definitive surgery or damage control surgery can be carried out safely. It is worthwhile to use combination of both scores for a superior prediction of mortality in patients of perforation peritonitis.

Though MPI did not prove to be as good as APACHE II in this study, there is definitely benefit in using the MPI scores in primary and secondary level hospitals where facilities are less and investigations such as blood gas may not be available. They can be used to ascertain a certain extent of the patient's present condition and the prognosis.

REFERENCES:

1. Ashish Ahuja, Ravinder Pal. Prognostic Scoring Indicator in Evaluation of Clinical Outcome in Intestinal Perforations. Journal of Clinical and Diagnostic Research. 2013; 7(9):1953-1955.
2. Ajaz Ahmad Malik, Khurshid Alam Wani, Latif Ahmad Dar, Mehmood Ahmed Wani, Rauf Ahmad Wani, Fazl Qadir Parray. Mannheim Peritonitis Index and APACHE II - Prediction of outcome in patients with peritonitis. Turkish Journal

- of Trauma and emergency Surgery. 2010; 16(1):27-32.
3. Ukwenya AY, Ilyasu Muhammad, Nmadu PT. Assessing the severity of intraabdominal Infections; the value of APACHE II Scoring System. Nigerian Journal of surgical Research. 2006; 8:24-29.
4. Dietmar Wittmann H, Moshe Schein, Robert E. Condon. Management of Secondary Peritonitis. Annals of Surgery. 1995; 224(1):10-18.
5. Hippokrates Fulf, auserlesene Schriften, u'bertragen von W. Capelle, Zu'rich: Artemis Verlag, 1955.
6. John Skandalakis E, Gene Colborn L, Thomas Weidman A et al. Chapter 10 peritoneum, omenta and internal hernia. Skandalakis' surgical anatomy. ed. McGraw Hill.
7. Kumar P, Singh K, Kumar A. A comparative study between Mannheim peritonitis index and APACHE II in predicting the outcome in patients of peritonitis due to hollow viscus perforation. International Surgery Journal. 2017; 4(2):690-96.
8. Függer R, Rogy M, Herbst F, Schemper M, Schulz F. Validation study of the Mannheim peritonitis index. Der Chirurg; Zeitschrift für alle Gebiete der operativen Medizin. 1988; 59(9):598-601.
9. Notash AY, Salimi J, Rahimian H, Fesharaki Ms, Abbasi A. Evaluation of Mannheim peritonitis index and multiple organ failure score in patients with peritonitis. Indian J Gastroenterol. 2005 Sep-Oct; 24(5):197-200. PMID: 16361763
10. Trinity P. Study to evaluate the validity of manheim peritonitis index as compared to apache ii scoring system in predicting outcome of patients with peritonitis. A dissertation submitted to the M.G.R. Medical University, Tamil Nadu - in partial fulfillment of the requirements for the M.S. Branch I (General Surgery) examination held in April 2017
11. P Naveen and Dhannur PK. Modified APACHE II scoring and Mannheims peritonitis Index (MPI) in predicting the outcome of patients with peritonitis secondary to hollow viscus perforation. International Journal of Surgery Science 2019; 3(3): 403-407
12. Muhuga, J. R. (2020). Surgical outcome prediction by using Mannheim peritonitis index and apache II scoring systems in patients with secondary peritonitis admitted at University of Dodoma affiliated teaching hospitals, Tanzania. <http://repository.udom.ac.tz/handle/20.500.12661/2830?show=full>
13. Sharma R, Ranjan V, Jain S, Joshi T, Tyagi A, Chaphekar R. A prospective study evaluating utility of Mannheim peritonitis index in predicting prognosis of perforation peritonitis. J Nat Sci Biol Med. 2015 Aug; 6(Suppl 1):S49-52.
14. Kulkarni SV, Naik AS, Subramanian N. APACHE-II scoring system in perforative peritonitis. Am J Surg. 2007 Oct; 194(4):549-52.
15. Agrawal H, Gupta Ak, Gupta N, Vats M, Pathania S, Durga CK. Comparison of MPI and APACHE II in the Prognosis of Perforating Peritonitis. Journal of Clinical and Diagnostic Research. 2020 Jun, Vol-14(6): PC09-PC13
16. Khan PS, Dar LA, Hayat H. Predictors of mortality and morbidity in peritonitis in a developing country. Turk J SurgeryUlusal Cerrahi Derg. 2013 Sep 1; 29(3):124-30.