

Role of Acute Physiological and Chronic Health Evaluation (APACHE II) Score in Patients with Peritonitis

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Abstract: Peritonitis presents most commonly due to localized or generalized infection caused from various factors. Despite advances in diagnosis, management and critical care of patients for patients with peritonitis due to hollow viscus perforation, yet there is lacunae in prognosis of the patient with peritonitis. Early assessment by scoring systems will influence the management and prognosis. A Prospective study was conducted on 80 patients admitted and operated for peritonitis in Maharajah's Medical College Hospital.

A structured scoring system i.e. Acute Physiological and Chronic Health Evaluation (APACHE II) Score was administered along with other clinical and biochemical parameters recorded in pre-structured proforma. Data was analysed for predicting mortality and morbidity using EPI info and SPSS software

The Acute Physiological Score (APS) is based upon 12 physiological variables. These values were scored in accordance with abnormally high or low range. The score ranged from 0 to 4 on each side of the normal value. Zero score represents a normal value; an increase to 4 indicates the extreme end of high or low abnormal levels. Chronic Health Points (CHP) were added if the patient had a history of severe organ system insufficiency or was immunocompromised; points were assigned as follows: 2 for elective postoperative patients and 5 for non-operative or emergency postoperative patients.

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I. Introduction

Peritonitis is inflammation of the peritoneum and peritoneal cavity. Usually caused by a localized or generalized infection. Primary peritonitis results from bacterial, chlamydial, fungal, or mycobacterial infection in the absence of perforation of the GI tract, Whereas secondary peritonitis occurs in the setting of GI perforation. Frequent causes of secondary bacterial peritonitis include peptic ulcer disease, acute appendicitis, colonic diverticulitis, and pelvic inflammatory disease.¹ Acute generalized peritonitis from gastrointestinal hollow viscus perforation is a potentially life threatening condition. The prognosis of peritonitis remains poor despite development in diagnosis and management. Early identification of patients with severe peritonitis may help in selecting patients for aggressive surgical approach.^{2,3} Grading the severity of acute peritonitis has assisted in no small way in decision making and has improved therapy in the management of severely ill patients.⁴ Empirically based risk assessment for important clinical events has been extremely useful in evaluating new therapies, in monitoring resources for effective use and improving quality of care.^{5,6} Any surgical clinician would believe that patient age, co-morbidities, origin of sepsis, level of generalization of peritonitis and multi-organ dysfunction play a dictatorial role in surgical decision making.⁷

Many of these factors have been incorporated in a simple Mannheim Peritonitis Index (MPI), which can effectively predict the morbidity and mortality in surgical patients with secondary peritonitis.^{4,5} Other scoring systems have also been used previously successfully in predicting the patient prognosis including APACHE II, POSSUM and APACHE III.^{4,5} However these scoring systems are cumbersome to administer in critically ill patients and a relatively simpler scoring system like Mannheim peritonitis Index still remains valid and effective all over the world.⁸⁻¹¹ Moreover, performing a risk analysis for cases by detecting the prognostic factors that affect morbidity and mortality may help prognosis prediction. Along with the predictive factors affecting the morbidity and mortality of cases, scoring systems have also been developed with parameters including demographic and clinical features.⁸⁻¹¹ Here, we have assessed the utility of one such scoring system that is, Mannheim peritonitis index (MPI) score system in predicting the outcome of patients with peritonitis in our set of population.

Objectives

1. To Evaluate Acute Physiological and Chronic Health Evaluation (APACHE II) score in predicting the outcome in patients with peritonitis.

2. To study their socio-demographic profile and its effect on the scoring index.

II. Methodology

Study design: Prospective Analytical study.

Study area: This study was conducted at Surgical department of Maharajahs Institute of Medical Sciences and Hospital, Nellimarla, Vizianagaram district, Andhra Pradesh from July to December 2017. Patients presenting with peritonitis secondary to hollow viscus perforation were included in the study.

Sample size: A total of 80 study subjects admitted and operated for peritonitis in Maharajah's Medical College Hospital were selected.

Study instrument: Patients with primary peritonitis, peritonitis due to trauma, age less than 15 years and patients who were managed conservatively were excluded from the study. Initial preoperative process and resuscitation with intravenous fluids, antibiotics, analgesics, nasogastric decompression was done in all the cases. Site of peritonitis secondary to hollow viscus perforation was diagnosed during surgery and was operated with appropriate surgical procedure. Peritoneal lavage was given in all cases. Accordingly Acute Physiological and Chronic Health Evaluation (APACHE II) scoring shown in table 1 was applied along with other clinical and biochemical parameters recorded in pre-structured proformae consisting of demographic characteristics of the study subjects.

Data analysis: Data was collected by using Acute Physiological and Chronic Health Evaluation (APACHE II) Score, questionnaire and interviews to evaluate the percentage of morbidity and mortality with respect to site of perforation and APACHE II scoring among the respondents. Collected data was entered in MS Excel and analyzed using SPSS version 21. Results are shown in the form of percentages, tables and figures.

Ethical clearance: Ethical clearance was obtained from Institutional Ethical Committee, MIMS.

A total of 80 cases of peritonitis secondary to hollow viscus perforation after confirming on emergency laparotomy were included

III. Results

AGE DISTRIBUTION with STATUS OF MORTALITY

Age in years	No. of patients	%	Survived	Expired	total
<20	4	5	4(5.6%)	0(0%)	4(5%)
20-30	16	20	16(22.2%)	0(0%)	16(20%)
31-40	13	16.3	13(18.1%)	0(0%)	13(16.3%)
41-50	17	21.3	14(19.4%)	3(37.5%)	17(21.3%)
51-60	13	16.3	11(15.3%)	2(25%)	13(16.3%)
61-70	15	18.8	12(16.7%)	3(37.5%)	15(18.8%)
>70	2	2.5	2(2.8%)	0(0%)	2(2.5%)
Total	80	100	72(100%)	8(100%)	80(100%)

Highest mortality is in the age group of 41-50years and 61-70years (37.5%). There were 3 patients in each age group. The next highest mortality (25%) is seen in age group of 51-60years. Other age groups did not have any mortality

STATUS OF MORTALITY DEPENDING ON SITE OF PERFORATION :

Site of Perforation	Outcome		Total
	Survived	Expired	
Duodenal	32(44.4%)	0(0%)	32(40%)
Pyloric	17(23.6%)	1(12.5%)	18(22.5%)
Gastric	9(12.5%)	3(37.5%)	12(15%)
Ileal	6(8.3%)	0(0%)	6(7.5%)
Appendix	6(8.3%)	0(0%)	6(7.5%)
Unknown	0(0%)	2(25%)	2(2.5%)
Jejunum	1(1.4%)	1(12.5%)	2(2.5%)
Colon	0(0%)	1(12.5%)	1(1.3%)
Rectum	1(1.4%)	0(0%)	1(1.3%)
Total	72(100%)	8(100%)	80(100%)

P<0.001**, significant, Fisher Exact test

In the study group of 80 patients, majority of the patients had duodenal perforation (40%). Highest survival rate was seen among duodenal perforation 32 of 32(100%) and the highest mortality was seen among patients with gastric, unknown and colonic perforations as shown in the graph.

STATUS OF MORTALITY IN RELATION TO TIME OF PRESENTATION

Duration (days)	Outcome		Total
	Survived	Expired	
1-2	46(63.9%)	2(25%)	48(60%)
3-5	23(31.9%)	5(62.5%)	28(35%)
6-10	3(4.2%)	1(12.5%)	4(5%)
Total	72(100%)	8(100%)	80(100%)

P=0.106, Not significant, Fisher Exact test

The time of presentation of patients ranged from < 24 hours to 10 days. Most of the patients presented within 1-2 days. Mortality increased correspondingly with delay in presentation to the hospital. It was 25% for 1-2days, 62.5% for 3-5 days and 12.5% for 6 to 10 days. Delayed presentation was usually seen in cases of peritonitis secondary to appendicular perforation which had better prognosis compared to other hollow viscus perforation presenting late.

COMPLICATIONS IN RELATION TO OUTCOME OF PATIENTS:

Patients with higher APACHE II score had more associated complications. 34(42.5%) patients had SSI with a p value of 1.000, a total of 18(22.5%) patients had respiratory complications with a P value of 0.071, a total of 12(15%) patients had renal complications with a P value of <0.001, 21(26.3%) patients had paralytic ileus and none of the patients had burst abdomen. This is depicted in the table and graph below.

Complications	Outcome		Total (n=80)	P value
	Survived (n=72)	Expired (n=8)		
Respiratory	14(19.4%)	4(50%)	18(22.5%)	0.071+
Renal	5(6.9%)	7(87.5%)	12(15%)	<0.001**
SSI	31(43.1%)	3(37.5%)	34(42.5%)	1.000
Sepsis	8(11.1%)	6(75%)	14(17.5%)	<0.001**
Burst abdomen	0(0%)	0(0%)	0(0%)	1.000
Paralytic ileus	16(22.2%)	5(62.5%)	21(26.3%)	0.026*

Chi-square test/ Fisher Exact test

APACHE II DISTRIBUTION IN RELATION TO OUTCOME OF PATIENTS STUDIED

APACHEII	Outcome		Total
	Survived	Expired	
<10	70(97.2%)	1(12.5%)	71(88.8%)
11-15	2(2.8%)	3(37.5%)	5(6.3%)
>20	0(0%)	4(50%)	4(4.9%)
Total	72(100%)	8(100%)	80(100%)

ASSOCIATION BETWEEN APACHE II TOTAL SCORE AND PROBABILITY OF DEATH

APACHE II total score	Actual no of deaths	Cumulative no of deaths	Proportion of deaths	Probability of death
1-5	0	0	0.00	0.00
6-10	1	1	0.125	0.125
11-15	3	4	0.375	0.50
16-20	3	7	0.375	0.875
21-25	1	8	0.125	1.00
Total	8		1.00	

APACHE II scores for 1 to 15 there were no deaths and expected number of deaths was also zero, and for 6-10, actual number of death was equal to expected number of deaths. With scores of 16 to 20 actual number of death was 3 as expected number of death was 7 with probability of 0.875 indicating it is reliable. For scores 21-25 actual number of death was 1 where as expected number of deaths was 8 with probability of 1.00.

IV. Conclusion

APACHE II Score:

All the patients were assigned APACHE II score. APACHE II score in our study was from 0 to 30, with the average of 5.84(SD 4.291)points. None of the patients (n=14)with scores more than 20 survived (MR-100%). This finding was consistent with all the other studies .There was 100% mortality in patients whose score was >20 in Ajaz et al,Horiuchi et al andAshish Ahuja studies. In other studies, different values of scores were reported

APACHE II SCORE WITH 100% MORTALITY IN VARIOUS STUDIES

	Various World-wide Studies	Apache II scores with 100% mortality
1	our study	>20
2	Ajaz et al ²	>20
3	Horiuchi et al ¹⁴	>20
4	Ashish Ahuja ¹	>20
5	Samir Delibegovic et al ¹²	>28
6	Chen et al ¹⁵	>40
7	Edward et al ¹⁶	>22

V. Conclusion

Peritonitis secondary to hollow viscus perforation is most common in young males in their prime age. In hospitals, mortality rate for perforative peritonitis remains high in spite of advances in investigation, improved treatment modality, better inpatient care and advanced hospital resources.

Modified APACHE II score considers physiological adversities of the disease which can be used easily and effectively to identify high risk patients for intensive care. Whereas other scoring systems like MPI score has the advantage of being easier to calculate with very minimum basic investigations and was specifically designed as a scoring system for peritonitis. The draw back with MPI is that it needs operative findings to complete the scoring.

VI. Discussion

Peritonitis secondary to hollow viscus perforation is one of the commonest reasons for emergency surgery done even today. Various factors like age, sex, site of perforation, mode of intervention, associated complications, socio-economic group involved are all known to influence mortality and morbidity. Definitive preoperative management, timely surgery, post-operative care will decide the outcome. The rate of death in patients with peritonitis is still very high with the mean being 19.5% and reaching upto 60% in some studies.¹²⁻¹⁴ With age distribution Highest mortality is in the age group of 41-50 years and 61-70 years (37.5%). Site of perforation with highest survival rate was seen among duodenal perforation 32 of 32 (100%) and the highest mortality was seen among patients with gastric. Mortality increased correspondingly with delay in presentation to the hospital. It was 25% for 1-2 days, 62.5% for 3-5 days and 12.5% for 6 to 10 days.

Peritonitis and mortality:

In hospital, mortality rate due to peritonitis remains high.

Bibliography

- [1]. Ashish Ahuja, Ravinder Pal. Prognostic Scoring Indicator in Evaluation of Clinical Outcome in Intestinal Perforations. Journal of Clinical and Diagnostic Research. 2013 Sept;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]. A.Y. Ukwenya, Ilyasu Muhammad and P. T. Nmadu. Assessing the severity of intraabdominal Infections; the value of APACHE II Scoring System. Nigerian journal of surgical Research. 2006; 8:24-29.
- [4]. Dietmar H. Wittmann, Moshe Schein, Robert E. Condon. Management of Secondary Peritonitis. Annals of Surgery. 1995;224(1):10-18.
- [5]. Hippokrates, Fu"nfuserlesene Schriften, u"bertragen von W. Capelle, Zu"rich: Artemis Verlag; 1955.
- [6]. John E Skandalakis, Gene L Colborn, Thomas A Weidman et al. Chapter 10 peritoneum, omentum and internal hernia. Skandalakis' surgical anatomy. ed. McGraw Hill.
- [7]. Toni Hau. Biology and Treatment of Peritonitis: The Historic Development of Current Concepts. American College of Surgeons. April 1998;186(4): 475-484.
- [8]. Bigelow HJ. Insensibility during surgical operations produced by inhalation. Boston Med Surg J 1846;35:309-317.
- [9]. Simpson JY. Discovery of a new anaesthetic agent more efficient than sulphuric ether. London Med Gaz 1847;5:934-937.
- [10]. Kirschner M. Die Behandlung der akuten eitrigen freien Bauchfellentz"ndung. Langenbecks Arch Klin Chir 1926;142: 253- 311.
- [11]. T.W. Sadler. Chapter 11. Body cavities Langman's Medical Embryology, 11th Ed. Wolters Kluwer P 155-157.
- [12]. Delibegovic S, Markovic D, Hodzic S, Nuhanovic A. Evaluation of Prognostic Scoring Systems in the Prediction of the Outcome in Critically Ill Patients with Perforative Peritonitis. Acta Inform Med. (2010), [cited January 10, 2014]; 18(4): 191-195.
- [13]. Chen FG, Koh KF, Goh MH. Validation of APACHE II score in a surgical intensive care unit. Singapore Med J, 1993; 34: 322-4.
- [14]. Edwards AT, Shandall AA, Price- Thomas JM. Experience with the APACHE II severity of disease scoring system in predicting outcome in a surgical intensive therapy unit. J R Coll Surg Edinb, 1991; 26: 37-40.
- [15]. William A Knaus, Jack E Zimmerman, Douglas P Wagner, Elizabeth A Draper, Diane E Lawrence. APACHE- acute physiology and chronic health evaluation: a physiologically based classification system. Crit Care Med 1981; 9:591.

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