

Prognostic Indicator in Severe Acute Pancreatitis

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Abstract

Aim of study: - To assess the utility of each as prognostic indicator in Severe Acute Pancreatitis.

Material and Methods: This prospective study entitled "To assess the utility of each as prognostic indicator in Severe Acute Pancreatitis" was carried out on patients hospitalized for acute pancreatitis in the surgery department at Chandulal Chandrakar Memorial Medical College and CM Hospital, Bhilai from March 2015 to October 2017. 50 patients with the diagnosis of first attack of acute pancreatitis of both sexes and all age groups were selected for the study.

Conclusion: - On the basis of observation and result of the study, it can be safely stated that APACHE II Scoring is quick, safe, reproducible, ongoing and cost effective. It can be done by resident or intelligent nursing staff. Give an idea regarding improving or worsening of patients.

APACHE II Scoring system when complimented by high quality CECT abdomen can further refine the results and give an idea of likelihood of patients developing local complication. Thus it can also be used along with CECT abdomen for Risk Stratification of subset of patients who are likely to develop local complication who might need surgical intervention.

CECT on 3rd day adds nothing to management. It has a tendency to over predict the regional complication, which are in anyway apart of natural course of history of disease (acute fluid collection). Management decision could not be based on CECT abdomen on 3rd day alone, since it is not needed to make a diagnosis of acute pancreatitis it should be abundant, thus reducing the financial burden of patients and institute. CECT abdomen done after 2nd week in the course of illness along with APACHE II Score and clinical finding are better guide for management and surgical intervention.

Keyword: - AP, SAP, APACHE, CECT, GCS, HR, Ph, Na⁺, k⁺, Creatinine, Haematocrit.

Introduction

Acute pancreatitis (AP), an acute inflammatory condition of the pancreas which may extend to local and distant extra-pancreatic tissues, which commonly presenting as acute abdomen and is associated with varied level of pancreatic enzymes in blood and urine. Broadly AP is classified as mild or severe. Based on radiographic appearance Mild Acute Pancreatitis is often referred to as interstitial pancreatitis while Severe Acute Pancreatitis (SAP) implies the presence of local complications, organ failure or pancreatic necrosis.

AP which is also known as acute pancreatic necrosis (APN) is a sudden inflammation of the pancreas. Severe complications and high mortality despite treatment is associated with AP. While mild cases are often successfully treated with conservative measures, like fasting and

aggressive intravenous fluid rehydration, severe cases may require admission to the intensive care unit or even surgery to deal with complications of the disease process.

AP is a disease of varying severity & up to 80% cases are mild & self-limiting, but disease process is unrelenting in 20% cases & complications of AP set in viz; pseudo cyst, abscess & infective pancreatic necrosis.^[1] To prognosticate the disease process & to stratify the risk of development of complications is challenge to physician & thus enable him to intervene at the optimal time to reduce the morbidity and mortality.

Traditionally APACHE (acute physiology score and the chronic health evaluation) II has been used for progression of disease process and CECT (Contrast Enhanced Computer Tomography) has been used for diagnosis and for complications of Acute Pancreatitis. By Knaus et al. in

1981, APACHE were used in the first major attempts to quantify the severity of the illness in ICU patients,

This was later modified in 1985 by the same author as APACHE II.^[2,3,4] It contains 12 continuous variables from the original APACHE system and also takes into account the age of the Patient, the pre-morbid conditions and the Glasgow coma scale(GCS). The major advantage of the APACHE II scoring system, As compared to the other systems, is that it can be used in monitoring the patient's response to therapy while the Ranson and the Glasgow scales are mainly meant for the assessment at presentation.^[2, 5]

The APACHE II scoring system takes into account 12 variables Which include, (1) Body temperature, (2) Mean arterial pressure (mm Hg), (3) Heart rate(HR), (4) Respiratory rate (R R/mt), (5) Oxygenation (mm Hg), (6) PH, (7) Na+ (mmol/l), (8) k+(mmol/l), (9) Creatinine (mg/100ml), (10) Haematocrit, (11) Total leucocytes count and the (12) Glasgow coma score. To eliminate the problem

of the missing values and concerns about the assumption that an unmeasured variable was normal, the measurement of all the 12 variables were made mandatory for the usage of APACHE II. The recorded values of the variables are based on the most deranged values during the past 24 hours.^[2,5,6]

As age and severe chronic health problems reflect a diminished physiological reserve, they have been directly incorporated into APACHE II.

CECT (contrast enhanced computed tomography) abdomen is the most sensitive and accurate method in detection of early and late complication of severe acute pancreatitis. CT scan abdomen has shown an overall accuracy of 87% with a sensitivity of 100% for detection of extended pancreatic necrosis, and a sensitivity of 50% if only minor necrotic areas are present at surgery.^[7] Thus, for staging purposes of severe acute pancreatitis, CECT scan abdomen provides more reliable results.

APACHE II Score^[8]

Physiologic Variable	High Abnormal Range					Low Abnormal Range				Points
	+4	+3	+2	+1	0	+1	+2	+3	+4	
Temperature - rectal (°C)	≥41°	39 to 40.9°		38.5 to 38.9°	36 to 38.4°	34 to 35.9°	32 to 33.9°	30 to 31.9°	≤29.9°	
Mean Arterial Pressure - mm Hg	≥160	130 to 159	110 to 129		70 to 109		50 to 69		≤49	
Heart Rate (ventricular response)	≥180	140 to 179	110 to 139		70 to 109		55 to 69	40 to 54	≤39	
Respiratory Rate (non-ventilated or ventilated)	≥50	35 to 49		25 to 34	12 to 24	10 to 11	6 to 9		≤5	
Oxygenation: A-aDO ₂ or PaO ₂ (mm Hg) a. FIO ₂ ≥0.5 record A-aDO ₂ b. FIO ₂ <0.5 record PaO ₂	≥500	350 to 499	200 to 349		<200					
Arterial pH (preferred)	≥7.7	7.6 to 7.69		7.5 to 7.59	7.33 to 7.49		7.25 to 7.32	7.15 to 7.24	<7.15	
Serum HCO ₃ (venous mEq/l) (not preferred, but may use if no ABGs)	≥52	41 to 51.9		32 to 40.9	22 to 31.9		18 to 21.9	15 to 17.9	<15	
Serum Sodium (mEq/l)	≥180	160 to 179	155 to 159	150 to 154	130 to 149		120 to 129	111 to 119	≤110	
Serum Potassium (mEq/l)	≥7	6 to 6.9		5.5 to 5.9	3.5 to 5.4	3 to 3.4	2.5 to 2.9		<2.5	
Serum Creatinine (mg/dl) Double point score for acute renal failure	≥3.5	2 to 3.4	1.5 to 1.9		0.6 to 1.4		<0.6			
Hematocrit (%)	≥60		50 to 59.9	46 to 49.9	30 to 45.9		20 to 29.9		<20	
White Blood Count (total/mm ³) (in 1000s)	≥40		20 to 39.9	15 to 19.9	3 to 14.9		1 to 2.9		<1	
Glasgow Coma Score (GCS) Score = 15 minus actual GCS										
A. Total Acute Physiology Score (sum of 12 above points)										
B. Age points (years) <44=0; 45 to 54=2; 55 to 64=3; 65 to 74=5; ≥75=6										
C. Chronic Health Points (see below)										
Total APACHE II Score (add together the points from A+B+C)										

Patients may exhibit a wide spectrum of presentation ranging from those who appear completely well to those who from the time of admission are gravely ill with profound shock, toxicity and confusion and failure to make diagnosis early in such cases is particularly liable to a fatal outcome.

Prediction of severity of the disease at the time of admission is difficult and this uncertainty has led to the search for more objective methods of grading the severity of this disease so that proper treatment and care can be instituted readily. The ideal predictor is one that is rapid, reproducible, inexpensive and minimally invasive.^[1]

Also, emergency surgery and non operative patients with severe, chronic organ system dysfunction were given five additional points in comparison to the elective surgical patients who were given only two points because patients with severe chronic conditions are not considered to be candidates for elective surgery.^[2,6]

With the limitation on of all scoring systems, early prognosis in severe AP subjects has been a tough task however, an extensive search for objective tools that predict severity and outcome at the time of hospital admission remains a major challenge.

Materials and Methods

This prospective study entitled “To assess the utility of each as prognostic indicator in Severe Acute Pancreatitis” was carried out on patients hospitalized for acute pancreatitis in the surgery department at Chandulal Chandrakar Memorial Medical College and CM Hospital, Bhilai from Jan 2018 to May 2018.

Selection of patients:

52 patients with the diagnosis of first attack of acute pancreatitis of both sexes and all age groups were selected for the study. The diagnosis of acute pancreatitis was accepted when a compatible clinical symptoms (a) abdominal pain suggestive of pancreatitis, with the start of such pain considered to be the onset of acute pancreatitis; (b) serum amylase levels more than three times normal, the upper limit of normal range 30-110 U/L, i.e., more than 330 U/L. Ultrasonography was done routinely performed for all patients to diagnose to have sever acute pancreatitis and CECT abdomen was done on all these patients within 72 hours and 15th day of admission to confirm the diagnosis and grade the severity of the disease and related complications. All these patients were scored using the APACHE II scoring system within 48 hours of admission and ongoing score.

Chronic Health Points: If the patient has a history of severe organ system insufficiency or is immune compromised as defined below, assign points as follows:

1. Five points for nonoperative or emergency postoperative patients
2. Two points for elective postoperative patients.

CT severity index score of severe acute pancreatitis was calculated as mentioned by Balthazar et al in 1985.

Grade	Score	Finding
A	0	Normal gland
B	1	Focal/diffuse gland enlargement
C	2	Peripancreatic inflammatory change
D	3	Single pancreatic fluid collection
E	4	2 or >peripancreatic fluid collection Or pancreatic abscess

Presence of necrosis is scored as:

0	2	4	6
None	<30% Pancreatic necrosis	30-50% Pancreatic necrosis	>50% Pancreatic necrosis

CT severity index

CTSI Score	Mortality	Morbidity
0-3	3%	8%
4-6	6%	35%
7-10	17%	92%

The severity of severe acute pancreatitis was stratified according to the CT severity index (CTSI) score described above. Patients with a CTSI score of 7-10 were predicted to have a severe acute pancreatitis as this group of patients had a mortality of 17% and morbidity of 92%. Patients with a CTSI score 4-6 were also predicted to have a severe course of this illness because apart from the mortality of 6% in this group of patients, they had a morbidity of 35% and it is to these two groups of patients, in whom aggressive treatment in the intensive care was instituted on diagnosis. All complications were managed with appropriate surgical approaches.

Patients APACHE II scores were compared with the CTSI score (within 72 hours and on 15th day) and were assessed for grading and the severity of the disease and predicting the outcome.

Data Analysis:

A statistical analysis was performed using the Stastical Package for the Social Science program (SPSS, 23.0). Frequencies and percentages were used for the categorical measures.

Data analysis was done by calculating the following:

- Ratio
- Percentage
- Standard deviation and Mean

- Significance was calculated by using following tests accordingly (p<0.05 was considered statistically significant.)
- Chi Square test

Data analysis was done with the help of statistician

Inclusion Criteria:

All consecutive patients with documented episodes of acute pancreatitis

Exclusion Criteria:

Patients with history of initial treatment elsewhere, recurrent episodes in the past, and known case of chronic pancreatitis were excluded from the study.

Observation and Results:

A total of 52 patients with the diagnosis of acute pancreatitis admitted from March 2015 to October 2017 were included in the study, out of these 36 patients had severe acute pancreatitis and 16 patients had mild acute pancreatitis. Patients with history of treatment elsewhere, recurrent episodes in the past were excluded from the study. Patients enrolled in the study were subjected to the study design viz; ongoing APACHE II assessment, CECT on 72 hrs and CECT on 15th day. However certain patients were in the study who could not be subjected to all the 3 parameter because of death / deranged RFT or irregular follow up. This aberration was suitably addressed by taking cognizance while preparing data and chart. However some amount of error might have occurred. This is one limitation of the study.

Table 1: Sex wise distribution

Sex	No of Patients	% of patients
Male	40	76.92%
Female	12	23.07 %

Male constituted 76.92% of the total patients and female were 23.07%.

Table 4: Correlations between Apache II with In 48 Hours and CTSI in 72 Hours

APACHE II Score	CTSI 72 Hours				P value
	SAP (4-10)		MAP (0-3)		
	No of Patients	% of Patients	No of Patients	% of Patients	
>=8	22	95.65 %	1	4.35 %	0.0002 HS
<8	6	42.86 %	8	57.14 %	

Highly significant association found between apache and CTSI (72 hrs)

Sensitivity 78.57%, Specificity 88.89%, Positive Predictive Value 95.65%, Negative Predictive Value 57.14%. Of the 28 patients with severe acute pancreatitis, only 22 patients had Apache II of 8 or more in 72 hours CECT. In 6 patients CTSI Score was more than 4 but there APACHE II Score

Table-2: Age wise distribution of patients

Age Group	No of patients	% of Patients
<20	1	1.9
20-30	5	9.6
30-40	9	17.3
40-50	16	30.76
50-60	8	15.38
60-70	13	25

The youngest patient age was of 17 years and the oldest age was 69 years.

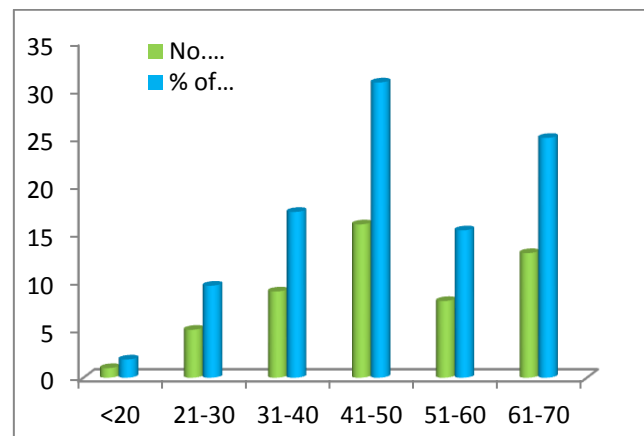


Table 3: Etiology

Etiology	No of Patients	% of Patients
Only Alcohol	31	59.6 %
Only Gallstones	15	28.8 %
Alcohol / Gallstones	3	5.8 %
Others	3	5.8 %

Alcohol is responsible for approximately 59.6% of the cases and biliary disease is responsible for approximately 28.8% and alcohol/biliary disease are responsible for approximately 5.8% of the cases and others were responsible approximately for 5.8% of the cases of acute pancreatitis.

less than 8. In the course of study these patients settled with conservative management and did not develop any loco regional complications and were discharged home and did not return with any complication.

Table 5: Correlations between apache II within 48 hours and CTSI on 15th day

APACHE Score	CTSI 15th Day				P value
	SAP (4-10)		MAP (0-3)		
	No of Patients	% of Patients	No of Patients	% of Patients	
≥8	23	95.83 %	1	1.17 %	0.0004 HS
<8	4	33.33 %	8	66.47 %	

Highly significant association found between apache II and CTSI (72 hrs)

Sensitivity 85.19%, Specificity 88.89%, Positive Predictive Value 95.83%, Negative Predictive Value 66.67%. Of the 27 patients with severe acute pancreatitis, only 23 patients had APACHE II of 8 or more on 15th day of CECT.

An assessment of severity of the attack should be made using the prognostic criteria such as that APACHE II ("Acute Physiology and Chronic Health Evaluation II") is a severity-of-disease classification system (Knaus et al. 1985).^[9] A severe attack may be heralded by an initial clinical impression of a very ill patient and an APACHE II^[17] score 8 or more.

In 1992, the Atlanta classification for acute pancreatitis was introduced as a universally applicable classification system for the various manifestations of acute pancreatitis.^[10] This system was designed to facilitate understanding and correlation of findings seen by gastroenterologists, pathologists, radiologists, and surgeons. This approach was to be particularly useful for assessment and treatment of the various fluid collections identified during the course of acute pancreatitis. It defined acute pancreatitis as an acute inflammatory process of the pancreas with variable involvement of other local tissues and remote organ systems. It is associated with elevated pancreatic enzyme levels in blood and/or urine. Mild pancreatitis was described as associated with minimal organ dysfunction and an uneventful recovery. Severe pancreatitis was defined as associated with organ failure and/or local complications such as "acute" pseudocyst, pancreatic necrosis, or pancreatic abscess.^[11] Both categories were described as having acute fluid collections early in the course of the disease. APACHE II (Acute Physiology and Chronic Health Evaluation II) score of 8 or higher was suggested as clinically predictive of severity. Organ failure and systemic complications were diagnosed on the basis of signs of shock, pulmonary insufficiency, renal failure, gastrointestinal bleeding, disseminated intravascular coagulation, and severe metabolic disturbances.



Figure: Acute necrotizing pancreatitis: pancreatic parenchymal necrosis alone, tail and body of the pancreas are non-enhancing (arrows) and slightly heterogeneous in appearance.

Conclusion

On the basis of observation and result of the study, it can be safely stated that APACHE II Scoring is quick, safe, reproducible, ongoing and cost effective. It can be done by resident or intelligent nursing staff. Give an idea regarding improving or worsening of patients.

APACHE II Scoring system when complimented by high quality CECT abdomen can further refine the results and give an idea of likelihood of patients developing local complication. Thus it can also be used along with CECT abdomen for Risk Stratification of subset of patients who are likely to develop local complication who might need surgical intervention.

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