

# Is APACHE II Score a Reliable Indicator in Necrotising Pancreatitis?

Dr. Basavarajappa M<sup>1</sup>, Dr. Dilip D K<sup>2</sup>, Dr. Veerendraswamy S M<sup>3</sup>

<sup>1</sup>Professor, Department of General Surgery, Shamnur Shivshankrappa Institute of medical sciences and Research Centre, Davangere, Karnataka India

<sup>2</sup>Postgraduate Student in the Department of General Surgery, Shamnur Shivshankrappa Institute of medical sciences and Research Centre, Davangere, Karnataka India.

<sup>3</sup>Professor & HOD, Department of General Surgery, Shamnur Shivshankrappa Institute of medical sciences and Research Centre, Davangere, Karnataka India

**Abstract:** Introduction: There has been an increasing amount of work worldwide in search for tests not only to be able to absolutely diagnose acute pancreatitis but more importantly to prognosticate patients at admission. The early prediction of the severity of an acute attack has important implications for management and timely intervention. The APACHE II score is highly recommended worldwide for the assessment of severe pancreatitis (interstitial and necrotizing). Aim: To evaluate whether APACHE II score is a reliable indicator in necrotizing pancreatitis as shown by contrast-enhanced computed tomography (CT). Methodology: This is a retrospective study on 80 patients admitted with acute pancreatitis. All these patients underwent contrast enhanced CT within 72 hours of admission. Results: Of the 80 patients, 69 (86%) had interstitial pancreatitis and 11 (14%) had necrotizing pancreatitis. In 21 (30%) of the 69 patients with interstitial pancreatitis, the APACHE II score was at least eight points, indicating severe pancreatitis (overestimation of the disease), whereas the score was less than eight in 7 (64%) of 11 patients with necrotizing pancreatitis (underestimation). Conclusion: The APACHE II score on admission to the hospital is unreliable to diagnose necrotizing pancreatitis.

**Keywords:** APACHE II, Acute pancreatitis, Necrotizing pancreatitis, interstitial pancreatitis

## 1. Introduction

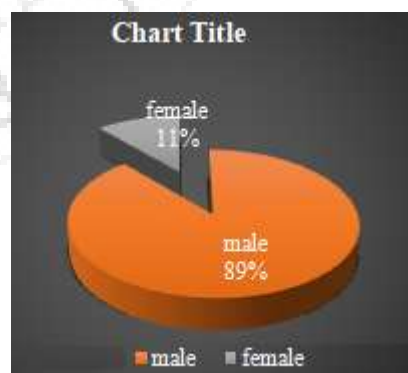
Acute pancreatitis may be clinically mild or severe. Severe acute pancreatitis is usually a result of pancreatic glandular necrosis. The morbidity and mortality associated with acute pancreatitis are substantially higher when necrosis is present, especially when the area of necrosis is also infected (1). It is important to identify patients with pancreatic necrosis so that appropriate management can be undertaken. In recent years, the treatment of these patients has shifted away from early surgical débridement ("necrosectomy") to aggressive intensive medical care, with specific criteria for operative and nonoperative intervention (2,3). Advances in radiologic imaging and aggressive medical management with emphasis on acute necrotizing pancreatitis has a severe prognosis and may lead to a number of life-threatening complications requiring immediate intensive care therapy (1). Early detection, preferably on admission to the hospital, is mandatory. The APACHE II score, originally developed to assess the severity of other diseases (2), has been used and recommended for the assessment of the severity of acute pancreatitis in a large number of patients (8). According to the Atlanta classification (4), the latest classification used worldwide for acute pancreatitis, an APACHE II score of at least eight points indicates severe pancreatitis on admission. However, this has never been evaluated in comparison with contrast-enhanced computed tomography (CT) in terms of prognosis.

## 2. Aim

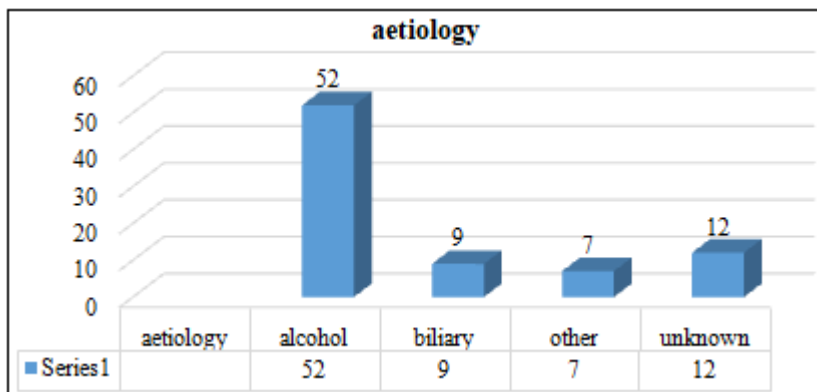
To evaluate whether APACHE II score is a reliable indicator in necrotizing pancreatitis as shown by contrast-enhanced computed tomography (CT)

## 3. Methodology

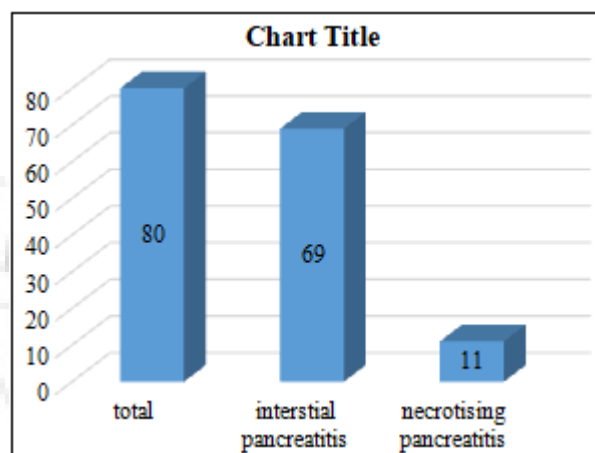
- This is a retrospective study on 80 patients with a first attack of acute pancreatitis, who all underwent contrast-enhanced CT at tertiary care hospital. Seventy one (89%) were men and 9 (11%) were women. The mean age was  $54.2 \pm 17.5$  years (range, 13–89 years). Causes for pancreatitis were evaluated such as alcohol, biliary cause, trauma, ERCP, hyperlipidemia, infection etc. In the remaining cases, the cause was classified as unknown.



- Accordingly, the cause was alcohol abuse in 52(65%), biliary in 9(11%), other in 7(9%), and unknown in 12(15%). Four patients (5%) of the 80 patients died, all of acute pancreatitis. The diagnosis was based on characteristic signs and symptoms, increased enzyme levels (amylase or lipase), and the CT examination. The CT was scored according to Balthazar (4) with zero points meaning normal pancreas, one to four points indicating interstitial pancreatitis, and six to 10 points indicating necrotizing pancreatitis.



- The following parameters were used to assess the severity of the disease:
- Initial organ failure according to the Atlanta classification(7): shock, systolic blood pressure less than 90mm Hg; respiratory insufficiency, arterial pO2 no greater than 60 mm Hg; renal insufficiency, serumcreatinine greater than 2.0 mg/dL after rehydration; gastrointestinal bleeding, greater than 500 mL in 24hours.
- Logistic regression was used to assess the association between an APACHE II score of zero to seven points versus eight or more points and variables related to the severity or complications of pancreatitis. Models were adjusted for age, sex, and cause. For variables with more than two levels of exposure, the p value for trend is given. The diagnostic accuracy of the APACHE II scoring system was evaluated by sensitivity, specificity, positive predictive value, negative predictive value, and overall accuracy.

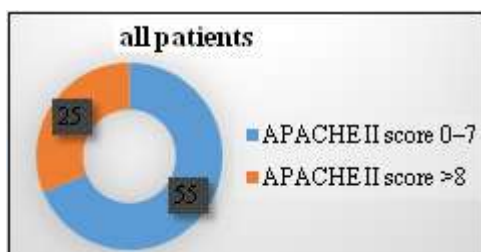


#### 4. Results

- When patients were divided into groups with an APACHE II score of zero to seven points and eight or more points, the high APACHE II score was more frequent among men than women (p 0.04)
- Of the different parameters of severity of the disease, renal failure, indication for artificial ventilation, a high Ranson, Imrie, or Balthazar score, and death were significantly associated with a high APACHE II score (eight or more points) on admission. Furthermore, patients with a high APACHE II score spent more time in the intensive care unit.

- In 21 (30%) of the 69 patients with interstitial pancreatitis, the APACHE II score was at least eight points, indicating severe pancreatitis (overestimation of the disease), whereas the score was less than eight in 7 (64%) of 11 patients with necrotizing pancreatitis (underestimation).

Morphologic form of the disease	APACHE II score 0-7	APACHE II score >8	All
interstitial	48	21	69
necrotising	7	4	11
all forms	55	25	80



- According to the Balthazar score, 69 (86%) of the 80 patients had interstitial pancreatitis and 11 (14%) had necrotizing pancreatitis.

- Sensitivity 4/11(36%), specificity 48/69(70%), and positive predictive value 48/55(87%) and negative predictive value 48/55(87%).
- The APACHE II score on admission to the hospital is unreliable to diagnose necrotizing pancreatitis

#### 5. Discussion

- Acute necrotizing pancreatitis has a higher rate of complications and mortality rate than interstitial pancreatitis does. Therefore, the early detection of necrotizing pancreatitis is mandatory and a major problem for the clinician in view of the lack of appropriate clinical or laboratory methods to detect pancreatic necroses.
- The gold standard to diagnose necrotizing pancreatitis is contrast-enhanced CT, although this method is expensive and not available everywhere.

- Several recent studies have indicated that in acute necrotizing pancreatitis, prophylactic Antibiotic treatment may prevent the infection of pancreatic necroses (8). Numerous studies (3) have highly recommended the APACHE II score. Several of them used a cutoff level of at least eight points on the Atlanta classification (7) and ranked this higher than the established Ranson and Imrie scores cause the studies never really tested the APACHE II score against contrast-enhanced CT.
  - There is a good statistical correlation of the APACHE II score with the Ranson and Imrie scores, but these scores need 48 hours for evaluation. The APACHE II score on admission is superior because results are quicker. An APACHE II score of eight or more points indicates that the patient will spend significantly more time in the intensive care unit than will patients with a lower APACHE II score. Death occurred significantly more frequently in the higher APACHE II group. So, all in all, an APACHE II score of eight or more points significantly indicates that complications or even death may occur. Concerning the detection of necrotizing pancreatitis, the overall correlation between the Balthazar score and the high APACHE II score of eight or more points was significant, but the APACHE II score of eight or more points overestimated the disease in 28% of the patients with interstitial pancreatitis and underestimated the disease in 64% of the patients with necrotizing pancreatitis. Sensitivity, specificity, and positive predictive value are too low to draw the conclusion that the APACHE II score of eight or more points is helpful to diagnose necrotizing pancreatitis. Unfortunately, the negative predictive value is also not high enough to exclude contrast-enhanced CT. It should be stressed that the APACHE II score was calculated by several doctors, so there may be a notable inter-observer variability in the use of APACHE II scores by experts and less experienced doctors (2). The failure of the APACHE II score to detect necrotizing pancreatitis may exist because the APACHE II score is a score to estimate systemic complications (i.e., organ failure). However, organ failure and pancreatic necroses in acute pancreatitis are not parallel events. Whereas pancreatic necroses may occur in patients without organ failure, organ failure can occur in patients without pancreatic necroses (2,4). APACHE II score was found to better indicate systemic complications and CT to better detect local complications (5). On the whole, the APACHE II score on admission to the hospital is not reliable to diagnose pancreatic necroses and thus severe pancreatitis. It cannot replace contrast-enhanced CT to detect these severe complications.
- [3] Bollen, T.L., Singh, V.K., Maurer, R. et al, A comparative evaluation of radiologic and clinical scoring systems in the early prediction of severity in acute pancreatitis. *Am J Gastroenterol.* 2012;107:612–619.
- [4] Wilscon C, Heath DI, Imrie CW. Prediction of outcome in acute pancreatitis: a comparative study of APACHE II, clinical assessment and multiple factor scoring systems. *Br J Surg* 1990;77: 1260–4.
- [5] Fan S-T, Lai ECS, Mok FPT, et al. Prediction of the severity of acute pancreatitis. *Am J Surg* 1993;166:262–9.
- [6] Stanten R, Frey CF. Comprehensive management of acute necrotizing pancreatitis and pancreatic abscess. *Arch Surg* 1990;125:1269–75.
- [7] Johnson CD, Toh S. Prediction of severity in acute pancreatitis. In: Johnson CD, Imrie CW, eds. *Pancreatic disease. Towards the year 2000.* London: Springer, 1999:31–9.
- [8] Toh SKC, Phillips S, Johnson CD. A prospective audit against national standards of the presentation and management of acute pancreatitis in the South of England. *Gut* 2000;46:239–43.

## References

- [1] Yadav, D., Lowenfels, A.B. Trends in the epidemiology of the first attack of acute pancreatitis: a systematic review. *Pancreas.* 2006;33:323–330.
- [2] Banks, P.A., Freeman, M.L., Practice Parameters Committee of the American College of Gastroenterology. Practice guidelines in acute pancreatitis. *Am J Gastroenterol.* 2006;101:2379–2400