Research Article

A comparative study of different predictive severity scoring system for acute pancreatitis in relation to outcome

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Abstract

Acute pancreatitis has wide spectrum of clinical illness that ranges from mild self-limited symptoms to early severe acute pancreatitis (ESAP), rapid deterioration and death. Prior assessment of severity allows the managing physician to identify those patients who are most likely to have a severe episode early administration of therapies to reduce severity. The present study was intended to compare the predictive accuracy of 04 different severity scoring systems for acute pancreatitis- Ranson's score, Acute Physiology and Chronic Health Evaluation [APACHE] II, Balthazar CT Severity Index (CTSI) and Goris Multi Organ Failure(MOF) scale for prediction of severe pancreatitis. This prospective study has been conducted by selecting 30 consecutive CECT confirmed patients of acute pancreatitis admitted during the period October 2012 to June 2014 in MGM Medical College, Kishanganj, Bihar. Patients have been evaluated, examined and investigated as per the study proforma. Severity assessment was done for every patient on admission and at 48 hrs using clinical, hematological, biochemical and radiological parameters by calculating severity scoring points in respect to Ranson's, APACHE II on admission, APACHEII after 48 hrs, Balthazar CT severity index score, Goris MOF score (at cut off>0), (at cut off ≥2) on admission and after 48 hrs .All cases were followed up for a period of next 06 months. In this study, out of 30 patients 24 (80%) cases were in the age group of 20-59 yrs. However only 6 (20%) cases were in the age group >60 yrs. Sex ratio was Male: female = 27:3. Alcohol and Gall stone disease was aetiology of pancreatitis in 17 (56.67%) patients and 7 (23.33%) patients. There was one case of hyperlipidemia and the remaining 5 cases were of idiopathic pancreatitis. 80% of the cases presented with upper abdominal pain and repeated vomiting. Classical presentation of radiation of pain to back and relief on leaning forward was present only in 09 (30%) and 6 (20 %) cases respectively. 20 (50%) patients presented with history of obstipation and about 44% patients presented with abdominal distension misleading the diagnosis initially towards intestinal obstruction on admission. In 8 patients amylase was not elevated and basis for a diagnosis of pancreatitis was characteristic pain, strong clinical suspicion and evident pancreatitis in CECT abdomen. In this study out of total 30 patient 11(37%) developed severe pancreatitis whereas 19(63%) developed mild pancreatitis. Out of 11 severe pancreatitis cases one patient died due to sepsis and multi organ failure during 5th week of hospital admission .Incidence of organ failure and MODS in this study was 83.33% and 10%. Hepatic dysfunction was present in all patients who developed organ failure. The sensitivity, specificity, Positive predictive value, Positive Likelihood Ratio and negative likelihood ratio of Ranson's score was found to be 73%, 63%, 53%, 1.97 and 0.43 respectively. There is no significant difference in median APACHE II score on admission and after 48 hrs in our study. CTSI score had almost equal AUC under ROC curve (0.653), NPV (79%) and equal specificity (73%) as of Ranson's score. However about 50% cases who had necrosis in CECT did not develop clinical severe pancreatitis This demonstrate a very low PPV (50%) for CTSI score. Goris MOF score (at cut off >0) on admission and after 48 hrs had the highest sensitivity (82%) of all scores. In this study, all patients who were predicted to develop severe pancreatitis due to persistence or progression of organ failure during first week actually developed severe pancreatitis later on. Also, all the patients who did not develop severe pancreatitis were correctly predicted as mild pancreatitis by the absence of persistent/progressive organ failure during first week. Thus a specificity and PPV of 100% were obtained by persistent organ failure criterion. Persistence or progression of organ failure during the first week of admission was also found to have the greatest area under the curve (AUC=0.727) under the receiver operating characteristic (ROC) curve and specificity (100%) denoting its highest predictive accuracy in comparison to other scores. However, the drawback of this score was that it takes one week observation of the patient prior to prediction of severity. Whereas APACHEII or Goris MOF score can be obtained as early as on admission making them more useful.

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INTRODUCTION

"Acute Pancreatitis is the most terrible of all the calamities that occur in connection with the abdominal viscera. The suddenness of its onset, the illimitable agony which accompanies it, and the mortality attendant upon it, all render it most formidable of catastrophes". (Berkeley Moynihan, 1865-1936) Approximately 80% of patients either have gallstones or history of sustained alcohol abuse.[1] Malnutrition, independent of alcohol abuse, is a factor for pancreatitis and males are affected more than females in third world countries.[2] Patients with severe acute pancreatitis associated with SIRS typically have a prolonged hospital stay and are the ones most likely to die from their disease process. Prior assessment of severity is one of the most important issues in the management of acute pancreatitis. It allows the managing physician to identify those patients who are most likely to have a severe episode, to transfer them to an intensive care unit for closer supervision and early administration of therapies to reduce severity. The purpose of present study is therefore, to compare the predictive efficacy of severity and outcome amongst 04 different severity scoring systems for acute pancreatitis, namely Ranson's criteria, Acute Physiology and Chronic Health Evaluation [APACHE] II, Balthazar CT Severity Index and Organ Failure scale in our set up.

MATERIAL AND METHODS

This study has been conducted in patients admitted with acute pancreatitis in MGM Medical college, Kishanganj, Bihar. The period of the study was from October 2012 to June 2014. The study population comprised of patients who mostly belong to this areas. The study has been conducted by selecting 30 consecutive patients admitted during the above mentioned period in MGM Medical college, Kishanganj, Bihar with a confirmed diagnosis of acute pancreatitis and by collecting the relevant clinical data as per the study protocol prospectively, from the time of admission till the time of discharge .The patients were also followed up for a period of 6 months following discharge. All cases for which all the details were available according to the study protocol and acute pancreatitis was proven by Contrast Enhanced Computed Tomography (CECT) of abdomen, were included in the study. For the patients having raised creatinine levels non contrast CT scan was done first followed by CECT when renal parameters normalize. All cases, for which details available were incomplete according to the study protocol or acute pancreatitis not substantiated in CECT abdomen, were excluded. All cases of characteristic acute upper abdominal pain with a clinical suspicion of acute pancreatitis have been particularly subjected to estimation of serum amylase on admission, USG abdomen within 24 hrs and CECT abdomen within 48 hrs to one week to reach a definitive diagnosis of acute

Clinical criteria

history of pain in abdomen characteristic of acute pancreatitis (radiating to the back and relieved on bending forward associated with tenderness/guarding in the upper abdomen).

Biochemical

Serum amylase and/or lipase concentration ≥3 times the upper limit of normal. Prediction of a severe pancreatitis has been made in this study if either of the following is present. Ranson's Score ≥3 after 48 hrs . APACHE II Score of ≥8 on admission or after 48 hrs. CT severity index(CTSI) score of ≥6 in the first CECT abdomen. Goris Multi organ failure(MOF) score >0 i.e any organ dysfunction/failure on admission or after 48 hrs. Persistent or progressive organ failure during the first week of admission. (calculated by daily calculation of Goris score) Prediction of a mild pancreatitis has been made if, Ranson's Score <3 after 48 hrs. APACHE II Score of <8 on admission and after 48 hrs CT severity index(CTSI) score of <6 in the first CECT abdomen Goris Multi organ failure(MOF) score =0 i.e. no organ dysfunction/failure at admission and after 48 hrs Any transient organ failure which is resolved within 48 hrs of its development (calculated by daily calculation of Goris score during the first week of admission)

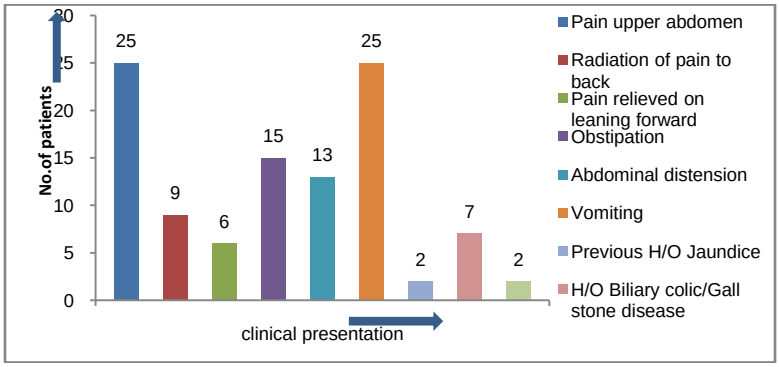
RESULTS

Age: In our study, 24(80%) cases were in the age group of 20-59 yrs. However only 6 (20%) cases were in the age group >60 yrs.

Gender: 27(90%) patients were males and there were only 3(10%) females. Mean duration of pain: Mean duration of pain abdomen prior to admission in 26 cases was 23.73hrs.Most of the patients presented within 12 hrs of onset of pain abdomen. However, 04 patients presented very late (≥1 week) who were not included in calculation of mean duration of pain.

Clinical presentation: In our study, more than 80% of the cases presented with upper abdominal pain and

repeated vomiting. 09(30%) patients presented with pain radiating to back and in 6 (20 %) cases pain was relived on leaning forward. 20(50%) patients presented with history of obstipation and about 44% patients presented with abdominal distension mimicking a clinical presentation of intestinal obstruction on admission. In our study, 02(6.67%) patients presented with previous history of jaundice, 07(23.33%) patients with either history of biliary colic or gall stone disease and 02(6.67%) patients with past history of acute pancreatitis.



Aetiology: In our study, alcohol consumption was found to be the aetiology in 17 (56.67%) patients (95%CI: 38.7-73.33) and gall stone disease was the aetiology in 7 (23.33%) patients (95% CI: 10.8-40.7). There was one case of hyperlipidemia and the remaining 5 cases were of idiopathic pancreatitis. In our study, acute pancreatitis could be diagnosed by USG abdomen in 16 (53.33%) out of 30 patients. However, in remaining 14 (46.67%) patients USG abdomen done within 24 hrs of admission could not indicate a diagnosis of acute pancreatitis. Out of 30 patients, 15 (50%)patients with a Ranson's Score of three or more, were predicted to develop severe pancreatitis, whereas, 15 (50%)patients with a Ranson's Score of less than three, were predicted to develop mild pancreatitis during hospital course. The mode of Ranson's score in the current study was 3 and the median was 2.

Ranson's Score	Frequency (%)
≥3(severe pancreatitis)	15(50%)
<3(mild pancreatitis)	15(50%)
Total cases	**30(100%)**

Out of 30 patients, 03 (10%) patients with an APACHE II of eight or more, were predicted to develop severe pancreatitis, whereas, 27 (90%) patients with an APACHE II score of less than eight, were predicted to develop mild pancreatitis during hospital course both on admission and at 48 hrs. The sensitivity of CTSI score was 73% and the Specificity was 58%.The negative predictive value of the score was 79% which was very high and comparable to Ranson's score. The sensitivity of Goris MOF score on admission was high (82%) whereas the Specificity was only 32%.The negative predictive value of the score was 75%. The negative likelihood ratio was 0.58. The Positive Likelihood Ratio was 1.20(>1).

DISCUSSION

Acute pancreatitis (AP) is an inflammatory disease that varies from self-limiting inflammation to rapidly deteriorating condition and poses the most difficult challenges we face in clinical practice. Most patients with acute pancreatitis have a mild form of the disease that will respond to supportive treatment. However approximately 20% run a severe course associated with high risk of mortality and require appropriate management in an intensive care unit. Accurate prediction of the severity is important to optimize treatment and prioritization of cases for timely and aggressive management in ICU or high dependency unit to prevent mortality and morbidity. Currently the severity of acute pancreatitis is defined according to the criteria adopted by the consensus meeting held in Atlanta[3]. There are several approaches that have been used in an attempt to predict the severity and prognosis of acute pancreatitis. These include clinical, biochemical and imaging assessments. Amongst these assessment tools, multiple factor scoring systems are the most often used. The Ranson's score and Glasgow criteria have been the most widely used indices in clinical practice since the 1980s. Subsequently, other severity scoring systems were instituted. However, a lack of consensus still prevails as to which severity scoring system is the best predictor of severity and final outcome in a case of acute pancreatitis. The present study was intended to compare the predictive efficacy of severity and outcome amongst 04 different severity scoring systems for acute pancreatitis, namely Ranson's Score, Acute Physiology and Chronic Health Evaluation [APACHE] II, Balthazar CT Severity Index (CTSI) and Goris MOF score. Incidence of organ failure and MODS in this study was found to be 83.33% and 10% respectively. Studies have shown highly variable

incidence of organ failure in SAP ranging from 63.5-90.3 %, single organ failure in 24.7-37%, multiple organ failure in 27-65.6 %. Among the single organ failures, pulmonary failure was the most commonly organ failure (39.1-63 %), followed by cardiovascular failure (23-37.7 %), hepatic failure (20.7 %), renal failure (8.5-13 %) [4,9,17]. However, in our study, most common organ dysfunction was hepatic and was present in all patients who developed organ failure. Other organ failures were respiratory in 3 (10%), cardio vascular in 3 (10%), renal in 3 (10%) and CNS in 3 (10%) cases. This difference of observation may be beause of the fact that in this study Goris MOF score was used to quantify organ failure, whereas in most of the studies in world literature either Alanta definition or other scores were used to define organ failure. In this study one patient out of 30 cases died due to sepsis and multi organ failure during 5th week of hospital admission. Mortality rate was found to be 3.33% overall and 9% amongst severe pancreatitis cases. Whereas, most studies from tertiary centers note mortality rates of 5%–15%. [5,6,7,8.] Less mortality may be due to better prognostication of cases by severity scoring systems on and 48 hrs after admission, investigating all cases with CECT abdomen which could pick up all cases of necrosis early, timely and aggressive management and strict adherence to the guidelines in the study protocol. Ranson's and CTSI score was found to have equal sensitivity of 73%, almost equal negative predictive value (80% and 79%)respectively with slightly larger area under the curve (AUC) under ROC curve for Ranson's score[(AUC=0.679) and (AUC=0.653) respectively]. Ranson's score and APACHE II were found less sensitive to predict the outcome in comparison to CTSI in the study by Ting-Kai Leung, Chi-Ming Lee *et al* [10] and also in the study by Chatzicostas, Constantinos, *et al*[11]. In our study the AUC of CTSI was larger than that of APACHE II (0.653 vs 0.565) which confirms the similar finding. However, PPV and likely hood of positive test (LR+) of CTSI was seen to be much lower than APACHE II score (50% vs 67%) and (1.73 vs 3.45). Also the disadvantages of CTSI is that it requires some time for necrosis to develop and in most of the centres in India CECT facility is not readily available. In our study 08 out of 16 (50%) patients with necrosis had mild AP according to scoring systems and had uneventful recovery. This may be explained by the possibility that radiological findings do not always reflect disease severity because severe AP is a condition mediated by cytokines whereas, pancreatic necrosis is not mandatory for cytokine effects. Also, the score obtained with the index does not significantly correlate with the subsequent development of organ failure[12], extrapancreatic parenchymalcomplications[13] or peripancreatic vascular complications[14].As documented in two independentstudies.[15,16] The interobserver agreement for scoring CT scans using the CT severity index is only 75%.

CONCLUSION

All the scores under study except Goris MOF at a cut off ≥2 on admission had good predictive value in terms of different predictive accuracy parameters. APACHEII and Goris MOF (at cut off>0) are useful on admission and thereafter at 48 hrs for prediction of severe cases, whereas CTSI and Ranson's score can be most useful to identify those who are not likely to be severe later on . However, Ranson's score cannot be applied for prediction of severity after 48 hrs.

REFERENCES

1. John H.C. Ranson. "Maingot's Abdominal operations".10th Ed. Vol II
2. Michael Trede, Sir David c. Carter, "Surgery of the Pancreas" 2nd Ed.
3. Bradley EL III. A clinically based classification system for acute pancreatitis. Summary of the International Symposium on Acute Pancreatitis, Atlanta, GA, September11- 13, 1992. Archives of Surgery 1993; 128:586–590.
4. Zhu AJ, Shi JS, Sun XJ. Organ failure associated with severe acute pancreatitis. World J Gastroenterol 2003; 9: 2570- 2573
5. Mann DV, Hershman MJ, et al. Multicentre audit of death from acute pancreatitis. Br J Surgery 1994; 81: 890–893.
6. McKay CJ, Evans S, et al. High early mortality rate from acute pancreatitis in Scotland, 1984-1995. Br J Surgery 1999; 86: 1302–1305.
7. Talamini G, Bassi C, Falconi M, Sartori N, Frulloni L, Di Francesco V, et al. Risk of death from acute pancreatitis. Role of early, simple "routine" data. Int J Pancreatology 1996; 19: 15–24.
8. Carnovale A, Rabitti PG, Manes G, Esposito P, Pacelli L, Uomo G. Mortality in acute pancreatitis: is it an early or a late event? JOP 2005; 6: 438-444)
9. Gotzinger P, Sautner T, Kriwanek S, Beckerhinn P, Barlan M, Armbruster C,Warmser P, Fugger R. Surgical treatment for severe acute pancreatitis: extent and surgical control of necrosis determine outcome. World J Surg 2002; 26:474 – 478
10. Ting-Kai Leung, Chi-Ming Lee et al.Balthazar computed tomography severity index is superior to Ranson criteria and APACHE II scoring system in predicting acute pancreatitis outcome. World J Gastroenterol 2005;11(38):6049-6052
11. Chatzicostas, Constantinos, Roussomoustakaki, Maria et al. Balthazar Computed Tomography Severity Index is superior to ranson criteria and apache ii and iii scoring systems in predicting acute pancreatitis outcome. journal of clinical gastroenterology: march 2003;36:253-260
12. Lankish PG, Pflichthofer D, Lehnick D. No strict correlation between necrosis and organ failure in acute pancreatitis. Pancreas 2000;20:319 -322

13. Wiesner W, Studler U, Kocher T, Degen L, Buitrago-Tellez CH, Steinbrich W. Colonic involvement in non-necrotizing acute pancreatitis: correlation of CT findings with the clinical course of affected patients. Eur Radio l2003; 13: 897-902
14. Inoue K, Hirota M, Beppu T, et al. Angiographic features in acute pancreatitis: the severity of abdominal vessel ischemic change reflects the severity of acute pancreatitis. J Pancreas 2003; 4:207 -213
15. Mortele KJ, Mergo P et al. Renal and perirenal space involvement in acute pancreatitis: state-of-the-art spiral CT findings. Abdom Imaging 2000; 25:272 -278
16. Lecesne R, Tourel P, et al. Acute pancreatitis: interobserver agreement and correlation of CT and MRCP with outcome. Radiology1999; 211:727 -735
17. Buchler MW, Gloor B, Muller CA, et al. Acute necrotizing pancreatitis: Treatment strategy according to the status of infection. Ann Surg2000;232:619-626

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