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Acute Pancreatitis: Role of Lipase and LDH at Admission as Predictors of Morbidity and Mortality

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Abstract: Acute pancreatitis is a common disease with multiple scoring systems to predict severity of disease. This observational, prospective study was carried out at Benazir Bhutto Hospital, Rawalpindi from June, 2013 to January, 2016. On the basis of Glasgow scoring, Ranson's scoring and CT scan severity index (CTSI), patients were categorized into mild, moderate and severe form of acute pancreatitis. Other investigations like full blood count, liver and renal function tests, serum amylase, lipase, blood sugar random, fasting lipid profile and serum calcium were done for all the patients as routine. CT severity index was calculated by the radiologist using Balthazar score when Contrast enhanced CT scan abdomen was indicated in certain deteriorating patients. Using a step up approach, surgical intervention was done in those patients whose condition deteriorated despite intensive medical management. In the study, there were 324 patients with mean age of 41.21+/-15.08 years ranging between 14-67 years of age. Overall morbidity development was 54.37% among the patients presenting with acute pancreatitis. 20 patients developed local complications needing necrosectomy and drainage of abcesses and 7 died in the course of illness. ICU admissions were 25% and Overall mortality was 16.04%. Admission value of LDH ($p<0.0001$), total leucocyte count ($p<0.0001$) and serum Lipase ($p<0.0001$) were significantly correlated with development of morbidity and mortality. However Amylase level ($p<0.0001$), Ranson's score ($p=0.769$) and Glasgow scale ($p=0.646$) did not correlate significantly with mortality and morbidity, concluding that LDH, Lipase and Total leucocyte count can predict outcomes of patients with acute pancreatitis supplemented by clinical judgement.

Keywords: Acute Pancreatitis, Ranson Score, Glasgow Score, APACHE II, Necrosectomy

1. Introduction

Acute pancreatitis (AP) is in fact an inflammatory disease of pancreas which has extensively studied causative mechanisms with the obvious reason to sort out the cause and the advancement of the disease to distinguish milder disease from severe form. Acute pancreatitis leads to damaged pancreas which in turn releases of pancreatic enzymes, lipase and phospholipase raising their plasma levels [1]. The disease has a systemic followed by a local complication phase usually encompassing 2 weeks after initial attack [2].

Acute pancreatitis is a relatively common infliction having wide range of clinical variations and complications with ever increasing incidence of the disease. Around 25% of patients suffering from acute pancreatitis develop severe acute pancreatitis (SAP) with average mortality rate approaching 2–10% [3]. About 50% of fatalities in such patients occur within the first week of the attack, majorly due to MODS and 40–60% in patients with local infected complications occurring in 2nd week in approximately all age cadres. The mortality toll related with MODS however varies from 30 to 100% [3] Respiratory failure is the commonest type of organ failure in acute pancreatitis stated in the literature [3, 4]. Management of acute pancreatitis has revolutionized in past decades from early prompt surgical intervention to conservative intensive care, early enteral feeding regimes and surgical intervention reserved for patients with worsening sepsis [8-10]. This revolution came after years of evidence based struggle and extensive complications following surgery for this enigmatic disease [8-10]. Initial evaluation of

severity of acute pancreatitis remains crucial in later management plan. Several classification systems have been proposed and experimented including organ failure and systemic inflammatory response syndrome (SIRS) score such as Ranson's, the Glasgow, and Acute Physiology and Chronic Health Evaluation (APACHE) II, [5, 7] 2012 Revised Atlanta Classification using the modified Marshall scoring system for assessing organ dysfunction [6], measurement of amylase and lipase [14] and assessment of fluid loss, are all useful for diagnosis, assessing severity but not well validated for predicting morbidity and mortality. CT scan is not useful till 72 hours of the attack and is not recommended in all patients [10]. All these have proved to be merely triaging tools. Genetic polymorphisms and mutations among patients also add to the deadlock in forecasting the outcome [11].

Costs of ICU care is escalating around the world hence the commitment for timely identification of those who could be profitted from intensive care in order to alleviate the costs and saving the life of the patients is paramount. Also the cost of so many investigations with minimal benefits is also jeopardizing. Timely identification can help reduce unnecessary intensive care admissions and also prevent undue delay in intensive care when the need arises. The present study was designed at assessing the morbidity and mortality risk signified by various severity indices and the role of surgical management.

2. Material and Methods

Our study was a prospective observational study done at Benazir Bhutto Hospital, Rawalpindi, Pakistan, from June, 2013 to January, 2016. All patients who were diagnosed to have acute pancreatitis were admitted in this study (consecutive 324 patients), with exclusion of patients having pancreatic malignancy and chronic pancreatitis from the present study. Patients were categorized into mild, moderate and severe acute pancreatitis on the basis of Glasgow score, Ranson's score and CT severity index (CTSI). Full blood count, renal and liver function tests, serum lipase and amylase, blood sugar random, fasting lipid profile and serum calcium were done for all the patients in routine. When indicated Contrast enhanced CT scan abdomen was done and CT severity index was determined by the radiologist using Balthazar score. Patients inflicted with moderate and severe pancreatitis were initially taken care of in High dependency Unit and were shifted to Intensive care unit in case of evidence of organ failure. Patients suffering from mild pancreatitis were treated conservatively in the ward settings. Step up approach was applied in case of patient's deterioration or non improvement despite intensive medical management and were surgically intervened. The Statistical Package for Social Sciences (SPSS) version 16 was used for the statistical analysis. Individual correlation followed by multiple logistic regression was employed as a continuous dependent variable of complications was predicted by usage of diagnostic indices like cause, serum LDH, amylase, AST, BSR, TLC, Ranson's and Glasgow scores. A $p<0.05$ was accepted statistically significant taken from regression table.

3. Results

In the study, there were 324 patients with mean age of 41.21+/-15.08 years ranging between 14-67 years of age. Out of 324 patients, 119 were males accounting for 36.7% and 205 were females making 63.3%. Table 1 shows causes of acute pancreatitis in our study population.

Table 1. *Causes of acute pancreatitis.*

Cause	No. of Patients	Percentage
Biliary	262	80.9
Alcohol	12	3.7
ERCP	16	4.9
Unknown	9	2.8
NSAID	8	2.5
Trauma	8	2.5
Thiazide	6	1.9
Autoimmune	3	0.9

Table 2. *Systemic Complications.*

Complications	No. of Patients		Discharge		Death
Respiratory	ARDS 38 (11.7%) (needed ventilator)	Pleural Effusion 62 (19.1%)	ARDS 27 (8.3%)	Pleural Effusion 46 (14.19%)	11 (3.4%)
CVS (shock)	36 (11.2%)		31 (9.56%)		5 (1.5%)
MODS (ICU)	40 (12.34%)		11 (3.4%)		29 (9.1%)

Overall morbidity development was 54.37%(n=176) among the patients presenting with acute pancreatitis. 20 patients developed local complications needing necrosectomy and drainage of abcesses and 7 died in the course of illness. ICU admissions were 25%(n=81) and Overall mortality was 16.04%(n=52).

Admission value of LDH, total leucocyte count, serum Lipase and serum amylase (Pearson correlation Ɣ value = 0.434, 0.282, -0.334 and 0.510 with 2-tailed significance <0.0001, <0.0001, <0.0001 and <0.0001 respectively where correlation is significant at 2-tailed 0.01 level) were significantly correlated with development of morbidity and mortality. However Ranson's score and Glasgow scale (Pearson correlation Ɣ value=0.016 and 0.026 and 2-tailed significance=0.769 and 0.646 respectively) did not significantly correlate with morbidity and mortality.

Table 3. *Multiple Linear Regression for various Diagnostic Indices predicting Mortality and Morbidity in patients with Acute Pancreatitis (N=324).*

Predictor variables	b	β	*Sig*	95% CI	
				L	U
TLC	.033	.149	.004*	.011	.055
S. Amylase	<.0001	-.328	.080	.010	.090
Ranson's Score	-.020	-.021	.642	-.103	.063
Glasgow Score	.095	.039	.370	-.113	.302
Serum LDH	.001	.226	<.0001*	.001	.002
Serum Lipase	.002	.384	<.0001*	.001	.002
Cause	-.041	-.074	.100	-.090	.008
AST	<.0001	-.038	.439	-.001	.001
BSR	-.001	-.043	.330	-.004	.002
R^2	.432				
F	26.56				

Logistic regression analysis was employed to predict the probability that the patient would be having morbidity or mortality. The predictor variables were Serum LDH, Lipase and Total leucocyte count. A test of the full model versus a model with intercept only was statistically significant i.e p <0.0001 (p< 0.05 is taken significant) for LDH and Lipase, holding that rise in LDH, Lipase and TLC leads to definite increase in mortality and morbidity

4. Discussion

Necrotizing and Hemorrhagic pancreatitis are serious life threatening complications of acute pancreatitis with very high mortality, which increases further if bacterial infection of necrosis occurs [2]. In such conditions early and aggressive resuscitation and early intervention may help [2, 3]. There is a definite improved outcome if severity of disease and high risk patients are identified early in the developing course of acute pancreatitis. In spite of the availability and usage of various clinical (Ranson's criteria, APACHE II score, Glasgow scoring system) and radiological scoring systems (CTSI /Balthazar scoring system), accurate prediction of the best treatment strategies and outcome after acute pancreatitis remains unknown [14]. Sadly these scoring systems can only be benefitted for triage but are unable to predict morbidity and mortality [2, 3, 14].

In the present study we objectively analysed the parameters which could avail in the appraisal of severity of acute pancreatitis. Ours is a developing country with limited resources so we intended to ascertain that initial evaluation of serum amylase, lipase [14], LDH in addition to clinical parameters that we routinely do in such patients; could be used as an elementary predictive mean for morbidity and mortality risk [15].

Of the 324 patients, biliary pancreatitis was the highest (81%) cause of pancreatitis, compared to western society, which can be expounded by prohibition of alcohol in religion compared to the western world [2-4]. In literature, females were more susceptible to have cholelithiasis and hence gall stone induced pancreatitis than males, similar to our study in which females were the main sufferers of Pancreatitis. Scoring systems in acute pancreatitis augments the precision of prognosis, morbidity and mortality which increases with incrementing the scores. Glasgow and Ranson's score can be calculated and is appropriate for triaging the diseased to ward care or intensive and truculent therapy in ITU. Comparison of sundry scores among each other in previous studies have ascertained that no solitary scoring system would precisely envision the outcome including morbidity and mortality but they were found useful when used together [12, 13]. The current study emphasizes that Ranson's score can still be of value in initial evaluation and consequent management of these patients. CT scan was however performed only in patients with local complications where it was found to be a good tool [13].

Multivariate analysis showed LDH and Lipase at the time of admission had greatest independent connotation in predicting the outcome [14]. In present study, serum LDH and Lipase correlated significantly with a significant regression analysis with mortality and morbidity being the dependent variable. Our results conferred that these two at admission may augment and in turn accentuate clinical acumen in recruiting high risk group.

Serum creatinine and BUN (Blood urea nitrogen) assessment at the time of admission revealed no paramount presage of morbidity and mortality however the initial 24 hours fluid resuscitation was found to be crucial for early recuperation. Wu Bu et al [15] and Lankisch PG et al [16] however supported the two to be a predictor only in cases of raised values

Various other markers including CRP, CECT, urinary trypsinogen activation peptide (TAP), interleukins 1, 6, and 8 and serum trypsinogen-2, have been discussed in literature as good predictors but we had a resource limitation issue in Pakistan. [17, 18]

The grail of Pancreatitis has seen many changes, shifting from early surgical exploration to enthusiastic an agile intensive care management, making it the domain of intensivists. Surgery in astringent severe acute pancreatitis has proven to be a gruesome procedure with fatal complications in majority of the operated patients, leading to long term pancreatic insufficiency and fistula formation. Delay in surgery is better in sterile necrosis and minimally invasive strategies yield better results. Percutaneous drainage, [19, 20] endoscopic transgastric procedures [21, 22, 23] and minimally invasive procedures are better alternatives to open necrosectomy. Percutaneous drainage has taken precedence and has better results. [19-24]

In the present study 20 patients underwent open necrosectomy surgery, 7 patients died following surgery due to various complications. This can be demonstrated by the procedure cognate risks in a critically sick patient with sepsis and MODS. The patients with severe disease and systemic complications were inducted for stepping up methodology and were monitored scrupulously for clinical condition and laboratory tests deterioration to proceed to early surgical intervention. Step up approach worked well for most of the patients included in study as in literature [24].

5. Conclusion

Living in a resource limited settings we found out that LDH, Lipase and Total leucocyte count can predict outcomes of patients with acute pancreatitis supplemented by clinical judgement. Other markers, scoring systems should be measured to predict severity but these hold better significance over them. LDH and Lipase at the time of admission could be paramount prognostic markers for presaging morbidity and mortality in patients with acute pancreatitis. More work is however needed to find a single definitive marker of severity in this multifactorial disease.

References

[1] Mateua A, Ramudoa L, Mansoa, MA, Closab D, Diosa D. Acinar inflammatory response to lipid derivatives generated in necrotic fat during acute pancreatitis. Biochimica et Biophysica Acta (BBA) - Molecular Basis of Disease 2014; 1842 (9): 1879-86.

[2] Vengadakrishnan K, Koushik AK. A study of the clinical profile of acute pancreatitis and its correlation with severity indices. Int J Health Sci (Qassim). 2015; 9 (4): 410-4.

[3] Singh VK, Bollen TL, Wu BU, et al. An assessment of the severity of interstitial pancreatitis. Clin Gastroenterol Hepatol. 2011; 9: 1098.

[4] Beger HG, Rau BM. Severe acute pancreatitis: Clinical course and management. World J Gastroenterol. 2007; 13: 5043.

[5] Forsmark CE, Baillie J. AGA Institute Clinical Practice and Economics Committee, AGA Institute Governing Board. AGA Institute technical review on acute pancreatitis. Gastroenterology. 2007; 132: 2022.

[6] Banks PA, Bollen TL, Dervenis C, et al. Classification of acute pancreatitis--2012: revision of the Atlanta classification and definitions by international consensus. Gut. 2013; 62: 102.

[7] Tenner S, Baillie J, DeWitt J, et al. American College of Gastroenterology guideline: management of acute pancreatitis. Am J Gastroenterol. 2013; 108: 1400.

[8] Working Group IAP/APA Acute Pancreatitis Guidelines. IAP/APA evidence-based guidelines for the management of acute pancreatitis. Pancreatology. 2013; 13: e1.

[9] Windsor JA. A better way to predict the outcome in acute pancreatitis? Am J Gastroenterol. 2010; 105: 1671. [PubMed] Wu BU, Banks PA. Clinical management of patients with acute pancreatitis. Gastroenterology. 2013; 144: 1272.

[10] Chauhan S, Forsmark CE. The difficulty in predicting outcome in acute pancreatitis. Am J Gastroenterol. 2010; 105: 443.

[11] Johnson CD, Abu-Hilal M. Persistent organ failure during the first week as a marker of fatal outcome in acute pancreatitis. Gut. 2004; 53: 1340.

[12] Robert JH, Frossard JL, Mermillod B, et al. Early prediction of acute pancreatitis: prospective study comparing computed tomography scans, Ranson, Glasgow, Acute Physiology and Chronic Health Evaluation II scores, and various serum markers. World J Surg. 2002; 26: 612.

[13] Yadav D, Agarwal N, Pitchumoni CS. A critical evaluation of laboratory tests in acute pancreatitis. Am J Gastroenterol. 2002; 97: 1309.

[14] Hofmeyr S, Meyer C, Warren BL. Serum lipase should be the laboratory test of choice for suspected acute pancreatitis. S. Afr. j. surg 2014; 52 (3): 34-8.

[15] Wu BU, Bakker OJ, Papachristou GI, et al. Blood urea nitrogen in the early assessment of acute pancreatitis: an international validation study. Arch Intern Med. 2011; 171: 669.

[16] Lankisch PG, Weber-Dany B, Maisonneuve P, Lowenfels AB. High serum creatinine in acute pancreatitis: a marker for pancreatic necrosis? Am J Gastroenterol. 2010; 105: 1196.

[17] Mayumi T, Inui K, Maetani I, et al. Validity of the urinary trypsinogen-2 test in the diagnosis of acute pancreatitis. Pancreas. 2012; 41: 869.

[18] Huang QL, Qian ZX, Li H. A comparative study of the urinary trypsinogen-2, trypsinogen activation peptide, and the computed tomography severity index as early predictors of the severity of acute pancreatitis. Hepatogastroenterology. 2010; 57: 1295.

[19] Hartwig W, Maksan SM, Foitzik T, et al. Reduction in mortality with delayed surgical therapy of severe pancreatitis. J Gastrointest Surg. 2002; 6: 481. [PubMed].

[20] vanSantvoort HC, Bakker OJ, Bollen TL, et al. A conservative and minimally invasive approach to necrotizing pancreatitis improves outcome. Gastroenterology. 2011; 141: 1254.

[21] Howard TJ, Patel JB, Zyromski N, et al. Declining morbidity and mortality rates in the surgical management of pancreatic necrosis. J GastrointestSurg. 2007; 11: 43.

[22] Mortelé KJ, Girshman J, Szejnfeld D, et al. CT-guided percutaneous catheter drainage of acute necrotizing pancreatitis: clinical experience and observations in patients with sterile and infected necrosis. AJR Am J Roentgenol. 2009; 192: 110. 144: 1272.

[23] Freeman ML, Werner J, van Santvoort HC, et al. Interventions for necrotizing pancreatitis: summary of a multidisciplinary consensus conference. Pancreas. 2012; 41: 1176.

[24] van Santvoort HC, Besselink MG, Bakker OJ, et al. A step-up approach or open necrosectomy for necrotizing pancreatitis. N Engl J Med. 2010; 362: 1491.