

# A COMPARATIVE EVALUATION OF RADIOLOGICAL SCORE (CTSI) AND CLINICAL SCORE (RANSON'S) IN PREDICTING THE SEVERITY OF ACUTE PANCREATITIS

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## ABSTRACT

Acute Pancreatitis, commonly presenting as pain abdomen to surgical ER, with either nausea or vomiting, is a common illness, with almost daily admissions from general population, with mild, moderate and severe forms. It is important that patient with severe disease are identified early on, for these patients may require intensive care or an HDU care.

**Methodology:** This was a cross sectional study conducted in the department of general surgery, Hayatabad medical complex Peshawar. The data was collected prospectively for each consecutive patient presenting with AP. Duration of study was 6 months from August 2018 to February 2019. A total of 148 patients were enrolled in the study.

**Results:** Among 148 patients, 18 (12%) were in age range 20-30 years, 47 (32%) were in age range 31-40 years while 83 (56%) were in age range 41-50 years. Mean age was 42 years with SD  $\pm$  2.25. 41 (28%) were male, 107 (72%) were female. (as shown in Table No 2). Based on etiology, n=112 were having gallstones, n=29 were idiopathic and n=7 were traumatic pancreatitis. 133 (90%) patients had Ranson's score <3 while 15 (10%) patients had Ranson's score >3. Those who underwent CECT, 118 (80%) had CTSI score < 5 while 30 (20%) had CTSI score > 5. Comparative evaluation of CTSI vs Ranson's score showed CTSI having the sensitivity of 58.8%, specificity of 91.2%. PPV was 66.7% while NPV was 88.1% while diagnostic accuracy of 83.8%. During the course of hospital admission and clinical score, 90% had mild AP while 10% went on to develop severe AP. Mortality was n=7 (4.7%). Compared to CTSI, Ranson score was a better predictor for mortality.

**Conclusion:** Our study didn't find any significant difference between the clinical and radiological scoring system predicting mortality and disease severity.

**Keywords:** Acute pancreatitis, CTSI, Ranson Score

## INTRODUCTION

Acute Pancreatitis, commonly presenting as pain abdomen to surgical ER, with either nausea or vomiting, is a common illness, with almost daily admissions from general population, with mild, moderate and severe forms. The incidence of acute pancreatitis in UK is 56 cases per 100,000 per year and while in USA, about 20,000 admissions are reported to have acute pancreatitis<sup>1</sup>. It is important that patient with severe disease are identified early on, for these patients may require intensive care or an HDU care. So that they can receive aggressive fluid resuscitation and close vitals monitoring for development of organ failure. In case these patients have developed complication which require interventions such as enteral feed and endoscopic sphincterotomy or antibiotics. It is important that we characterize high risk group of patients for critical

appraisal of management strategies. Necrotizing Pancreatitis with an incidence of 20% in admitted patients have complications which include MOD (Multi - Organ Dysfunction) or Inflammatory Cascade resulting in infection, edema, pseudocyst or necrosis of the Pancreatic Parenchyma<sup>2</sup>. The severity of Acute pancreatitis can be assessed by several scoring systems developed overtime, which can be predict whether the course of the pancreatitis will mild, moderate or severe, different scoring systems have different accuracy profile<sup>3</sup>. Severe acute pancreatitis is demarcated by a cascade of local effects, pancreatic necrosis and ischemic changes due to micro thrombi in local vasculature. Pancreatitis severity scores were first described by Ranson in early seventies and consisted of eleven criteria. There are also other scores which include Glasgow, Moss Score and acute physiological score for ICU (APACHE-II) and a bedside score by the name of BISAP Score<sup>4</sup>. All of these criterion developed over the years have a varying baseline for specificity and sensitivity ranging between 55-90%, although these scores are valuable assets as prognostic indicators but they are too complex or require a time period (48 Hours) to elapse before they can be implemented i.e. Ranson's Score<sup>5</sup>. C.T Abdomen with pancreatic protocol which uses IV Contrast has become the basis for CTSI Score for acute pancreatitis

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graded between 1-10 and is the investigation of choice for Physician's to accurately assess the local inflammatory and necrotizing processes and give an indication of prognoses<sup>4,6,8</sup> disease course, CT timing, Balthazar CT score, and clinical management were evaluated. RESULTS First documented hospital admissions of 166 patients were analyzed. Etiology was biliary (42.8%). The mainstream approach advocates if the disease is mild and patient improving then one can forego the CT abdomen n pelvis, and only opt for the investigation whenever there is suspicion of severe acute pancreatitis. Therefore, judicious use of CT is warranted<sup>9,10</sup>. Ajay K. Khanna et al. reported a sensitivity of 87.5% and specificity of 55.3% ICU admission with an accuracy of 64.8% for CTSI while Ranson's Score had a sensitivity of 88.9% and specificity of 57.1% for ICU admission with an accuracy of 61.1%<sup>11</sup>. Although Clinical assessment by a Physician to diagnose Acute Pancreatitis is difficult at best with a specificity of 34-39% and acute pancreatitis is sometimes mislabeled in 30-40% of the cases with diagnoses being made on the autopsy table post-demise<sup>5</sup>. So on admission if the patient has clinical biomarkers for Acute-Pancreatitis, C.T Abdomen-Pelvis with pancreatic protocol should be a modality of choice to index the severity of Acute Pancreatitis in admitted patient<sup>9</sup>. Recognition of Multi Organ Dysfunction in the beginning of the disease process in Acute Severe AP, significantly improves outcomes in such patients<sup>12</sup>. CT severity index is still a very valuable and relatively inexpensive tool for assessing acute inflammation of pancreas and for predicting the severity of the pancreatitis<sup>8</sup>. International studies have compared CTSI with various scoring systems for severity of acute pancreatitis and found CTSI to be fairly accurate<sup>5,8</sup>. There is a need for a validation study which can safely categorize high risk patients in AP with the aid of clinical and radiological scoring systems in our institution.

## METHODOLOGY

A cross sectional analysis of the cases in the General Surgery Department, Hayatabad medical complex Peshawar. The data was collected prospectively for each consecutive patient presenting with AP. The study continued for almost 6 months, from August 2018 to February 2019. A prompt approval from ethical board was sought which was granted subsequently, followed by informed consent from the patients both written and oral. A total of 148 patients were enrolled in the study. The patients were admitted through ER and OPD as a case of diagnosed acute pancreatitis based on history, examination and lab findings. AP was defined as 2 or more of the following; characteristic abdominal pain, serum amylase/lipase 3 or more times the upper limit of normal and or CT Inclusion criteria involved age 18-50 years of either gender or patients presenting with pain within 48 hours of onset of symptoms of acute pancreatitis. Strict exclusion criteria was followed in which patients presenting greater than 48 hours of on-

set of symptoms, patients who already had developed complications, congenital anomalies of pancreas, and malignancies of pancreas and peri-ampullary origin, previous recent history of MI or surgery. All patients were subjected to contrast enhanced computer tomography (CECT) by Toshiba Asteion Scanner with Pancreatic Protocol and the severity of Pancreatic inflammation scored according to CTSI by the two radiologists independently who were blinded to the clinical scores. The review of CT scans was done on PACS work stations. The clinical data was recorded by 2 consultant surgeons who were also blinded to CTSI. They collected data for Ranson score from the prospective patients. Sensitivity, specificity, positive predictive value and negative predictive value was measured for each scoring system in predicting the severity of Pancreatitis, and all patients were managed according to standard protocols. The patients were observed during their hospital stay till their discharge or referral to otherspecialized unit, like ICU.

## Statistical analysis

All data was collected, indexed and entered in excel and exported to SPSS 18. All manner of basic statistical analyses was carried out and values obtained for each variable. All data was tabulated and graphed in charts. Sensitivity, specificity, positive predictive value and negative predictive value were calculated taking Ranson's score as a Gold Standard in a 2\*2 table. P value of < 0.05 was considered significant. All the results were presented in the form of tables and charts.

## RESULTS

Among 148 patients, 18(12%) were in age range 20-30 years, 47(32%) were in age range 31-40 years while 83(56%) were in age range 41-50 years. Mean age was 42 years with  $SD \pm 2.25$ . (as shown in Table No 1). 41(28%) were male, 107(72%) were female. (as shown in Table No 2). Based on etiology, n=112 were having gallstones, n=29 were idiopathic and n=7 were traumatic pancreatitis. 133(90%) patients had Ranson's score <3 while 15(10%) patients had Ranson's score >3 (as shown in Table No 3). Those who underwent CECT, 118(80%) had CTSI score < 5 while 30(20%) had CTSI score >5 (as shown in Table No 4). Comparative evaluation of CTSI vs Ranson's score showed CTSI having the sensitivity of 58.8%, specificity of 91.2%. PPV was 66.7% while NPV was 88.1% while diagnostic accuracy of 83.8%. (as shown in Table No 5). During the course of hospital admission and clinical score, 90% had mild AP while 10% went on to develop severe AP. Mortality was n=7 (4.7%). Compared to CTSI, Ranson score was a better predictor for mortality.

## DISCUSSION

Acute pancreatitis has always been a challenging disease due to its complicated disease course. Physicians have always sought out a way to recognize

Table 1: Age distribution (n=148)

| Age         | Fréquency | Percentage |
|-------------|-----------|------------|
| 20-30 years | 18        | 12%        |
| 31-40 years | 47        | 32%        |
| 41-50 years | 83        | 56%        |
| Total       | 148       | 100%       |

Mean age was 42 years, with SD  $\pm$  2.25.

Table 2: Gender distribution (n=148)

| Gender | Fréquency | Percentage |
|--------|-----------|------------|
| Male   | 41        | 28%        |
| Female | 107       | 72%        |
| Total  | 148       | 100%       |

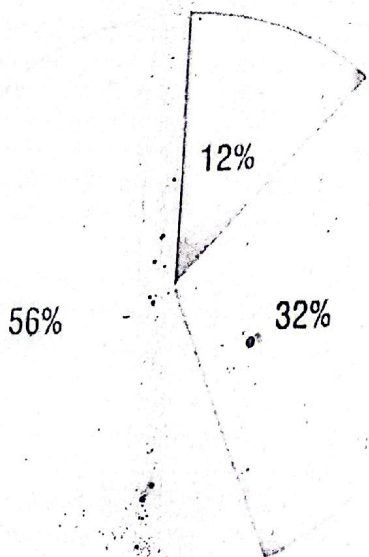
Table 3: Ranson's Score (n=148)

| Ranson's score | Fréquency | Percentage |
|----------------|-----------|------------|
| (>3) Positive  | 15        | 10%        |
| (<3) Negative  | 133       | 90%        |
| Total          | 148       | 100%       |

Table 4: Ctsi Findings (n=148)

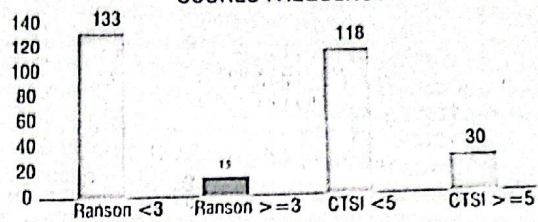
| Ctsi           | Fréquency | Percentage |
|----------------|-----------|------------|
| (>5) Positive  | 30        | 20%        |
| (< 5) Negative | 118       | 80%        |
| Total          | 148       | 100%       |

### Age Groups Percentage



■ 18-30 years ■ 31-40 years ■ 41-50 years

### CLINICAL & RADIOLOGICAL SCORES FREQUENCY



patients at risk of developing severe disease. Multiple scoring systems have been devised overtime which included clinical scoring systems such as Ranson's, Glasgow and APACHE II and radiological scoring systems first described by Balthazar et al in 1985<sup>13</sup> 50%, or greater than 50%. Since then, several radiological scoring systems have come into existence<sup>8</sup>, which include scoring systems such as Balthazar grade, pancreatic size index (PSI), mesenteric oedema and peritoneal fluid (MOP) score, extra pancreatic (EP) score and extra pancreatic inflammation on CT (EPIC) score. CTSI requires contrast enhanced CT which combines extra pancreatic inflammation/extent with pancreatic necrosis. This was later modified by Mortelet et al termed as modified CTSI which combined extra pancreatic complications (pleural effusion, ascites, and ischemia) with separate scoring points.

The radiological scoring systems have moderate accuracy compared to clinical scoring system due to the fact that the disease progress is nonlinear in nature such as a patient having low CTSI score on admission will and can go into severe AP. This is due to the fact that disease progression is not dictated by the morphological features of the disease<sup>4,5,14,15</sup>. It remains a conundrum that why some patients who have significant pancreatic necrosis will have a mild course of disease<sup>16</sup>, nonetheless, it has also been clinically observed that patients who have pancreatic necrosis do develop organ failure and requires intervention.<sup>17-19</sup>

Papachristou et al. compared multiple scores as predictors of SAP and mortality and found that Ranson score compared to CTSI had sensitivity, specificity and accuracy of 84.2%, 89.8% and 94% respectively<sup>5</sup>. While-Bollen et al. found that CTSI had sensitivity, specificity and accuracy of 65.4%, 50% and 57.4% respectively for predicting severe acute pancreatitis<sup>8</sup>. Compared to our study, the above findings correlate to our study as CTSI having sensitivity, specificity and accuracy of 58.8%, 91.2% and 83.7% respectively.

Pancreatitis severity scores were first described by Ranson in early seventies and consisted of eleven criteria. There are also other scores which include Glasgow, Moss Score and acute physiological score for ICU (APACHE-II) and a bedside score by the name of BISAP Score. All of these criterion developed over the years have a varying baseline for specificity and sensi-

tivity ranging between 55-90%, although these scores are valuable assets as prognostic indicators but they are too complex or require a time period (48 Hours) to elapse before they can be implemented i.e. Ranson's Score. C.T Abdomen with pancreatic protocol which uses IV Contrast has become the basis for CTSI Score for acute pancreatitis graded between 1-10 and is the investigation of choice for Physician's to accurately assess the local inflammatory and necrotizing processes and give an indication of prognoses<sup>8</sup>.

Similar results were found in another study conducted by Ajay K. Khanna et al<sup>11</sup> reported a sensitivity of 87.5% and specificity of 55.3% ICU admission with an accuracy of 64.8% for CTSI while Ranson's Score had a sensitivity of 88.9% and specificity of 57.1% for ICU admission with an accuracy of 61.1%. Although Clinical assessment by a Physician to diagnose Acute Pancreatitis is difficult at best with a specificity of 34-39% and acute pancreatitis is sometimes mislabeled in 30-40% of the cases with diagnoses being made on the autopsy table post-demise<sup>20-24</sup>. So on admission if the patient has clinical biomarkers for Acute-Pancreatitis, C.T Abdomen-Pelvis with pancreatic protocol should be a modality of choice to index the severity of Acute Pancreatitis in admitted patient(8). If a severe clinical course is suspected for Acute AP, early recognition of Multiorgan Dysfunction or MODI, and its treatment significantly impacts the outcome in such patients<sup>25</sup>.

Similar results were found in another study conducted by Srivastava A. et al.<sup>26</sup> in which CTSI has the sensitivity 80%, Specificity 63%, Positive predictive value 83%, Negative predictive value 70%, Diagnostic accuracy was 86%.

Similar results were found in another study conducted by Arvanitakis M1 et al.<sup>7</sup> comparing CT and MRI for assessment of disease severity in AP. In which MRI and CT Scan both were done in 39 patients. Of all the admitted patients 07 (18%) were diagnosed as Clinically Severe Cases of Acute Pancreatitis. On admission both MRSI and CTSI were performed and values obtained which showed correlation between clinical severity and radiological scores. Subsequently after a week (07 Days) MRSI had a baseline correlation with CRP levels, Ranson's Score, Stay in the Hospital, Patients' morbidity and post pancreatitis complications. Thus it is ascertained that Ranson's Scoring Criteria correlated well with MRSI by detecting severe Acute Pancreatitis with a specificity of 91% vs. 86% for C.T and sensitivity of 83% vs. 78% for C.T.<sup>27</sup>. MRCP with IV Secretin resulted in leak from Pancreatic Duct in three patients (08%).

Our study had limitations in the form of that on day of admission not all patients underwent CT due to the fact that the advisement of CT was under the discretion of attending surgeon which he would usually advise based on the disease severity only. It is also noted that it was highly impractical for all patients to undergo CT due to the fact that the procedure had a high cost and

the risk of needless radiation exposure.

## CONCLUSION

Our study didn't find any significant difference between the clinical and radiological scoring system predicting mortality and severity. It is noted that clinical severity scores are superior to radiological scoring system due to the ease of use and economic viability. There is no significant advantage in performing a CT on admission. A CT can only be performed at physician's discretion when patient failed to respond to conservative management or falls into a high risk group of SAP.

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