ORIGINAL RESEARCH ARTICLE

Management of Acute Pancreatitis by Using Modified Computed Tomography Severity Index

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A B S T R A C T

Introduction: Acute Pancreatitis is an acute inflammatory process of the pancreas and significant cause of morbidity and mortality. Treatment of patients with acute pancreatitis is based on the initial assessment of disease severity. The aim of this present study is role of modified computed tomography severity index in assessment of acute pancreatitis and its correlation with clinical outcome.

Material and methods: This was a prospective study; a total of 53 patients with acute pancreatitis were included. The severity of pancreatitis was scored using modified CT severity index. All the data were analyzed by statistical software SPSS 20.0.

Results: Among 53 patients, 39 (73.6%) were males and 14(26.4%) were females. The mean age group was 44 years. The most common cause of pancreatitis in the study is chronic alcohol abuse in 32 patients (60.3%). Most of the patients were seen to fall in the grade 4 (28.3%) and minimum patients (11.3%) were seen in grade 2 category. Pseudocyst was seen in 17 patients (32.0%) and abscess was seen in 8 cases in our study (15.0%). Surgical treatment was done for 2 patients and radiological intervention was needed in 18 patients (33.9%). 2 were died due to severe acute pancreatitis.

Conclusion: The Modified CT Severity Index is a simpler scoring tool, which can help in identifying patients with acute pancreatitis that may develop complications and thus help in their management.

Key words: Acute pancreatitis, Modified Computed Tomography Severity Index, Radio diagnosis.

INTRODUCTION

Acute Pancreatitis is an acute inflammatory process of the pancreas caused by inappropriate intracellular activation of proteolytic enzymes with subsequent autodigestion of pancreatic parenchyma, interstitial fat necrosis and necrotising vasculitis. The inflammatory process may remain localized in the pancreas, spread to regional tissues, or even involve remote organ systems.[1] Acute pancreatitis is a significant cause of morbidity and mortality and is known to run an unpredictable course. Severe pancreatitis occurs in 20%–30% of all patients with acute pancreatitis and is characterized by a protracted clinical course, multiorgan failure and pancreatic necrosis. Individual laboratory indexes (markers of pancreatic injury, markers of inflammatory response), while promising, have not yet gained clinical acceptance. Numeric grading systems like RANSON and APACHE II are commonly used today as indicators of disease severity. While RANSON score cannot be used for the first 48 hrs, APACHE score is cumbersome to use.[2] However the imaging based scoring is found to be more relevant. Computed tomography severity index (CTSI) was introduced which combined CT grading and percentage of necrosis to obtain a number that correlates with risk of increased morbidity and risk of death and was found to be statistically relevant. CT severity index was used initially which was popularly called Balthazar scoring system, is based on pancreatic morphology, number of peri-pancreatic fluid collections and pancreatic necrosis.[3] Now Modified Computed Tomography Severity Index (MCTSI) has been introduced which differs from the Computed Tomography Severity Index (CTSI) by including the presence of extra pancreatic complications and grading the peripancreatic fluid collection in terms of presence or absence instead of the number of fluid collections. The grading of necrosis is also different in this system.[4] The purpose of this study is to assess, duration of ICU and hospital stay, local and systemic complication and need for intervention in patients with acute pancreatitis and correlate these parameters with the grade assigned to them using the modified CT severity index.

MATERIAL AND METHODS

This prospective study was carried out in MNR Medical College, Sangareddy during the period of June 2016 to July 2017. A total of 53 patients with acute pancreatitis detected on imaging were included in this study. This study was approved by the institutional ethical committee.

Inclusion criteria

All patients with clinical or USG features of Acute pancreatitis who undergo CECT abdomen and are shown to be positive for acute pancreatitis.

Exclusion criteria

1. Patients with chronic pancreatitis suggested by intraductal calculi, ductal stricture and parenchymal calcification on CT.
2. Patients with suspected pancreatitis in whom a CT examination is contraindicated (Example: pregnancy).
3. Patients with compromised renal function.
4. Patients with sensitivity to contrast agent (Allergic reactions).

All the patients referred to Department of Radiology, MNR Medical College and Hospital, Sangareddy for CECT abdomen with clinical or USG features of acute pancreatitis were evaluated with detailed clinical history and imaging. For evaluation of the Pancreas, plain and contrast enhanced CT scan was performed using 16 slice CT scanner (Siemens, Somatom Cardiac Sensation). Unenhanced CT scan images of the pancreas were acquired. Images were acquired starting from top of the diaphragm and covering entire abdomen and pelvis. After an informed written consent, 500 ml of oral contrast, 20-30 minutes before the examination and another 250ml just before the start of the scan was given. Iodinated Nonionic contrast (Iohexol or ultravist 350 mg/ml) of dose 1.5 ml /kg body weight was injected via intravenous route by means of a mechanical power injector at the rate of 3ml/sec followed by a 30 ml of saline chaser. To achieve optimum timing for various phases bolus tracking technique was be used. The region-of-interest cursor for bolus tracking was placed in the aorta at a level just above the diaphragmatic dome; this level was also used as a starting position for diagnostic scans. Real-time low dose (120 kVp, 50 mA) serial monitoring scans were initiated 5 seconds after the start of contrast medium injection. During this 5-second interval, patients were carefully observed for acute adverse events caused by the contrast medium injection. The trigger threshold level was set at the CT value of 100 HU at the lower thoracic aorta. Once the bolus-tracking program detects threshold enhancement by 100 HU in the lower thoracic aorta, the phases with respective time delays that were undertaken are as below:

Pancreatic parenchymal phase ~ 20s after the trigger.

Portal venous phase ~ 55 seconds after the trigger.

To evaluate the pancreas, real-time axial and multiplanar (coronal and sagittal) scrolling, maximum intensity projection techniques were used. Images were reconstructed with use of standard soft tissue (window width: 400 HU; level 40 HU) and Pancreas (window width 150 HU; level 50-80 HU) display settings. Using Modified CT severity index severity of pancreatitis, each patient was then categorized as mild, moderate and severe pancreatitis [4] [Table 1].Each patient is prospectively followed up for a minimum period of 4 months for complication of pancreatitis. Data were analyzed by statistical software SPSS 20.0.

Prognostic Indicator	Points
Pancreatic inflammation	
Normal pancreas	0
Intrinsic pancreatic abnormalities with or without inflammatory changes in peripancreatic fat	2
Pancreatic or peripancreatic fluid collection or peri-pancreatic fat necrosis	4
Pancreatic necrosis	
None	0
≤ 30%	2
> 30%	4
Extrapancreatic complications (one or more of pleural effusion, ascites, vascular complications, parenchymal complications, or gastrointestinal tract)	2

Table-1: Modified CT Severity Index

Ultrasound findings	Number of patients (n=53)	%
No abnormality detected	22	41.0
Direct evidence of pancreatitis	21	39.6
Abnormalities consistent with pancreatitis	10	18.8

Table-2: Ultrasound findings in patients with Acute Pancreatitis

CT grade	Number of patients (n=53)	%
2 and 4 (mild)	21	39.6
6 (moderate)	11	20.1
8 and 10 (severe)	21	39.6

Table-3: Distribution of CT grade when AP is classified as mild, moderate and severe

CT grade	ICU (days)	WARD (days)	Hospital stay in days
2 and 4	1.19±1.28	4.66±1.95	5.00±2.84
6	3.09±1.37	6.90±1.97	7.00±2.68
8 and10	8.15±3.04	8.15±3.19	13.30±4.79
P value	<0.0001	<0.0001	<0.0001

Table-4: Correlation of ICU stay, WARD stay and Total hospital stay in days with CT grade

Pseudocyst	Number of patients (n=53)	%
Absent	38	71.6
Present	15	28.3

Table-5: Patients developing pseudocyst as a consequence of Acute Pancreatitis

RESULTS

A total of 53 cases, 39 (73.6%) were males and 14(26.4%) were females [Figure1]. The mean age group was 44 years; most of the patients belong to the age group 31-40 years [Figure 2]. The most common cause of pancreatitis in the study is chronic alcohol abuse in 32 patients (60.3%). This was followed by cholelithiasis in 16 patients (30.1); 1case of each post ERCP, Post operative, hypercalcemia, pancreatic mass and idiopathic (1.8% each) [Figure 3]. In the ultrasound studies conducted on the patients with acute pancreatitis

Abscess	Number of patients (n=53)	%
Abscess absent	45	84.9
Abscess present	8	15.0

Table-6: Patients developing abscess in Acute Pancreatitis

Local complications	Number of patients (n=53)	%
No	36	67.9
Yes	17	32.1

Table-7: Development of local complications in Acute Pancreatitis

Systemic complications	Number of patients (n=53)	%
No	46	86.7
Yes	7	13.3

Table-8: Systemic complications in acute pancreatitis

Necrosis	Number of patients (n=53)	%
Absent	29	54.7
Present	24	45.3

Table-9: Patients developing necrosis in acute pancreatitis identified by CT

Intervention	Number of patients (n=53)	%
Pigtail aspiration	18	33.9
Necrostomy and debridement	2	3.7
Vascular intervention	1	1.8

Table-10: Patients who needed Intervention in AP

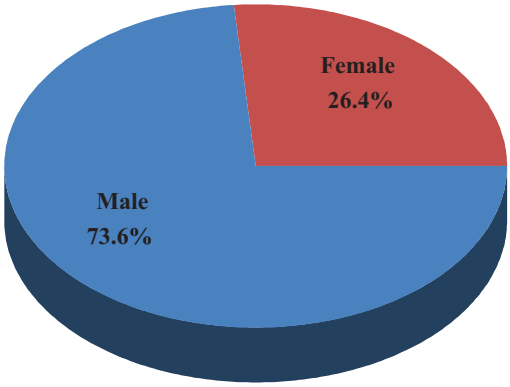

Figure-1: Gender distribution of patients with acute pancreatitis.

direct evidence of pancreatitis was seen in 21 patients (39.6%), no abnormality was detected in 22 (41%) of the patients [Table 2]. Most of the patients were seen to fall in the grade 4 (28.3%) and minimum patients (11.3%) were seen in grade 2 category [Table 3]. There is significant correlation (p< 0.0001) with duration of ICU stay and grade of pancreatitis too. Most of the patients needed ward stay ranging from 1 to 7 days (86.7%) and very few patients needed ward stay exceeding 14 days (1.8%) [Table4]. Pseudocyst was seen in

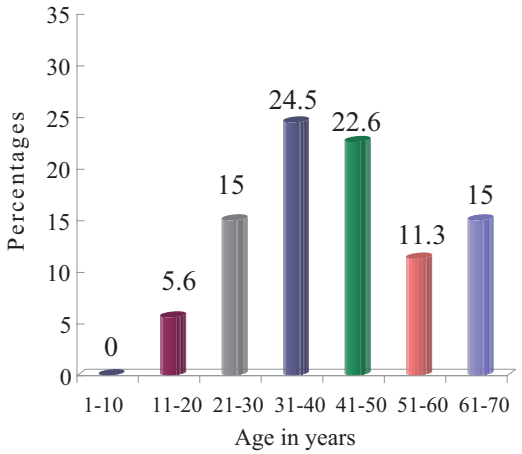

Figure-2: Age distribution of patients with acute pancreatitis

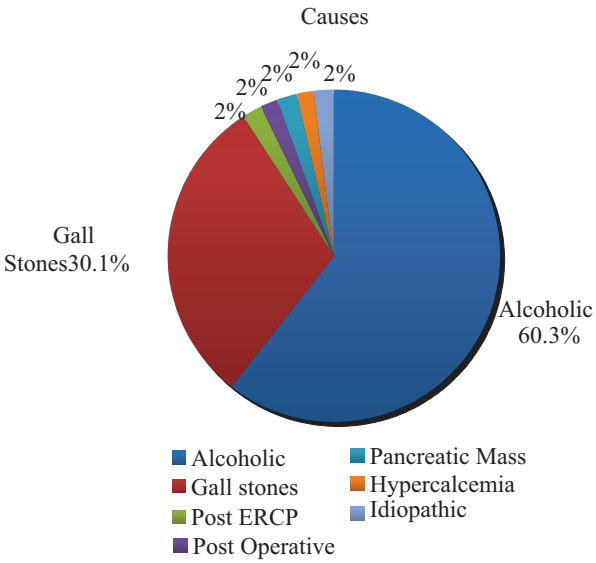

Figure-3: Distribution of cause in acute pancreatitis

17 patients (32.0%) [Table5]. Abscess was seen in 8 cases in our study (15.0%) [Table6]. The total percentage of patients developing local complications in the study was 32.1% [Table 7]. Systemic complication developed in 7 patients (13.3%) [Table8]. Pancreatic necrosis was identified in 24 patients (45.3%) and no necrosis was seen in 29 patients (54.7%) [Table9]. In our study intervention was needed in form of surgical debridement and necrostomy in 2 patients with grade 10 of AP. Radiological intervention was needed in 18 patients (33.9%) [Table10]. Two patients (3.7%) were died due to pancreatitis was observed in our study.

DISCUSSION

This was a Prospective study; the mean age of patients in the study was 44 years with maximum patients in the age group 31 to 40 years (24.5%). The next group with maximum patients was in the 41 to 50 years segment (22.6%). Out of 53 patients studied, 39 (73.6%) were males and 14(26.4%) were females. No association of age and gender was noted with severity of pancreatitis in our study. These observations was similar to study conducted by Lankish et al, on 602 patients of acute pancreatitis which showed no correlation between age, gender with severity of acute pancreatitis. The study also

showed the maximum incidence of acute pancreatitis in age group 31 to 40 years similar to our study.[5] The most common cause of pancreatitis in the study is chronic alcohol abuse in 32 patients (60.3%). In the ultrasound studies conducted on the patients with acute pancreatitis, direct evidence of pancreatitis was seen in 21 patients (39.6%), Features consistent with pancreatitis was seen in 10 patients (18.8%) in form of ascites, pleural effusion (unilateral / bilateral). No abnormality was detected in 22 (41%) of the patients. In the observation made by Balthazar et al abnormal ultrasound findings are seen in 33–90% of patients with acute pancreatitis.[6,7] Interstitial edema in acute pancreatitis is depicted on ultrasound as an enlarged hypoechoic gland. Thus the main role of ultrasound in the imaging of acute pancreatitis is limited to the detection of cholelithiasis and choledocholithiasis and identification of fluid collection. The CT grades were classified into 2, 4, 6, 8 and 10 according to the MCTSI. We further classified the grades into mild (grade 2 and 4), moderate (grade 6) and severe (grade 8 and 10). The previous studies by Bollen et al and Mortele et al have classified grade 2 as mild, grade 4 and 6 as moderate and grade 8 and 10 as severe.[4,7] The prognosis of patients with grade 2 and 4 pancreatitis was similar and milder than patients who had a grade of 6 as observed in our study, hence were grouped together in our study. The maximum patients were seen to fall in the grade 4 categories (28.3%) and minimum patients (11.3%) were seen in grade 2 category. Similarly most of the patients were of mild and severe CT grade (39.6% and 40% respectively) and minimum patients had a modearate grade (20.1%). According to other studies the morphologic severity of pancreatitis was graded as mild in 86 (44%), moderate in 75 (38%), and severe in 35 (18%) cases.[7,8,9] ICU admission was needed by 73% patients with pancreatitis. There was significant correlation between necessity of ICU admission and grade of pancreatitis. There is significant correlation (p< 0.0001) with duration of ICU stay and grade of pancreatitis too. Most of the patients needed ward stay ranging from 1 to 7 days (86.7%) and very few patients needed ward stay exceeding 14 days (1.8%). There was significant correlation (p<0.0001) between duration of ward stay and CT grading. Strong correlation (p<0.0001) was seen between patient's CT grade and total duration of hospital stay. Mean duration of stay was 5.0 days in mild, 7.0 days in moderate and 13.3 days in severe pancreatitis. Similar findings were reported by other authors, showed a significant correlation between MCTSI grade of pancreatitis and length of hospital stay. [4,10,11,12,13] The local complications identified in the study were pseudocysts and abscess formation. Higher CT grade is positively associated with presence of Psuedocyst (p<0.0081). Abscess was seen in 8 cases in our study (15.0%), one in moderate and 7 in severe grade pancreatitis. Higher CT grade is positively associated with presence of abscess (p<0.0140). Our findings were correlated with other studies which demonstrated; Maximum patients who developed psudocyst and abscess were in severe grade. [4,14,15,16] The total percentage of patients developing local complications in the study was 32.1%. Higher CT grade is positively associated with presence of local complications (p < 0.0001). Systemic complication developed in 7 patients (13.3%). The complications seen were respiratory failure, shock, renal failure and abdominal hemorrhage. Systemic complications were seen only in patients with a CT grade of 8 and 10 which showed a significant association (p<0.0111). Similar findings were reported by other researchers.[4,17,18,19] In our study intervention was needed in form of surgical debridement and necrostomy in 2 patients with grade 10 of acute pancreatitis. Radiological intervention was needed in 18 patients (33.9%), out of which on psuedocyst seen in mild pancreatitis (4.7%), 3 psuedocyst in moderate pancreatitis (27.7%) and 14 cases in severe pancreatitis(66.6%). Embolisation of gastroduodenal artery was needed in one patient with grade 10 AP. Thus patients who need an intervention have higher CT grades. Similar findings were reported by Bollen et al.,. [4] In our study pancreatic necrosis was identified in 24 patients (45.3%). No necrosis was seen in 29 patients (54.7%). A study by Bollen et al and Mortele et al identified necrosis in 18% and 15% of patients with acute pancreatitis respectively. [4,7] Mortality rate in our study was 3.7%. According to the study done by Bollen et al and Mortele et al. mortality was seen in 6% and 1.5% patients respectively.[4,7]

CONCLUSION

We conclude from our study that modified CT severity index can be used to predict the possibility of developing local and systemic complications and necessity of ICU admission and can predict the need for interventions.

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