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Evaluation of patients who are clinically suspected for the case of acute pancreatitis by MCTSI

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Abstract

AP can be diagnosed either by clinical, laboratory, or image findings. For an appropriate diagnosis of AP, at least two of the following criteria to be fulfilled. In majority of cases, the disease is self-limiting and presents with response to supportive treatment alone. The assessment of the severity of AP has a significant role in management. All male and female patients with complaints of abdominal pain (epigastric pain), vomiting with raised serum amylase & lipase levels and who underwent contrast enhanced MDCT during study period were study subjects. MDCT being a useful, non-invasive, accurate investigative tool in confirming the clinical diagnosis of acute pancreatitis and grading of AP as mild (grade 2 and grade 4), moderate (grade 6) and severe (grade 8 and 10) contrary to other previous studies which classified it into mild (grade 2), moderate (grade 4 and grade 6) and severe (grade 8 and 10) on the basis of MCTSI scoring index.

Keywords: Acute Pancreatitis, MCTSI, MDCT

Introduction

Acute Pancreatitis (AP) is a disease that is triggered by abnormal activation of proteolytic enzymes within the gland and the release of a number of inflammatory mediators (acute inflammation) [1-2]. It may manifest either as acute or chronic form [1]. Acute pancreatitis onset is abrupt in nature. Chronic Pancreatitis (CP) is an inflammatory process that develops progressively and deteriorates over time causing irreversible organ damage [1].

AP is a common medical condition requiring emergent care, but its incidence has been increasing globally over years. According to the global data, the incidence of AP has been reported to be much higher in USA, Finland, and Scotland (49.3, 46.6, and 41.9 per 100,000 populations, respectively). In addendum to this, frequency of AP has been tremendously increased since last decade in European countries and UK [3]. It is the single most frequent Gastrointestinal (GI) cause of hospital admissions globally [4].

AP is at times associated with a systemic inflammatory process, which may further worsen the function of other organs or systems. These inflammatory responses may further advance to necrosis of the pancreas or the surrounding fatty tissue which may subside/resolve or worsen to distant-organ damage. These series of events have been ranged in a broad way from mild to severe stage – mild (80%, where patients recover within a few days (<48 hours) of conservative treatment), severe (20%, with prolonged hospital stay, multi-organ failure, pancreatic necrosis with a 15–20% risk of death) [5].

Clinical considerations fail to identify about two thirds of patients and are a poor indicator of the severity of AP. By this kind of assessment, patients during the course of disease may develop severe complications [6].

So personalized laboratory tests (markers of pancreatic injury, markers of inflammatory response) are used, which may provide some potential effects in the evaluation, but have not been clinically acceptable yet [7].

Series of grading systems used as indicators to detect the disease severity earlier like RANSON'S score, APACHE score, CECT using Atlanta classification, Balthazar's CT Severity Index, Modified CTSI -

- While RANSON's score cannot be used for the first 48 hrs, APACHE score is cumbersome to use [8].
- The Atlanta classification distinguishes two forms from a clinical point of view,

including mild AP without any complications and severe pancreatitis characterized by systemic and local complications such as necrosis, pseudocysts, and distant organ failures [9].

- Later on, prognosis of patients was evaluated using Contrast Enhanced Computed Tomography (CECT) [10]
- Balthazar *et al.*, in 1990 introduced a new system of evaluation considering pancreatic parenchyma, peripancreatic fluid (in terms of number of collections & quantification), and adjacent organ inflammation with pancreatic necrosis [10].
- Modified Computed Tomography Severity Index (MCTSI) had been introduced in 2004, which unlike the Computed Tomography Severity Index (CTSI) includes the presence of extra-pancreatic complications, necrosis, and grading the peripancreatic fluid collection in terms of presence or absence instead of the number of fluid collections [11].

AP can be diagnosed either by clinical, laboratory, or image findings [2]. For an appropriate diagnosis of AP, at least two of the following criteria to be fulfilled [12]. In majority of cases, the disease is self-limiting and presents with response to supportive treatment alone [2]. The assessment of the severity of AP has a significant role in management. The primary goal of the treatment is to stabilize the patients hemodynamically by regular monitoring of vital signs, oxygen saturation, pain intensity level, intake and output, hematocrit, and Blood Urea Nitrogen (BUN) levels. Supportive care and curative interventions are the initial management strategies for AP [12].

AP has an overall low mortality of approximately 3%, and the risk of death increases with age, comorbidities, and severe disease. The risk of death was the highest among patients with both organ failure and infected necrosis. Proportional mortality has decreased over time, likely from better intensive and supportive care, clarity on optimal timing of interventions for complications (surgery, endoscopic, or percutaneous drainage), and increased detection of milder cases [4].

Methodology

All male and female patients with complaints of abdominal pain (epigastric pain), vomiting with raised serum amylase & lipase levels and who underwent contrast enhanced MDCT during study period were study subjects.

- Patient’s detailed clinical history was taken - history of alcohol intake, Location, type & duration of pain with associated clinical symptoms like vomiting/ fever.
- **Ultrasound examination:** Patients admitted with clinical suspicion of acute pancreatitis. Informed consent was taken from all the patients.
- **Patient’s preparation:** If feasible, patients were kept 4 - 6 hours fasting before the scan and were asked to drink water just before the scan for adequate visualization of the pancreas.
- **Patient’s position:** The patients were positioned in supine and sitting position for evaluation of pancreas.
- **Pancreas:** Size of the pancreas with echotexture, peripancreatic region was examined. The acquired images were stored in the memory of the system and retrieved from the system in CDs.

Results

Table 1: Distribution of CT grade in patients with AP

CT grade	Number of patients (n=50)	%
2	7	15.7
4	9	17.6
6	24	48.4
8	3	5.8
10	6	12.9

Table 2: ICU, Ward and Hospital stay (in days) in patients with acute pancreatitis

Hospital stay (days)	Number of patients (n=50)	%	Mean ± SD
ICU stay (days)			
Nil	24	48.7	3.71±8.96
1-7	21	41.0	
>7	5	10.3	
Ward stay (days)			
1-7	27	53.8	9.62±6.77
8-14	17	33.3	
>14	6	12.9	
Total hospital stay (days)			
1-7	19	38.5	13.33±14.76
8-14	21	41.1	
>14	10	20.5	

Table 3: Necessity of ICU admission in each grade

Grades	ICU admission needed (patients)	No ICU admission needed (Patients)	Percentage of patients needing ICU care
2	2	5	33.3
4	1	8	14.2
6	15	9	62.5
8	3	0	100
10	6	0	100

Table 4: Distribution of CT grade when AP is classified as mild, moderate and severe

CT grade	Number of patients (n=50)	%
2 & 4 (mild)	17	32
6 (moderate)	24	49
8 & 10 (severe)	9	19

Table 5: Accuracy of CT grading in predicting local complications

	Local complication absent	Local complication present	Total
CT grade moderate and severe (grades 6, 8 and 10)	25	24	49
CT grade mild (2 & 4)	13	0	13
Total	38	12	50

Sensitivity = 100%

Specificity = 42%

Positive predictive value = 33.9 % Negative predictive value = 100%

Discussion

On the basis of MCTSI, patients were divided into 2, 4, 6, 8 and 10 grades which were further classified as mild (grade 2

& 4), moderate (grade 6) and severe (grade 8 & 10). Few older studies have classified grade 2 as mild, grade 4 and 6 as moderate and grade 8 and 10 as severe. As the prognosis of patients with grade 2 and 4 pancreatitis was similar and milder than patients who had a grade of 6 in our observation, we have grouped grade 2 and 4 together.

In this study, 17 patients AP was mild and they fell in the group 2 & 4, 24 patients AP was moderate and the fell into the grade 6 and the remaining 9 had severe pancreatitis under grade 8 & 10.

The maximum patients were seen to fall in the grade 6 category (49%) and minimum patients (5.1%) were seen in grade 8 category. However, these results were contrary to studies done by Bolen *et al.* [13] and Mortelet *et al.* [14]. Which had maximum number of patients in mild category (43%) and next being the moderate (38.3%) and severe (33.2%) categories.

Total duration of hospital stay ICU stay

ICU admission criteria in our institution:

- When the patient is going into organ failure and requires mechanical support like ventilation, hemodialysis etc.
- When the serious patient condition is potentially reversible.
- Circumstances in which Patient requires continuous monitoring
- Emergency treatment has already been carried out (e.g. intubation and ventilation).

ICU admission was needed by 48% of patients with pancreatitis.

- Correlation between necessity of ICU admission and grade of pancreatitis: There was significant correlation between necessity of ICU admission and grade of pancreatitis. Patients with a mild grade needed ICU admission in an average of 33%, moderate grade needed admission in 62% and severe grade needed admission in 99% of patients.

Correlation with duration of ICU stay and grade of pancreatitis:

There is significant correlation with duration of ICU stay and grade of pancreatitis too. The most common overall duration of ICU stay was between 1 to 7 days. Patients with a mild grade had a mean duration of stay in ICU for 1.6 days, moderate grade had duration of stay of 3 days and with a severe grade of pancreatitis had duration of stay of 12 days.

Ward stay: Most of the patients needed ward stay ranging from 1 to 7 days (41%) and very few patients needed ward stay exceeding 14 days (10.3%). There was moderate correlation between duration of ward stay and CT grading.

Total duration of hospital stay: The most common segment of total duration of hospital stay was from 8 to 14 days (42%). Strong correlation was seen between patient's CT grade and total duration of hospital stay. Mean duration of stay was 7.2 days in mild, 11.7 days in moderate and 28.8 days in severe pancreatitis.

A study by Mortelet *et al.* [14] showed a significant correlation between MCTSI grade of acute pancreatitis and

length of hospital stay (5 days for mild pancreatitis, 10 days for moderate and 15 days for severe grades).

Local complications

Pseudocysts and abscess formation were the two local complications considered in this study.

- Pseudocyst was seen in 12 patients (21.6%) in our study.
- Abscess was detected in 1 patient (4%).

Again here the presence of local complications was positively associated with CT grading.

- No local complications were seen in patients with mild pancreatitis.
- About 34 % of patients with moderate pancreatitis.
- 46 % of patients with severe pancreatitis had developed local complications.

These findings were similar to the study by Gonzalez *et al.* according to whom the pseudocyst formation occurred in 50% of patients and a study by Bollen *et al.* [13] which demonstrated that development of local complications and need for intervention was significantly associated with grade of pancreatitis.

Conclusion

MCTSI is an indispensable tool for classifying the patients based on severity and to predict the clinical outcome as grading by modified CT severity index has a significant correlation with necessity of ICU admission, duration of ICU stay and total duration of hospital stay

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