Original Research Article

Computed Tomographic Evaluation for Acute Pancreatitis Diagnosis

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Abstract

Introduction: Pancreatitis is one of the most complicated and difficult to treat of all the abdominal ailments. The most prevalent diagnostic imaging modalities for pancreatic examination are USG and abdominal CT. In both diagnosing and displaying the extent, computed tomography (CT) is more accurate and sensitive than ultrasound (USG). The importance of determining the aetiology and severity of acute pancreatitis early on is critical for rapid treatment and thorough monitoring of patients with severe pancreatitis. **Materials and Methods:** This Hospital-based prospective study comprised of a total of 40 patients. Of 40 Cases of suspected acute pancreatitis referred to the department of Radio-diagnosis for contrast-enhanced computed tomography on the clinical suspicion/diagnosis of acute pancreatitis, altered biochemical parameters in favour of acute pancreatitis were included in this study. **Results**: The present study consisted of 40 patients who were suspected to havepancreatitis. The peak age of incidence was noted in 31-40 years. Etiology of pancreatitis in 23 cases (57.5%) gallstones and alcoholic comprising of 8 (20%). The contour of the pancreatic gland was irregular in 25 (62.5%) patients while in 15 (37.5%) it was regular.7 patients are normal and 33 patients had enlargement of the pancreas with focal enlargement seen in 14 patients (35%)while the 18 patients (47.5%) showed diffuse enlargement. The density of the pancreatic gland was normal in 4 (10.0%) patients; focally hypodense in 23 (57.5%) of patients, generalized hypodensities in 8 (20 %) patients, and the entire gland was distorted in 3 patients (7.5%). Organ failure, death seen in only severe category in revised Atlanta classification, moderate and severe category in modified Mortele CTSI, mild, moderate, severe category in Balthazar CTSI. **Conclusions**: In every case, a CT scan revealed the disease's exact morphological appearance. Using several CT numerical grading systems, CECT was particularly beneficial in staging acute pancreatitis.

Keywords: Abdominal computed tomography, Complications, Pancreatic diseases

Introduction

Pancreatitis is one of the most complicated and difficult to treat of all the abdominal ailments. The most prevalent diagnostic imaging modalities for pancreatic examination are USG and abdominal CT. In both diagnosing and displaying the extent, computed tomography (CT) is more accurate and sensitive than ultrasound (USG). The importance of determining the aetiology and severity of acute pancreatitis early on is critical for rapid treatment and thorough monitoring of patients with severe pancreatitis. Plain radiography, contrast studies, ultrasonography, endoscopic ultrasound, endoscopic retrograde cholangiopancreatography (ERCP), computed tomography (CT), and magnetic resonance imaging are all options for pancreas imaging. Because it is unaffected by bowel gas or huge body habitus, CT scan is the preferred non-invasive approach of pancreas examination[1,2,3]Between 10% and 20% of instances of acute pancreatitis are classified as severe. Treatment of individuals with acute pancreatitis dependent on the severity of the disease at the outset. A lengthy clinical course, multiorgan failure, and pancreatic necrosis are all symptoms of severe pancreatitis. Individual laboratory indexes (indicators of pancreatic injury, markers of inflammatory response) have yet to achieve clinical recognition, despite their promise. Now Modified Computed Tomography Severity Index (MCTSI) has been introduced which differs from the Computed Tomography Severity Index (CTSI) by including the presence of extrapancreatic complications and grading the peripancreatic fluid collection in terms of presence or absence instead of the number of fluid collections[4]. Aim of present study isto study the use of CT for the detection and evaluation of acute pancreatitis.

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Materials and methods

It was a prospective study conducted from November 2019 to March 2021, in the Department of Radio Diagnosis, Alameen Medical College, Bijapur, Karnataka. A total of 40 patients referred from the Department of Emergency Medicine with the chief complaint of epigastric pain, nausea and vomiting and CECT abdomen were suggestive of acute pancreatitis were included in this study.

All cases referred for CT scan with clinical suspicion of acute pancreatitis were included in this study. Patients were selected on the basis of clinical history, laboratory data suggestive of acute pancreatitis or findings of acute pancreatitis on other imaging modalities, especially ultrasounds scan. Each patient underwent a thorough clinical evaluation including a detailed history and physical examination. All the patients underwent routine baseline blood investigations, which, however, did not form a part of the study. All the study participants were made to undergo CECT scan as the radiologic examination after taking proper informed consent for the same.

Inclusion Criteria

Clinically suspected case of acute pancreatitis of all ages.

Exclusion criteria

Patients with chronic pancreatitis suggested by intraductal calculi, ductal stricture and parenchymal calcification, Other pancreatic pathology like pancreatic malignancy, cyst,previous pancreatic surgery, Contraindicated cases for contrast study, Postoperative cases and Pregnant females.

Assessment of severity of acute pancreatitis was done in all cases by Balthazar CTSI scoring[5] and Mortele Modified[6] CTSI scoring.

Method of data collection clinical diagnosis was based on the symptoms like upper abdominal pain, nausea, vomiting, fever and/or elevation of serum amylase three times the upper limit of normal (normal serum amylase 20-110 U/L).Data analysis was done using SPSS version 16.0 Data transformation by recoding, counting and cross tabulation was performed and obtained information was processed using Pearson chi-square and Fisher's-exact test.

Results

In our study, a total 40 patients were studied using CT scan, who were suspected to have acute pancreatitis

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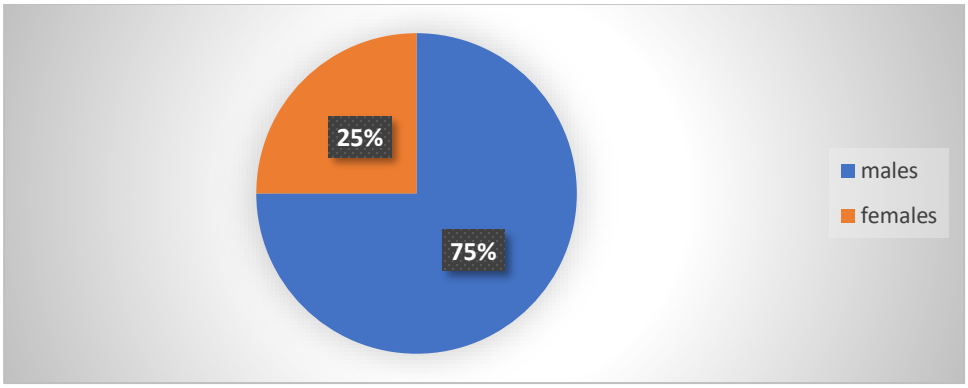

Fig 1: Gender distribution in study

Among 40 patients 30 (75%) were males and 10 (25%) were females.

Table 1: Age distribution in study

Age in years	Number of cases	Percentages
0-10	0	0
11-20	4	10
21-30	6	15
31-40	14	35
41-50	7	17.5
51-60	5	12.5
60 and above	4	10

Most of the patients in study belong to 31-40 years followed by 41-50 years.

Table 2: Aetiology of acute pancreatitis.

Causes	Number of cases	Percentages
Gall stones	23	57.5
Alcohol	8	20
Trauma	5	12.5
Drug induced	3	7.5
Idiopathic	1	2.5

40 patients 23(57.5%) gallstones and alcoholic comprising of 8 (20%) remaining patients were grouped as others which consisted of 8 patients.

Table 3: CT findings of acute pancreatitis

Findings	Number of cases	Percentages
Contour		
Regular	15	37.5
Irregular enlargement	25	62.5
Gland		
Normal	7	17.5
Diffuse enlargement	18	47.5
Focal enlargement	14	35
Density		
Isodense	6	15
Focal hypodensity	23	57.5
Generalized hypodensities	8	20
Distorted architecture	3	7.5
Necrosis		
<30	9	22.5
30-50	4	10
>50	4	10
Peripancreatic changes	24	60
Presence of gas/abscess	5	12.5
Phlegmonous changes	16	40
Pseudocyst formation	4	10
Ascites	25	62.5
Pleural effusion	24	60

The contour of the pancreatic gland was irregular in 25 (62.5%) patients while in 15 (37.5%) it was regular.7 patients are normal and 33 patients had enlargement of the pancreas with focal enlargement seen in 14 patients (35%)while the 18 patients (47.5%) showed diffuse enlargement. The

density of the pancreatic gland was normal in 4 (10.0%) patients; focally hypodense in 23 (57.5%) of patients, generalized hypodensities in 8 (20 %) patients, and the entire gland was distorted in 3 patients (7.5%). 16 of 40 patients (40%) showed peripancreatic fat stranding with or without phlegmonous changes.

Table 4: Grading severity of acute pancreatitis using Balthazar CTSI score.

Severity	Score	No. of patients	%
Mild	0-3	17	42.5
Moderate	4-6	10	25
Severe	7-10	13	32.5
Total		40	100

Majority of the cases were categorized as mild pancreatitis according Balthazar CTSI score.

Table 5: Grading severity of acute pancreatitis using modified Mortele CTSI.

Severity	Score	No. of Cases	%
Mild	0-2	9	22.5
Moderate	4-6	13	32.5
Severe	8-10	18	45
Total		40	100

Majority of the cases were categorized as severe pancreatitis using the Modified Mortele CTS score.

Table 6: Severity of acute pancreatitis according to revised Atlanta classification.

Severity	Total no. of cases	Organ failure	No. of death
Mild	35	0	0
Moderate	0	0	0
Severe	5	6	5

According to revised Atlanta classification majority of the cases were categorized as mild pancreatitis.

Table 7: Modified ctsi and revised atlanta classification (N=40).

Grading System	Severity	Organ Failure	No of death
Balthazar CTSI	Mild	1	
	Moderate	1	1
	Severe	4	4
Modified Mortele CTSI	Mild	0	0
	Moderate	1	1
	Severe	5	4
Revised Atlanta Classification	Mild	0	0
	Moderate	0	0
	Severe	6	5

Organ failure, death seen in only severe category in revised Atlanta classification, moderate and severe category in modified Mortele CTSI, mild, moderate, severe category in Balthazar CTSI.

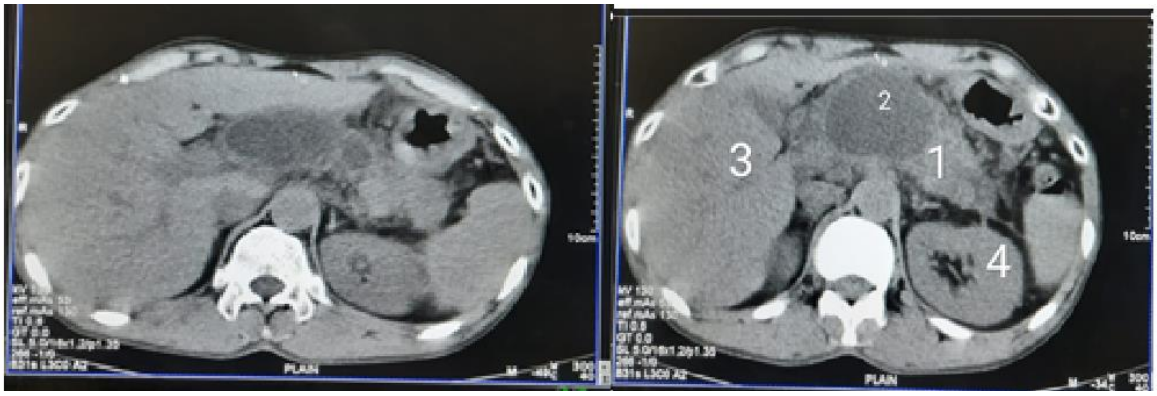

Fig 2: Acute pancreatitis with collections

1. Enlarged pancreas
2. Peripancreatic collection
3. Liver
4. Left Kidney

Discussion

Our study included 40 subjects who were suspected of having acute pancreatitis based on clinical examination and laboratory results and were referred for an abdominal CECT evaluation. We were able to achieve good contrast enhancement of the normal pancreas using non-ionic water-soluble contrast medium.

Among these 40 patients, 40 patients 30 (75%) were males and 10 (25%) were females. Thus, an increase in the percentage of males in the study could be attributed to alcoholism, which was the most common cause of pancreatitis which is coinciding with study done byBlock et al[7]., consisted of 61 (65.6%) males and 32 (34.4%) females with a male to female ratio of 2:1. Silverstein et al[8]., in his prospective study of 102 patients, also had a male to female ratio of 2:1

In present study highestincidence is seen in 31-40 years followed by 41-50 years. In U S Vinayaka et al[9] study peak age of incidence was noted in 30-40 years. This correlates with other studies 29-33 in which mean age was 38 years. In our study among 40 patients 23(57.5%) gallstones and alcoholic comprising of 8 (20%). In Sameer Raghuwanshi et al[10] study, most common aetiological factors were

cholelithiasis (42%) and alcoholism (38%) followed by idiopathic (24%), trauma (2%) and drug induced (2%). Casas et al[11]., in their study of 148 patients, found the cause of acute pancreatitis as gall stones in 57%, alcohol over indulgence in 21% and to both in 5% which is in concordance with the present study.The pancreatic gland contour was irregular in 25 (62.5%) of patients, while it was regular in 15 (37.5%). 7 (17.5%) individuals are normal, and 33 patients have pancreas enlargement, with focal enlargement found in 14 patients (35%) and diffuse enlargement seen in 18 patients (47.5%). The pancreatic gland density was normal in 4 (10.0%) of the patients, focally hypodense in 23 (57.5%), generalised hypodensities in 8 (20%) of the patients, and the distortedin 3 patients (7.5 percent). Peripancreatic inflammatory changes were the most common CT findings seen in 60% of the cases of acute pancreatitis. Mendez et al., found that out of 32 patients, 28 (87.5%) exhibited extrapancreatic spread of the inflammatory process.

In our study pancreatic gland was enlarged in 82% of cases, in Sameer Raghuwanshi et al[10] study pancreatic gland was enlarged in 60% cases. Silverstein et al., found enlargement of the pancreas in 68% of the cases as in this study[8].Necrosis occurred in 15 cases (37.5%) in this study, Sameer Raghuwanshi et al[10] study had Twenty-five patients (50%) had necrosis of the pancreas. Balthazar et al[5]., found that on the basis of initial assessment, pancreatic necrosis was detected in 22% of the patients .Using the currently accepted Balthazar CTSI, the severity of acute pancreatitis was graded as mild (score of 0-3) in 17 (42.5%) cases, moderate (score of 4-6) in 10 (25%) and severe (score of 7-10) in 13 (32.5%) patients. Using the modified CTSI scoring, maximum number 18 (45%) of the patients had severe (score of 8-10) pancreatitis. Mild (score of 0-2) and moderate (score of 4-6) pancreatitis were categorized in 9(22.5%) and 13 (32.5%) patients respectively. This was fairly similar to the study conducted by Sameer Raghuwanshi et al and Irshad Ahmad Banday et al[12]., where in when Balthazar CT Severity Index was employed, acute pancreatitis was graded as mild in 21/50 (42%), moderate in 12/50 (24%) and severe in 17/50 (34%) patients and 22/50 (44%), moderate in 11/50 (22%) and severe in 17/50 (34%) patients. Modified CT scoring system correctly predicted the outcome in all the patients who had a shift in their severity grades than Balthazar CTSI. The change in severity scoring was seen mainly due to the presence of extra pancreatic complication.

Results of our study were also found similar to a study conducted by Shivanand Melkundi et al[13]., which showed a significant correlation of grades of severity of acute pancreatitis based on MCTSI with patient outcome parameters than grades of severity of acute pancreatitis based on CTSI.Patient outcome using currently accepted Baltazar CTSI showed intervention and length of stay was more significantly associated with moderate grade. Infection, organ system failure and death were significantly associated with severe grade. Patient outcome in terms of organ failure and death is more accurately assessed by revised Atlanta classification in comparison with Balthazar and modified ct severity index. The revised classification seems to be a good predictor for clinical outcome of AP Shyu JY et al[14].

Conclusion

Computed Tomography is a good diagnostic tool for evaluating the severity of acute pancreatitis, detecting pancreatic necrosis, depicting local complications, and staging the severity of the inflammatory process. In comparison to the Balthazar index, the modified Mortele index scores demonstrated a greater association for all outcome metrics in all patients. For assessing patient mortality and organ failure, the revised Atlanta classification is more accurate than the modified Mortele index and the Balthazar severity index.

Conflict of Interest: Nil Source of support: Nil

References

1. Millar FH, Keppke AL, Balthazar EJ. Pancreatitis.In: Gore GM, Levine MS, eds. Textbook of gastrointestinal radiology, 3rd ed. Philadelphia,PA: Elsevier, 2008:1885–1915.
2. Bradley EL III. A clinically based classification system for acute pancreatitis: summary of the International Symposium on Acute Pancreatitis, Atlanta, GA 1992. Arch Surg 1993;128:586–590.
3. Nagar AB, Gorelick FS. Epidemiology and pathophysiology of acute pancreatitis. In:Forsmark CE, ed. Pancreatitis and its complications.Totowa, NJ: Humana, 2005:3–15.
4. Manfredi R, Brizi MG, Canade A, Vecchioli A, Marano P. Imaging of acute pancreatitis. Rays. 2001;26:135–42.
5. Balthazar EJ, Megibow AJ, et al. Acute pancreatitis: value of CT in establishing prognosis. Radiology. 1990;174(2):331–36.
6. Han J, Cho CM, Cho K, Kim KH, et al. Revised Atlanta classification of acute pancreatitis can predict clinical outcome better: a retrospective, multicenter study. Pancreatology. 2014;14(3):S32.
7. Block S, Maier W, Bittner R, Büchler M, Malfertheiner P, Beger HG. Identification of pancreas necrosis in severe acute pancreatitis: imaging procedures versus clinical staging. Gut. 1986;27(9):1035–42.
8. Silverstein W, Barkin J.Diagnostic imaging of acute pancreatitis: prospective study using CT and sonography. American Journal of Roentgenology. 1981; 137(3): 497–502.
9. Vinayaka US,Muralidhara KN. Contrast-enhanced Computed Tomographic Evaluation of Acute Pancreatitis: An Exploratory Study. Int J Sci Stud 2016;3(11):139-146.
10. Raghuwanshi S, Gupta R, Vyas MM, Sharma R. CT Evaluation of Acute Pancreatitis and its Prognostic Correlation with CT Severity Index. J Clin Diagn Res. 2016;10(6):TC06-TC11.
11. Casas JD, Mariscal A, Cuadras P. Prognostic value of CT in the early assessment of patients with acute pancreatitis. American Journal of Roentgenology. 2004;182(3):569–74.
12. Banday IA, Gattoo I, Khan AM, Javeed J, Gupta G, Latief M. Modified computed tomography severity index for evaluation of acute pancreatitis and its correlation with clinical outcome: a tertiary care hospital based observational study. JCDR. 2015; (9)(8):TC01.
13. Melkundi S, Anand N. Modified computed tomography severity index in acute pancreatitis. Journal of Evolution of Medical and Dental Sciences. 2014;3(74):15541–51.
14. Shyu JY, Sainani NI, Sahni VA, Chick JF, Chauhan NR, Conwell DL, et al. Necrotizing pancreatitis: diagnosis, imaging, and intervention. Radiographics. 2014;34(5):1218–39.