DOI: 10.7860/JCDR/2015/14824.6368

Original Article

Radiology Section

Modified Computed Tomography Severity Index for Evaluation of Acute Pancreatitis and its Correlation with Clinical Outcome: A Tertiary Care Hospital Based Observational Study

IRSHAD AHMAD BANDAY[1], IMRAN GATTOO[2], AZHER MAQBOOL KHAN[3], JASIMA JAVEED[4], GHANSHYAM GUPTA[5], MOHMAD LATIEF[6]

ABSTRACT

Background: Acute Pancreatitis is a very common condition leading to the emergency visits in both developed and developing countries. Computed Tomography plays a pivotal role in the diagnosis and subsequent management of pancreatitis. The modified CT severity index includes a simplified assessment of pancreatic inflammation and necrosis as well as an assessment of extra pancreatic complications.

Aim: To study role of modified computed tomography severity index in evaluation of acute pancreatitis and its correlation with clinical outcome.

Materials and Methods: This was a hospital based prospective correlative study done on patients of all age groups referred to the Department of Radio diagnosis from the various indoor and outdoor departments of the hospital, with clinical/Laboratory/ ultrasonography findings suggestive of acute pancreatitis. The severity of pancreatitis was scored using Modified CT severity index & CT severity index and classified into mild, moderate and severe categories. Total of 50 patients of acute pancreatitis presenting to the emergency department of our hospital were included in the study. Clinical outcome parameters for correlation collected from respective referral departments included, the length of hospital stay (in days), need for surgical intervention, need for percutaneous intervention (aspiration and drainage), evidence of infection in any organ system (combination of a fever > 100°F and elevated WBC >15,000/ mm^3), evidence of organ failure (PaO_2 < 60 mm Hg or need of ventilation, systolic BP of < 90 mm Hg, serum creatinine of >300µmoles/L or urine output of < 500 ml / 24 h) and death.

Results: The age of the patients in the study group was in the range of 17 to 80 years. Maximum patients were in the age group 40-50 years (42.0%). The mean age was 42.32 years. Out of 50 cases, 33 (66%) were male and 17 (34%) were females with a male to female ratio of 2:1. Cholelithiasis was found to be most common aetiological factor for acute pancreatitis in 40% cases. Alcoholic pancreatitis was seen in 36% of cases. Together cholelithiasis and alcoholism accounted for 76% of cases. Pleural effusion was the most common extra-pancreatic complication, 28 patients (56%), followed by ascites. Majority of patients were categorized as severe pancreatitis (44%). 38% patients were grouped into moderate pancreatitis and 18% were categorized in mild pancreatitis. The outcome parameters in terms of length of hospital stay, need of intervention, development of infection, and development of organ failure were more in patients with higher modified CT severity index.

Conclusion: In conclusion CECT was found to be an excellent imaging modality for diagnosis, establishing the extent of disease process and in grading its severity. The Modified CT Severity Index is a simpler scoring tool and more accurate than the Balthazar CT Severity Index. In this study, it had a stronger statistical correlation with the clinical outcome, be it the length of hospital stay, development of infection, occurrence of organ failure and overall mortality. It could also predict the need for interventional procedures.

Keywords: Cholecystitis, Pleural effusion, Pancreatitis

INTRODUCTION

Acute Pancreatitis is a common condition presenting as acute abdomen. This condition is broadly classified into two subtypes: one, oedematous or mild acute pancreatitis and two, a necrotizing or severe acute pancreatitis. The majority of patients have mild interstitial edematous pancreatitis (IOP) which is self-limiting. However 20% have severe acute pancreatitis (SAP) which can progress to a systemic inflammatory response syndrome (SIRS) and result in septic systemic complications with significant morbidity and mortality [1].

The most common causes of pancreatitis are choledocholithiasis and ethanol abuse. Other causes include trauma, metabolic disorders (hyperlipidemia, hypercalcemia), ERCP induced pancreatitis, medications (azathioprine, sulphonamides), tumours, and congenital anomalies such as pancreas divisum [2].

The pancreas is well-demonstrated in cross-section surrounded by fat in the average person. Normally, it has homogenous CT attenuation and is identified by its relationship to the superior mesenteric artery and the duodenum [3]. Peak enhancement of normal pancreatic parenchyma is about 50-80 Hounsfield Units (HU) [4,5].

Contrast Enhanced CT (CE-CT) is considered to be the gold standard imaging modality in the evaluation of patients with acute pancreatitis [6]. The role of imaging is not only to diagnose acute pancreatitis but to demonstrate the presence and extent of pancreatic necrosis and the complications of acute pancreatitis. Ideally, doing CECT after 48-72 hours of onset of an acute attack, increases the chances of picking the necrotising pancreatitis [7].

The CT imaging features of acute pancreatitis include focal or diffuse enlargement of the pancreas, peripancreatic fat stranding, peripancreatic fascial thickening and fluid collections [8].

CT has an overall accuracy of 87% and sensitivity and specificity of 100% in the detection of pancreatic necrosis [9].

CT results are better prognostic indicators than numeric systems owing to their greater sensitivity and specificity and CTSI is more sensitive, correlates better with the patient outcome than the APACHE II score and serum C-reactive protein [10,11].

Balthazar et al., introduced a grading system for acute pancreatitis based on an overall assessment of size, contour and density of the gland and peripancreatic abnormalities, to predict the severity of the disease [12]. Although necrotizing pancreatitis has higher incidence of complications (6% vs. 52%) and mortality (<1% vs. 23%) in contrast to oedematous pancreatitis, necrosis of the pancreas was not correlated with the clinical outcome in this grading system.

Balthazar again in 1990 validated the CT severity of acute pancreatitis (CT Severity Index) by combining his original grading system (1985) with the presence and extent of pancreatic necrosis [4,13]. This CT Severity Index was found to have a better prognostic accuracy than the earlier score but it, too, was found to have some limitations. First, the score obtained with the index did not incorporate the presence of organ failure [14] extra pancreatic parenchymal complications [15,16] or peripancreatic vascular complications [17] and their correlation with the final outcome. Secondly, as documented in some studies, inter-observer agreement for scoring the CT scans using the CT Severity Index was only moderate, with a reported agreement of approximately 75% [15,18]. The source of this variability possibly relates to the subjective and multiple categorization of the extent of pancreatic inflammation and necrosis.

In view of these limitations, a modified and simplified CT scoring system (MCTSI) was proposed by Mortele et al., which is easier to calculate & reproduce and correlates more closely with the patient outcome measures like the occurrence of infections, organ failure, the need for surgical or percutaneous intervention, the length of hospital stay, and death than the CT Severity Index [19].

The present study was conducted with the purpose of correlating MCTSI with clinical outcome in patients of acute pancreatitis.

AIM

The study was undertaken to determine the value of computed tomography evaluation in early diagnosis of acute pancreatitis and to evaluate the complications of acute pancreatitis using Modified computed tomography (CT) severity index and its correlation with clinical outcome.

MATERIALS AND METHODS

This was a hospital based prospective correlative study done in Postgraduate Department of Radiodiagnosis and Imaging, Government Medical College, Jammu, for a period of one year from November 2012 to October 2013 on patients of all age groups referred to the Department of Radio diagnosis, from the various indoor and outdoor departments of the hospital, with clinical/Laboratory/ultrasonography findings suggestive of acute pancreatitis.

Participants

Fifty patients of acute pancreatitis who presented to the emergency department as acute abdomen were included in the study. Informed and written consent was taken from all the participants.

Diagnostic criteria

Presence of at least two of the following:

1. Acute abdominal pain and tenderness suggestive of pancreatitis.
2. Serum amylase/lipase ≥ 3 times the normal.
3. Imaging findings (USG and/or CT) suggestive of acute pancreatitis.

Inclusion Criteria

All referred patients with clinical/laboratory/ultrasonography diagnosis of acute pancreatitis, who were willing to undergo Contrast enhanced computed tomography.

Exclusion Criteria

1. Patients not willing to undergo Contrast study.
2. Patients with known history of allergy to iodinated contrast agents.
3. Patients with deranged Renal function test (serum creatitine> 1.5 mg/dl after rehydration).
4. Pregnant Patients.

The clinical details recorded were demographic data, detailed clinical history with presenting symptoms like pain abdomen, nausea, vomiting, and fever with duration, physical examination (local and systemic) including pulse rate, blood pressure, respiratory rate, temperature and icterus and any history suggestive of possible aetiology such as gallstone disease, alcohol abuse, trauma to abdomen, drug intake, metabolic disorder or any recent surgical intervention or procedure.

All patients were detailed about the purpose of study. A brief account of the procedure was explained to the patient with emphasis on reassuring the patient prior to the procedure. Informed and written consent was taken from the patient in writing both in English and Vernacular. Imaging was done by GE Medical Systems single slice spiral CT, Siemiens Somatom Spirit Dual slice spiral CT scan and Siemiens Somatom multi detector (128 slice) spiral CT scan with 120 KVp and 150-350mAs. Plain and post-contrast series of the abdomen and pelvis were taken. It consisted of acquisition of contagious axial sections, of thickness 5mm, interval of 5mm and large FOV in cranio-caudal direction from the level of the xiphisternum to pubic symphisis before and after administration of oral (10-20ml water soluble contrast in 500-1000ml distilled water) and intravenous non-ionic iodinated contrast of 1.5-2ml/kg dose @ 3-4ml/s. All images were viewed in a range of soft tissue window settings. Images were reformatted in sagittal and coronal planes for analysis.

Assessment of Severity of Acute Pancreatitis

The severity of pancreatitis was scored using CT severity index & Modified CT severity index [Table/Fig-1,2] and classified into mild, moderate and severe categories.

Prognostic Indicator	Points
Normal pancreas	0
Focal or diffuse enlargement of pancreas	1
Intrinsic pancreatic abnormalties with inflammatory changes in peripancreatic fat	2
Single, ill defined fluid collection or phlegmon	3
Two or more poorly defined collections or presence of gas in or adjacent to the pancreas	4
Extent of pancreatic inflammation was assigned points from 0-4. The presence and extent of necrosis was classified into four categories and awarded points from 0-6.	

Necrosis	Points
None	0
≤30%	2
30-50%	4
≥50%	6
The Balthazar CTSI was calculated by adding the above points in each case and the total score was then categorized as: Mild Pancreatitis CTSI Score 0-3 Moderate Pancreatitis CTSI Score 4-6 Severe Pancreatitis CTSI Score 7-10	

[Table/Fig-1]: Balthazar CTSI Scoring (1990)

Prognostic Indicator		Points
Pancreatic Inflammation	Normal pancreas	0
	Intrinsic pancreatic abnormalties with or without inflammatory changes in peripancreatic fat.	2
	Pancreatic or peripancreatic fluid collection or peripancreatic fat necrosis	4
Pancreatic Necrosis	None	0
	≤ 30%	2
	≥ 30%	4
Extra Pancreatic Complications	One or more of following: Pleural Effusion, ascites, vascular complications, parenchymal complications, or gastrointestinal tract involvement.	2

[Table/Fig-2]: Mortele Modified CTSI Scoring (2004)

The modified CTSI was calculated by summing these values and acute pancreatitis was then categorized as:

Mild Pancreatitis Modified CTSI score 0-2

Moderate Pancreatitis Modified CTSI score 4-6

Severe Pancreatitis Modified CTSI score 8-10

Clinical Outcome Parameters

Clinical outcome parameters for correlation collected from respective referral departments included, the length of hospital stay (in days), need for surgical intervention, need for percutaneous intervention (aspiration and drainage), evidence of infection in any organ system (combination of a fever > 100°F and elevated WBC >15,000/ mm^3), evidence of organ failure (PaO2 < 60 mm Hg or need of ventilation, systolic BP of < 90 mm Hg, serum creatinine of >300µmoles / L or urine output of < 500 ml / 24 h) and death.

RESULTS

The age of the patients in the study group was in the range of 17 to 80 years. Maximum patients were in the age group 40-50 years (42.0%). The mean age was 42.32 years. Out of 50 cases, 33(66%) were male and 17(34%) were females with a male to female ratio of 2:1.

Cause	No. of Cases	%	No of Male Patients	% of total	No of Female Patients	% of total
Cholelithiasis	20	40	8	16	12	24
Alcohol	18	36	18	36	0	6
Trauma	1	2	1	2	0	0
Post ERCP	2	4	0	0	2	4
Idiopathic	14	28	9	18	5	10

[Table/Fig-3]: Aetiological Distribution of Acute Pancreatitis

Cholelithiasis was found to be most common aetiological factor for acute pancreatitis in 40% cases. Alcoholic pancreatitis was seen in 36% of cases. Together cholelithiasis and alcoholism accounted for 76% of cases. Aetiology was more than one in some cases [Table/Fig-3].

In males, alcohol was found to be most common aetiological agent accounting for 54.54% of cases. In females, cholelithiasis was found to be most common aetiological agent accounting for 70.58% of cases. In our study epigastric pain was present in all the patients. Triad of epigastric pain, nausea and vomiting was present in 75% of patients. Jaundice was noted in only in 1 case.

Extra-Pancreatic Complications

In our study pleural effusion was the most common extra-pancreatic complication, 28 patients (56%). Left pleural effusion was more common than the right, and in none of the cases, isolated right sided pleural effusion was found. Ascites was the second most common complication seen in 18 patients (36%). Among vascular complications, venous thrombosis was the most common (3 in portal vein and 1 in splenic vein). Two cases of pseudoaneurysm were found, both in splenic artery [Table/Fig-4]. More than one complication was present in few cases.

Finding(s)		No. of Cases	Percentage (%)
Pleural effusion	Left only	16	32
	Right only	0	0
	Bilateral	12	24
	Total	28	56
Ascites		18	36
Extra-pancreatic parenchymal abnormality	Infarction	1	2
	Haemorrhage	0	0
	Subcapsular collection	5	10
Vascular complication	Venous Thrombosis	4	8
	Pseudoaneurysm	2	4
GI Involvement		13	26

[Table/Fig-4]: Extrapancreatic Complications in Patients of Acute Pancreatitis

MCTSI Score	No. of cases	Percentage (%)
0	1	2
2	8	16
4	7	14
6	12	24
8	11	22
10	11	22
Total	50	100

[Table/Fig-5]: Distribution of Modified CTSI Scores in the Subjects

Majority of patients were categorized as severe pancreatitis (44%). 38% patients were grouped into moderate pancreatitis and 18% were categorized in mild pancreatitis [Table/Fig-5].

Grading	No. of cases according to CTSI	No. of cases according to MCTSI
Mild	22	9
Moderate	11	19
Severe	17	22

[Table/Fig-6]: Gradation of Acute Pancreatitis Employing Balthazar CTSI and Modified CTSI

Majority of patients had mild pancreatitis according to CT Severity Index. However, according to Modified CT Severity Index, majority were categorized as severe pancreatitis. The Spearman rank correlation between CT Severity Index and Modified CT Severity Index was +0.815 with significance value of 0.01 [Table/Fig-6].

Outcome Factor	Modified CT Severity Index		
	Mild	Moderate	Severe
No. of Patients	9	19	22
Avg. length of hospital stay in days	1.5	6.9	14.2
Intervention	0	2	8
Infection	0	1	9
Organ Failure	0	1	7
Death	0	0	2

[Table/Fig-7]: Modified CT Severity Index and Patient Outcome

When the Modified CT Severity Index was applied, the average duration of hospital stay in patients categorized as mild pancreatitis was 1.5 days, in moderate pancreatitis 6.9 days and in severe pancreatitis 14.2 days [Table/Fig-7]. None of the patients categorized as mild pancreatitis had an adverse or fatal outcome.

The majority (80%) of patients requiring interventional procedure fell in the severe pancreatitis group. Likewise, 9 out of 10 patients who developed infection and 7 out of 8 patients who developed organ failure belonged to this group. Mortality was also only reported in this group.

DISCUSSION

The most common CT findings observed in the series were peri-pancreatic inflammatory changes. Forty-four (88%) patients had this finding. Parenchymal changes in the pancreas included diffuse or focal enlargement of pancreas in 29 (58%), contour irregularity in 41 (82%) and non-homogenous attenuation of pancreas in 34 (68%) patients. However, a normal pancreas was found only in 1 patient (2%). In contrast, Balthazar et al., reported normal appearance of pancreas in 10% patients [4].

The most common extrapancreatic complication in the study group was pleural effusion. This was found in 28 (56%) patients. Left sided pleural effusion was more common. None of the patients had an isolated right sided pleural effusion. This observation tallies with Mortele et al., who also found that the commonest extrapancreatic abnormality was left pleural effusion [19].

CT Grading of Severity of Pancreatitis

In this series, when Balthazar CT Severity Index was employed, acute pancreatitis was graded as mild in 22/50 (44%), moderate in 11/50 (22%) and severe in 17/50 (34%) patients. In contrast, when using the Modified CT Severity Index, a much larger number, viz. 22/50 (44%) patients were placed in the severe pancreatitis group and 9/50 (18%),19/50 (38%) patients as mild and moderate pancreatitis. The Balthazar CT Severity Index graded 22 (44%) patients into the mild group while the Modified CT Severity Index, only considered 9 (18%) of these patients to be in this group.

The Balthazar CT Severity Index graded 17 (34%) patients into severe pancreatitis while the Modified CT Severity Index graded 22 (44%) patients in the like manner. This increase was due to the upgradation of 6 patients with extrapancreatic complications into the severe group under the Modified CT Severity Index, and downgrading of 1 patient of the severe group in Balthazar CT Severity Index to the moderate grade under the Modified CT Severity Index.

Correlation of CT Scoring Indexes With patient Outcome Parameters

Our study showed a significant correlation of grades of severity of pancreatitis based on both MCTSI and CTSI with patient outcome parameters. However, MCTSI was more closely associated with patient outcome than CTSI in our study. Several studies reported a strong correlation between the CT evaluation and the clinical severity of acute pancreatitis [14,20,21] and some studies have not corroborated these findings [22-24].

This difference in statistical significance between CTSI and MCTSI in our study may be attributed to the inclusion of extrapancreatic complications in the MCTSI system.

Similar study was done by Mortele et al., [19]. In his study, when applying the modified index, the severity of pancreatitis and the following parameters correlated more closely than when the previously established CTSI was applied: the length of the hospital stay, the need for surgical or percutaneous procedures, and the occurrence of infection. Significant correlation between the severity of pancreatitis and the development of organ failure was seen only using the MCTSI ($p = 0.0024$), not the CTSI ($p = 0.0513$). Our study resulted in almost similar findings.

In contrary to our study results, Bollen et al., showed no statistically significant differences between the two CT scoring systems with regard to all the studied severity parameters [24]. The differences observed may be due to differences in criteria for organ failure and clinically severe AP (the present study used criteria in accordance with the Marshall criteria of end organ failure).

In our study, for the MCTSI and CTSI to detect severe pancreatitis, sensitivity was 40% vs. 34%, negative predictive value was 67% vs. 56% respectively, specificity and positive predictive value of 100% for both indexes. Hence, MCTSI is more useful for the screening in patients with severe acute pancreatitis than CTSI. Jauregui et al., found similar results, stating that for the MCTSI and CTSI, to detect severe pancreatitis, sensitivity was 61% vs. 38%, specificity 66% vs. 100% and positive predictive value of 81% vs. 100%, respectively [25].

It was observed in our study that no significant association exists in different subgroups of necrosis when using the CT severity index (between patients who have 30–50% necrosis and patients who have more than 50% necrosis) and clinical outcome. Similar results were seen by Balthazar et al., and Lecesne et al., [4,18]. This is an important limitation of the CTSI as it is cumbersome and technically difficult to quantify the necrosis as 30-50% or above 50%. This limitation is not observed in MCTSI as patients having more than 30% necrosis are grouped together and assigned 4 points.

CONCLUSION

In conclusion CECT was found to be an excellent imaging modality for diagnosis, establishing the extent of disease process and in grading its severity. The Modified CT Severity Index is a simpler scoring tool and more accurate than the Balthazar CT Severity Index. In this study, it had a stronger statistical correlation with the clinical outcome, be it the length of hospital stay, development of infection, occurrence of organ failure, and overall mortality. It could also predict the need for interventional procedures.

ACKNOWLEDGMENT

The authors want to Thank the patients who consented for their participation in the study.

REFERENCES

[1] Whitcomb DC. Clinical practice. Acute pancreatitis. *N Engl J Med*. 2006;354(20):2142-50.
[2] Lin A, Feller ER. Pancreatic carcinoma as a cause of unexplained pancreatitis: Report of ten cases. *Ann intern Med*. 1990;113:166-67.
[3] Redman HC. Standard Radiological Diagnosis and CT scanning in pancreatic cancer. *Cancer*. 1981;47:1656-61.
[4] Balthazar EJ, Robinson DL, Megibow AJ, et al. Acute pancreatitis: value of CT in establishing prognosis. *Radiology*. 1990;174(2):331-36.
[5] Shankar S, van Sonnenberg E, Silverman SG, et al. Imaging and percutaneous management of acute complicated pancreatitis. *Cardio vasc Intervent Radiol*. 2004;27(6):567-80.
[6] Banks PA, Freeman ML. Practice guidelines in acute pancreatitis. *Am J Gastroenterol*. 2006;101(10):2379-400.
[7] Isenmann R, Buchler M, Uh IW, et al. Pancreatic necrosis: an early Finding in severe acute pancreatitis. *Pancreas*. 1993;8(3):358-61.
[8] Paspulati RM. Multidetector CT of pancreas. *Radiology clinics of North America*. 2005;43:999-1020.
[9] Yassa NA, Agostini JT, Ralls PW. Accuracy of CT in estimating extent of pancreatic necrosis. *Clinical imaging*. 1997;21:407-10.
[10] Alhajeri A, Erwin S. Acute pancreatitis: value and impact of CT severity index. *Abdom Imaging*. 2008;33:18-20.
[11] Bastera G, Alvarez M, Marcaide A, et al Acute pancreatitis: Evaluation of the prognostic criteria of latest Balthazar tomographic classification. *Rev EspEnferm Dig*. 1999;91:433-38.
[12] Balthazar EJ, Ranson JH, Naidich DP, et al. Acute pancreatitis: prognostic value of CT. *Radiology*. 1985;156(3):767-72.
[13] Balthazar EJ, Freeny PC, Van Sonnenberg E. Imaging and intervention in acute pancreatitis. *Radiology*. 1994;193(2):297–306.
[14] Lankisch PG, Struckmann K, Assmus C, et al. Do we need a computed tomography examination in all patients with acute pancreatitis within 72 h after admission to hospital for the detection of pancreatic necrosis? *Scand J Gastroenterol*. 2001;36(4):432-36.
[15] Mortele KJ, Mergo P, Taylor H, et al. Renal and perirenal space involvement in acute pancreatitis: state-of-the-art spiral CT findings. *Abdom Imaging*. 2000;25:272–78.
[16] Wiesner W, Studler U, Kocher T, et al. Colonic involvement in non-necrotizing acute pancreatitis: correlation of CT findings with the clinical course of affected patients. *Eur Radiol*. 2003;13:897–902.

[17] Chamisa I, Mokoena T, Luvhengo TE. Changing Pattern of Incidence, Aaetiology and Mortality from Acute Pancreatitis at Kalafong Hospital, Pretoria, South Africa, 1988-2007: A Retrospective Evaluation. *East and Central African Journal of Surgery.* 2010;15 (1):35-39.
[18] Lecesne R, Tourel P, Bret PM, et al. Acute pancreatitis: interobserver agreement and correlation of CT and MR cholangiopancreatography with outcome. *Radiology.* 1999;211(3):727–35.
[19] Mortele KJ, Mergo PJ, Taylor HM, et al. Peripancreatic vascular abnormalities complicating acute pancreatitis: contrast-enhanced helical CT findings. *Eur J Radiol.* 2004;52(1):67-72.
[20] Triantopoulou C, Lytras D, Maniatis P, et al. Computed tomography versus Acute Physiology and Chronic Health Evaluation II score in predicting severity of acute pancreatitis: a prospective, comparative study with statistical evaluation. *Pancreas*. 2007;35(3):238-42.
[21] Thomas BL, Singh VK, Maurer R, et al. Comparative evaluation of the modified CT severity index and CT severity index in assessing severity of acute pancreatitis. *AJR.* 2011;197:386–92.
[22] De Waele JJ, Delrue L, Hoste EA, et al. Extrapancreatic inflammation on abdominal computed tomography as an early predictor of disease severity in acute pancreatitis: evaluation of a new scoring system. *Pancreas.* 2007;34(2):185-90.
[23] Knoepfli AS, Kinkel K, Berney T, et al. Prospective study of 310 patients: can early CT predict the severity of acute pancreatitis? *Abdom Imaging*. 2007;32(1):111-15.
[24] Munoz-Bongrand N, Panis Y, Soyer P, et al. Serial computed tomography is rarely necessary in patients with acute pancreatitis: a prospective study in 102 patients. *J Am Coll Surg*. 2001;193(2):146-52.
[25] Ju S, Chen F, Liu S, Zheng K, et al. Value of CT and clinical criteria in assessment of patients with acute pancreatitis. *Eur J Radiol*. 2006;57(1):102-07.

PARTICULARS OF CONTRIBUTORS:
1. Resident, Post Graduate, Department of Radiodiagnosis, Government Medical College Jammu, J&K, India.
2. Registrar, Post Graduate, Department of Paediatrics, Government Medical College Srinagar, J&K, India.
3. Registrar, Department of Radiodiagnosis, SKIMS, Srinagar, J&K, India.
4. Resident, Government Medical College Srinagar, J&K, India.
5. Professor and Head, Post Graduate Department of Radiodiagnosis, Government Medical College Jammu, India.
6. Resident, Government Medical College Srinagar, J&K, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Imran Gattoo,
Registrar, Department of Pediatrics, Government Medical College Srinagar, J&K-190008, India.
E-mail: immz24@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **May 08, 2015**
Date of Peer Review: **Jun 23, 2015**
Date of Acceptance: **Jul 08, 2015**
Date of Publishing: **Aug 01, 2015**