ORIGINAL ARTICLE

PROSPECTIVE STUDY OF CT IN ACUTE PANCREATITIS AND ITS COMPLICATIONS

Shivanand S. Melkundi[1], Shrishail Patil[2], Mahesh[3], Govinda Raju B. T[4]

ABSTRACT: Visualization of the pancreas was far better by CT than by ultrasound. Ultrasound had certain limitation. Due to bowel gas the pancreas may not be visualized. Extra pancreatic spread of inflammation and vascular complications was not always picked up by Ultrasonography. These limitations were overcome with the use of CT which yielded more diagnostic information in the evaluation of acute pancreatitis. CT is a confirmative investigation in diagnosis and staging of acute pancreatitis. MCTSI is a very useful tool for the screening of patients with acute pancreatitis for the classification of severity accurately and to predict the clinical outcome. **OBJECTIVES OF STUDY:** To determine the value of computed tomography in evaluation of early diagnosis of acute pancreatitis. To evaluate the complications using computed tomography severity index. **MATERIAL AND METHODS:** The study was conducted on 100 patients with clinical suspicion of acute pancreatitis, altered biochemical parameters (Serum amylase, Serum lipase) in favor of acute pancreatitis, ultrasonography suggestive of acute pancreatitis and complications known case of chronic pancreatitis with features of acute symptoms who were referred to the department of Radiodiagnosis, Basaveshwar teaching & General Hospital, Kalaburagi. Before evaluating a patient by CT imaging, informed consent was obtained from the patient or guardian. The patient were informed about the radiation exposure in the examination. CT was carried out using Philips 6 slice scanner. Scan was obtained with both plain and contrast study. **RESULT:** 100 patients were included in the study. 83% patients were males and 17% patients were females. Majority of patients belonged to 31-40 yrs. of age group. Alcohol was the most common cause of acute pancreatitis. 73 patients had positive ultrasound finding while CT was positive in all cases. According to, MCTSI 63 patients had moderate, 26 patients had mild and 11 patients had severe pancreatitis.

KEYWORDS: Acute pancreatitis, Computed Tomography, Modified CT severity index.

INTRODUCTION: Visualization of the pancreas was far better by CT than by ultrasound. Ultrasound had certain limitation. Due to bowel gas the pancreas may not be visualized. Extra pancreatic spread of inflammation and vascular complications was not always picked up by Ultrasonography. These limitations were overcome with the use of CT which yielded more diagnostic information in the evaluation of acute pancreatitis. CT is a confirmative investigation in diagnosis and staging of acute pancreatitis.

MCTSI is a very useful tool for the screening of patients with acute pancreatitis for the classification of severity accurately and to predict the clinical outcome.

OBJECTIVES OF STUDY:
1. To determine the value of computed tomography in evaluation of early diagnosis of acute pancreatitis.
2. To evaluate the complications using computed tomography severity index.

ORIGINAL ARTICLE

METHODOLOGY: The study was conducted on a 100 sample patients (By random sampling technique 100 samples were selected) with clinical suspicion of acute pancreatitis, altered biochemical parameters (Serum amylase, Serum lipase) in favor of acute pancreatitis, Ultrasonography suggestive of acute pancreatitis and complications, known case of chronic pancreatitis with features of acute symptoms who were referred to the department of Radiodiagnosis, Basaveshwar Hospital.

Inclusion Criteria:
1. All the patients who are suspected of acute pancreatitis based on clinical and laboratory findings (Serum amylase & Serum lipase).
2. Patients who are diagnosed acute pancreatitis on ultrasonography.
3. Patients who present as acute on chronic pancreatitis.

Exclusion Criteria:
1. Congenital pancreatic lesion.
2. Pancreatic carcinoma and metastasis.
3. Traumatic injury to pancreas.
4. Simple cyst of pancreas.

Technique: All patients were called with at least 6 hours of fasting before the scan. A written consent was obtained from each patient after explaining the possibility of contrast reaction. Oral contrast (1 ampoule (20m1) of omnipaque 76% diluted in 1 liter of water) 600-800ml was administered to the patient 45 minutes prior to the scan. 5ml test dose was given 10mins before starting the scan.

The patient was placed on the gantry table in the supine position with both arms above the head. Non-enhanced 5mm sections were obtained throughout the abdomen. Contrast scans were obtained by injecting non-ionic contrast 60ml to 80ml at a rate of 3ml per second using a pressure injector via an 18G cannula placed in the antecubital vein.

SCANNING PARAMETERS:
- Position: Supine Scanner Settings KVP 120 MAS 200.
- Collimation: 6x3mm.
- Table speed: 12 mm/sec.
- Pitch: 0.90.
- Exposure time: 30seconds.
- Reconstruction interval: 1.5mm.
- Matrix size: 512 x 512.
- Superior extent: dome of diaphragm.
- Inferior extent: Kidney.
- I.V contrast: 60 to 80ml of non-ionic contrast injected I.V @ 3min/sec through 18G cannula placed in the median cubital vein.
- Scan delay: from star of injection 30-40 seconds for phase 1 60-70 seconds for phase 2.

All images were stored in memory and were reviewed on the console and on hard Copy. Multi planar reconstructions were performed where ever applicable.

ORIGINAL ARTICLE

RESULTS: The study of "Computed tomographic Evaluation of Acute Pancreatitis and its complications" was conducted in Department of Radio-diagnosis, M.R.M.C. Medical College, Basaweshwar hospital, Gulbarga:

- 100 patients were included in the study.
- 83% patients were males and 17% patients were females.
- Majority of patients belonged to 31-40 yrs. of age group total of 28 and least patients belonged to 11-20 yrs. of age group total of 7.
- Mean age ± SD: 41.25±14.17.
- Alcohol was the most common cause of acute pancreatitis in 65 patients.
- The accuracy and sensitivity of serum amylase and lipase in diagnosing AP is 77%. While CT showed 100% accuracy and sensitivity.
- 73 patients had positive ultrasound finding while CT was positive in all cases.
- 12 patients had pseudocyst.
- According to, CTSI 48 patients had mild, 41 patients had moderate and 11 patients had severe pancreatitis.
- According to, MCTSI 63 patients had moderate, 26 patients had mild and 11 patients had severe pancreatitis.
- Pancreatic inflammation was seen in all patients, 52 patients were given 2 points and 48 patients were given 4 points.
- 82 patients had no evidence of necrosis while 18 patients had necrosis out of which 7 patients had necrosis ≤30% while 11patients had necrosis >30%
- GIT complications was the most common extrapancreatic complication of AP seen in 52 patients, 16 patients had pleural effusion and 11 patients had ascites and 47 patients showed no evidence of complications.

DISCUSSION: This was a study conducted in Basaveshwar Hospital, Gulbarga. 100 cases diagnosed as acute pancreatitis were included in this study. These patients underwent CECT of the abdomen and pelvis and were graded according to the modified CT severity index.

Age Incidence: The mean age of patients in the study was 41.25±14.17. It is concurrent with study done by Jauregui et al,[1] and others.[2,3] The maximum patients were in the age group of 31 to 40 years (28%). The next group with maximum patients was in the 41 to 50 years group (21%). The minimum age of patients was 15 years and maximum age was 79 years with a minimum number of patients seen below the age of 20 years.

Sex Distribution: Most of the patients were male (83%) as compared to female (17%). No association of gender was noted with severity of pancreatitis in our study. These observations was similar to that of a study conducted by Lankish et al.[4] on 602 patients of acute pancreatitis which showed no correlation between gender and severity of acute pancreatitis.

Etiology: Chronic alcohol abuse is the most common etiological factor in our study constituting 65%of cases. Similar results were observed by Dugernier T L.[5] and Freeny et al.[6]

ORIGINAL ARTICLE

Serum Amylase and Lipase: The accuracy and sensitivity of serum amylase and serum lipase in diagnosing AP is 77%. When compared with CT findings of these patients, it showed 100% accuracy and sensitivity which helps in early diagnosis and predicting the severity of AP. Balthazar et al says that early overall detection rate of 90% with 100% sensitivity. CECT is the most important imaging modality for diagnosis and staging of AP due to its ability in demonstrating early inflammatory changes as well as development of complication.

Ultrasound: The pancreas was abnormal in 73 patients and obscured or normal in the remaining 27. This was a better yield for a visualized pancreas as compared to a study reported by Calleja and JS Barkin which stated that in acute pancreatitis, overlying bowel gas disturbances may obscure the pancreas in 40% of patients.[7]

Comparison between Ultrasonography and CT in Acute Pancreatitis: The overall visualization of the pancreas was far better by CT than by ultrasound. In a study done between 1979-1980 on 102 patients, good to excellent visualization of the pancreas was present in 64% of CT scans as compared to 20% of sonographic studies.[8] With improvements in technology, visualization of the pancreas is better on both modalities. This study showed that the pancreas is visualized in as many as 73% of patients on ultrasonography and in 100% of patients on CT in acute pancreatitis. However, as mentioned in the study by SJ Hessel et al, a negative ultrasound study does not exclude significant and, at times, life-threatening pancreatic disease.[9]

Assessment of Severity of Acute Pancreatitis: The CTSI are classified into mild (0-3), moderate (4-6) and severe (7-10) and MDCTSI grades are classified into mild (0-2), moderate (4-6) and severe (8-10). In our study all patients had pancreatic inflammation, 52 patients were given 2 points while 48 patients were given 4 points. 82 patients had no evidence of necrosis while 18 patients had necrosis out of which 7 patients had necrosis ≤30% while 11patients had necrosis >30% Extra-pancreatic complications were seen in 53 patients in our study, out of which GIT complications were seen in 52 patients, Ascites was seen in 11 patients and pleural effusion in 16 patients.

According to, CTSI maximum patients were seen to fall in mild category 48 and minimum patients 11 were seen in the severe category while moderate category had 41 patients. According to, MDCTSI maximum patients were seen to fall in the moderate category 63 and minimum patients 11 were seen in the severe category while mild category had 26. According to the study by Bollen et al.[10] the morphologic severity of pancreatitis was graded as mild in 86(44%), moderate in 75(38%), and severe in 35 (18%) cases. The study had patients with severe pancreatitis as the minimum number of patients which is similar to our study.

Patients who had extrapancreatic complications had more severity score according to the MCTSI than CTSI, thereby increase in the number of patients having moderate pancreatitis according to the MCTSI when compared to the CTSI. This resulted in the more closely association with the patient outcome in MCTSI. Study done by De Waele et al.[11] showed similar results and concluded that, extrapancreatic inflammation assessed by abdominal CT scan allows accurate estimation of disease severity and mortality within 24 h of admission.

CONCLUSION: Visualization of the pancreas was far better by CT than by ultrasound. Ultrasonography is non-invasive, quick, inexpensive widely available and a safe tool in the imaging and diagnosis of pancreatitis. It has certain limitation. Due to bowel gas and obesity the pancreas may not be visualized.

ORIGINAL ARTICLE

Extra pancreatic spread of inflammation and vascular complications may not be picked up by Ultrasonography. These limitations are overcome with the use of CT which yields more diagnostic information in the evaluation of acute pancreatitis. CT is a confirmative investigation in diagnosis and staging of acute pancreatitis. The MCTSI helps in evaluating the percentage pancreatic necrosis and its grading correlates directly with the development of local and systemic complications.

There was 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. MCTSI is a very useful tool for the screening of patients with acute pancreatitis for the classification of severity and to accurately predict the clinical outcome.

Age in years	No. of Patients	%
11-20	7	7.0
21-30	19	19.0
31-40	28	28.0
41-50	21	21.0
51-60	14	14.0
>60	11	11.0
Total	**100**	**100.0**
Table 1: Age Distribution of Patients Studied		

Etiology	No. of Patients	%
Alcoholic	65	65
Non-Alcoholic/Others	35	35
Total	**100**	**100**
Table 2: Etiology		

USG	No. of Patients	%
Negative	27	27.0
Positive	73	73.0
Total	**100**	**100.0**
Table 3: USG Findings		

	No. of Patients (n=100)	%
Pancreatic Inflammation		
Peri-Pancreatic Inflammation [Value 2]	52	52
Fluid Accumulation [Value 4]	48	48
Table 4: Pancreatic Inflammation		

ORIGINAL ARTICLE

	No. of Patients (n=100)	%
Pleural Effusion		
• Negative	84	84.0
• Positive	16	16.0
Ascites		
• Negative	89	89.0
• Positive	11	11.0
GIT Complications		
• Negative	48	48.0
• Positive	52	52.0
Vascular Complications		
• Negative	100	100.0
• Positive	0	0.0
Table 5: Extrapancreatic Complications		

	No. of Patients (n=100)	%
Pseudocyst		
• Negative	88	88.0
• Positive	12	12.0
Table 6: Pseudocyst-12 patients had Pseudoyst		

Modified CT Severity Index	No. of Patients	%
Mild	26	26.0
Moderate	63	63.0
Severe	11	11.0
Total	**100**	**100.0**
Table 7: Modified CT severity Index		

CT Severity Index	No. of Patients	%
Mild	48	48
Moderate	41	41
Severe	11	11
Total	**100**	**100**
Table 8: CT Severity Index		

ORIGINAL ARTICLE

	Mild	**Moderate**	**Severe**	**Total**
CT severity Index	48 (48%)	41 (41%)	11(11%)	100 (100%)
Modified CT severity Index	26 (26%)	63 (63%)	11 (11%)	100 (100%)
Table 9: Comparison between CTSI and Modified CTSI				

REFERENCES:

1. Jauregui-Arrieta L, Alvarez-Lopez F, Cobian-Machuca H, Solis-Ugalde J, Torres- Mendoza B, Troyo-Sanroman R. Effectiveness of the modify tomographic severity index in patients with severe acutepancreatitis. Rev Gastroenterol Mex. 2008 Jul- Sep; 73(3):144-8.

2. Koenraad J. M., Walter Wiesner, Lisaintriere, shridhar Shankar, Kelly H. Z. Babek N. K., Alex Perez et al. A Modified CT Severity Index for Evaluating Acute Pancreatitis: improved correlation wirh patient outcome|| AiR 2004; 183: 1261- 1265.9

3. Thomas L Bollen, Vikesh K Singh, Rie Maurer, Kathryn Repas, Hendrik W van Es, Peter A Banks and Koenraad J Mortele. A Comparative Evaluation of Radiologic and Clinical Scoring Systems in the Early Prediction of Severity in Acute Pancreatitis. The American Journal of Gastroenterology 107, 612-619 (April 2012).

4. Lankisch D, Paul G, Burchard R, Petersen S. Etiology and Age Have Only a Limited Influence on the Course of Acute Pancreatitis. Pancreas. 1996 Nov; 13(4):344-349.

5. Thierry L. Dugernier et al, Compartmentalization of the Inflammatory Response during Acute Pancreatitis Correlation with Local and Systemic Complications. Am J Respir Crit Care, 2003, Med Vol 168. pp 148–157.

6. Freeny PC, Hauptmann E, Althaus SJ, Traverso LW, Sinanan M. Percutaneous Ctguided catheter drainage of infected acute necrotizing pancreatitis: techniques and results. AJR Am J Roentgenol. 1998 Apr; 170(4):969-75.

7. Calleja G.A., J.S Barkia, -Acute Pancreatitis|| MedicalClin North Am 1993; 77 (5): 1037-1055.

8. Sheedy P.F., D.H. Stephen, R.R. Hattery, R. L. MacCarty, B. Williamson Jr., -Computed Tomography of the Pancreas|| RadiolClin N Am 1977; 15 (3): 349-366.

9. Hessel S.J. et al. -A Prospective Evaluation of Computed Tomography and Ultrasound of the Pancreas|| Radiology 1982; 143: 129-133.

10. Mortele K, Wiesner W, Intriere L, Shankar S, Kelly H. A Modified CT Severity Index for Evaluating Acute Pancreatitis: Improved Correlation with Patient Outcome. AJR. 2004 Nov; 183(5):1261-1265.

11. De Waele JJ, Delrue L, Hoste EA, De Vos M, Duyck P, Colardyn FA. Extrapancreatic inflammation on abdominal computed tomography as an early predictor of disease severity in acute pancreatitis: evaluation of a new scoring system. Pancreas. 2007 Mar; 34(2):185-90.

ORIGINAL ARTICLE

AUTHORS:
1. Shivanand S. Melkundi
2. Shrishail Patil
3. Mahesh
4. Govinda Raju B. T.

PARTICULARS OF CONTRIBUTORS:
1. Professor, Department of Radiology, Mahadevappa Rampure Medical College, Gulbarga.
2. Professor, Department of Radiology, Mahadevappa Rampure Medical College, Gulbarga.
3. Post Graduate, Department of Radiology, Mahadevappa Rampure Medical College, Gulbarga.

FINANCIAL OR OTHER COMPETING INTERESTS: None

4. Post Graduate, Department of Radiology, Mahadevappa Rampure Medical College, Gulbarga.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Shivanand S. Melkundi,
Professor,
Department of Radiology,
Mahadevappa Rampure Medical College,
Gulbarga.
E-mail: shivanandmelkundi@gmail.com