

COMPUTED TOMOGRAPHY FINDINGS IN ACUTE PANCREATITIS

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ABSTRACT

Objective: To determine the role of computed tomography in the diagnosis of acute pancreatitis and to determine the presence of its complications.

Material and Methods: A prospective descriptive study was carried out at Radiology Department, Hayatabad Medical Complex Peshawar from January 2006 to June 2007. 180 consecutive patients with suspected or known acute pancreatitis underwent contrast enhanced helical computed tomography (CT) scan. Scans were observed for pancreatic size, its outlines and other associated complications. The pancreatic findings on CT were classified into five categories on the basis of Balthazar score; A: normal B: pancreatic enlargement alone C: inflammation confined to the pancreatic and peripancreatic fats D: one peripancreatic fluid collection E: two or more fluid collections.

Results: Out of 180 patients, 110(61%) were males and 70(39%) were females. The pancreatic CT findings were grade A in 30 patients (17%); grade B in 34 (19%); grade C in 55 (30%); grade D in 29 (16%); and grade E in 32 (18%) patients. 25 pseudocysts were detected while abscesses were seen only in three patients. Adjacent organ involvement such as spleen and left kidney was noted in 6 cases.

Conclusion: Abdominal CT scan plays an important role in the quick and accurate diagnosis and staging of pancreatitis. CT can assess the degree of pancreatic involvement by the disease process and enables detection of complications.

Key Words: Contrast enhanced helical CT scan, acute pancreatitis, pseudocysts.

INTRODUCTION

Acute pancreatitis is a complex inflammatory process involving the pancreatic gland. The pathological definition of acute pancreatitis is a nonbacterial inflammation of the pancreatic gland caused by the activation and the digestion of the gland by its own enzymes.¹

Acute pancreatitis is suspected in patients presenting with epigastric upper abdominal pain that is acute in onset, rapidly increasing in severity, and persistent without relief. The intensity of the pain almost always results in the patient seeking medical attention. Serum amylase and/or lipase levels can be considered diagnostic when the reported value(s) is ≥ 3 times normal. In some patients, acute pancreatitis may be present in the absence of enzyme abnormalities.^{1,2}

Early recognition of pancreatitis is

essential so that the most suitable treatment can be provided to patients. Most cases of acute pancreatitis can be diagnosed clinically but clinical assessment is not reliable, with as many as 50% of patients being incorrectly classified.³ Often the diagnosis is not straight forward, and a reliable imaging modality is required to establish the diagnosis.⁴ The mortality of acute pancreatitis patients with necrosis has gradually decreased to 10%, but it is still a continuing problem. Because the order of severity is closely correlated to the extrapancreatic extension, it is necessary to make the imaging diagnosis further comprehensive and precise.⁵

For nearly two decades, CT has been the imaging procedure of choice in the initial evaluation and follow-up patients with suspected pancreatitis.⁴ Clear communication regarding CT findings in severe acute pancreatitis is essential for

GRADING OF CT FINDINGS IN ACUTE PANCREATITIS

Grade	Computed Tomographic Findings	Total no. of patients	% age
A	Normal	30	17%
B	Pancreatic enlargement alone	34	19%
C	Inflammation confined to the pancreas and peripancreatic fats	55	30%
D	One peripancreatic fluid collection	29	16%
E	Two or more fluid collections	32	18%

Table 1

proper treatment decisions and clinical research.⁶ The sensitivity of CT for the diagnosis of acute pancreatitis is not known, especially in very mild cases, but a good-quality contrast-enhanced CT scan will demonstrate definite changes in the majority of patients with moderate to severe disease. CT can easily diagnose acute pancreatitis, demonstrates its most major complications, and can help guide percutaneous aspirations and drainages. CT is also indicated when there is failure of clinical response to treatment.⁴

Keeping in view that CT scanning has become the gold standard for the evaluation of pancreatic pathology and allows quick and accurate diagnosis, this study was conducted to determine the role of computed tomography in the diagnosis of acute pancreatitis and the presence of its complications.

MATERIAL AND METHODS

This is a prospective study done over a period of 18 months from January 2006 to June 2007.

Inclusion criteria:

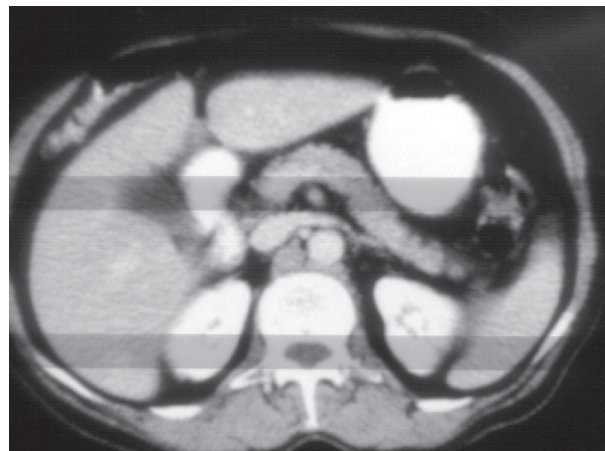
1. All patients both male and female
2. Patients with clinical suspicion of acute pancreatitis
3. Known cases of acute pancreatitis referred for CT abdomen to the Department of Radiology Hayatabad Medical Complex were included in this study.

Exclusion criteria:

1. Patients with history of trauma.
2. Patients with history of surgical intervention were excluded from our study.

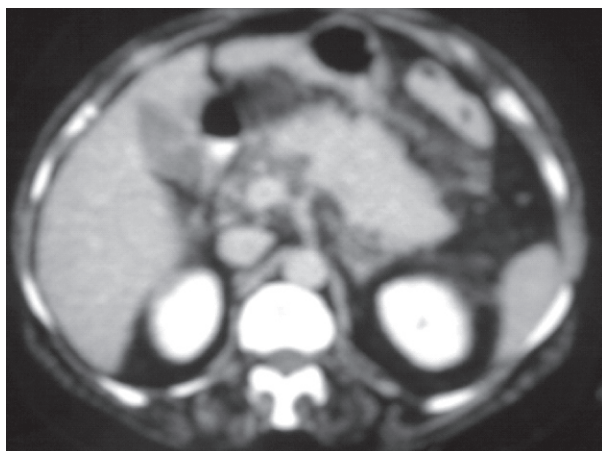
CT was performed on X-vision Toshiba Helical CT scanner available at our department. Oral and intravenous contrast material was given. Scanning was started from diaphragm to the symphysis pubis. Slice thickness was 3mm at the level of pancreas and 10 mm elsewhere.

One hundred and eighty consecutive patients underwent computed tomography (CT) scan for pancreatitis. One hundred and ten (61%) were male and 70(39%) were female. Image interpretation was done by two consultant radiologists with experience of abdominal CT imaging. Interpretation was done on hard copy images and on the console. Images were interpreted for findings of acute pancreatitis and its complications. CT findings indicative of acute pancreatitis include pancreatic enlargement, irregular pancreatic contours, peripancreatic inflammatory changes and uneven density of pancreatic parenchyma. Findings were classified into five categories on the basis of Balthazar scoring: A: normal, B: pancreatic enlargement alone, C: inflammation confined to the pancreatic and peripancreatic fats, D: one peripancreatic fluid collection, E: two or more fluid collections. Complications which were looked for included intrapancreatic or peripancreatic fluid collections, pancreatic necrosis, vascular complications or hemorrhage, pancreatic abscess, pseudocysts, involvement of the adjacent organs, ascites and pleural effusions. Presence of biliary stones, fatty liver and pancreatic calcifications was also noted. Serum amylase levels along with surgical findings



Grade A pancreatitis: Contrast enhanced CT abdomen showing normal pancreas

Fig.1.



Grade C pancreatitis: CT abdomen showing diffuse swelling of pancreas with irregular outlines and inflammation of the peripancreatic fats.

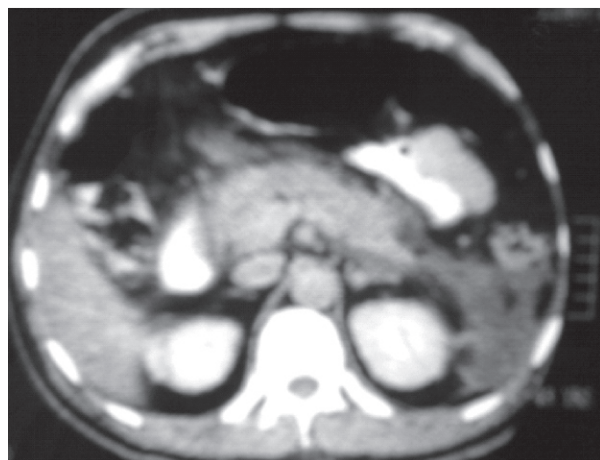
Fig.2.

were observed for the confirmation of diagnosis.

RESULTS

One hundred and eighty patients underwent abdominal CT scan for pancreas. Out of these patients, 110(61%) were male and 70(39%) were female. Age range was from 12 years to 58 years. The pancreatic CT findings were divided into five categories as summarized in table.1.

Phlegmonous changes were present in 35 (19%) cases, including one patient with focal pancreatic hemorrhage. Acute necrotizing (hemorrhagic, suppurative) pancreatitis was seen in 9(5%) patients. Acute on chronic pancreatitis was observed in 8 cases in which CT scans showed pancreatic calcifications (30%), a focal mass (35%), and pancreatic ductal dilatation (28%).



Grade D pancreatitis: CT shows diffuse enlargement of the pancreas, streaky density of the peripancreatic fat and fluid collection into the left anterior pararenal space.

Fig.3.

Pseudocysts were seen in 25 cases, out of which size index of $< 15\text{cm}^2$ were seen in 23 cases while size index of 15cm^2 were noted in 2 cases and 10 pseudocysts were also clinically apparent. Pancreatic abscesses were seen only in three patients while intra or extra pancreatic gas was seen in none of our cases. Adjacent organ involvement such as spleen and left kidney was noted in 6 cases.

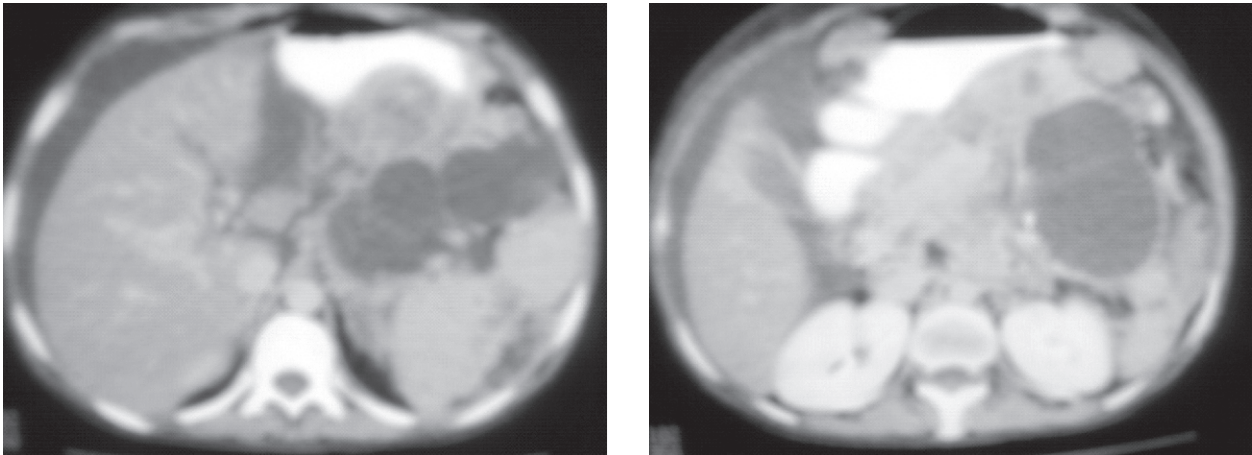
The etiology of pancreatitis could be inferred from 28 (15%) CT scans i.e. in 20 cases gallstones were detected and in 8 cases fatty liver was present along with biochemical evidence of hyperlipidemia. Pleural effusion was present in 69 cases. Out of these 23 were bilateral, 44 left sided while only two were right sided. Ascites was seen in 12 cases.

DISCUSSION

Sonography and CT have radically changed our ability to visualize the pancreas.⁷ It is well known that CT is better than Sonography in imaging the acutely inflamed pancreas.⁸ Potential role for CT evaluation in patients with acute pancreatitis are (1) to determine the presence or absence of pancreatitis; (2) to identify early in their course those patients with a high risk of complications; (3) to diagnose the occurrence of local complications.⁹

An ideal method that allows assessing the severity of pancreatitis should be accurate, easy to use, and should have low inter observer variability. It also should be applicable early in the disease process, so that patients who could potentially develop complications can be monitored closely.¹⁰ The pancreatic CT findings were grade A i.e. normal looking pancreas in 30(7%) patients while in the remaining 150 (93%) cases there were positive CT findings supporting the clinical impression of acute pancreatitis. In other studies normal CT findings have been reported in 24 to 67% patients.¹¹ It is possible that some of these patient did not have pancreatitis. However the frequency of normal CT study appears related to severity of pancreatitis studied.¹² Thus a normal CT scan does not exclude pancreatitis but indicates that, if present, the disease is mild.¹⁰ (Fig.1) Pancreatic enlargement alone was seen in 34 (19%) patients i.e. grade B while inflammation limited to pancreas and peripancreatic fat i.e. grade C patients were seen in 55(30%)cases.(Fig. 2) It is seen that grades B and C occurs in patients with the clinically milder forms of acute pancreatitis. The CT findings of phlegmonous pancreatitis were more common in this study.

Single peripancreatic fluid collection was seen in 29 (16%) patients while two or more fluid



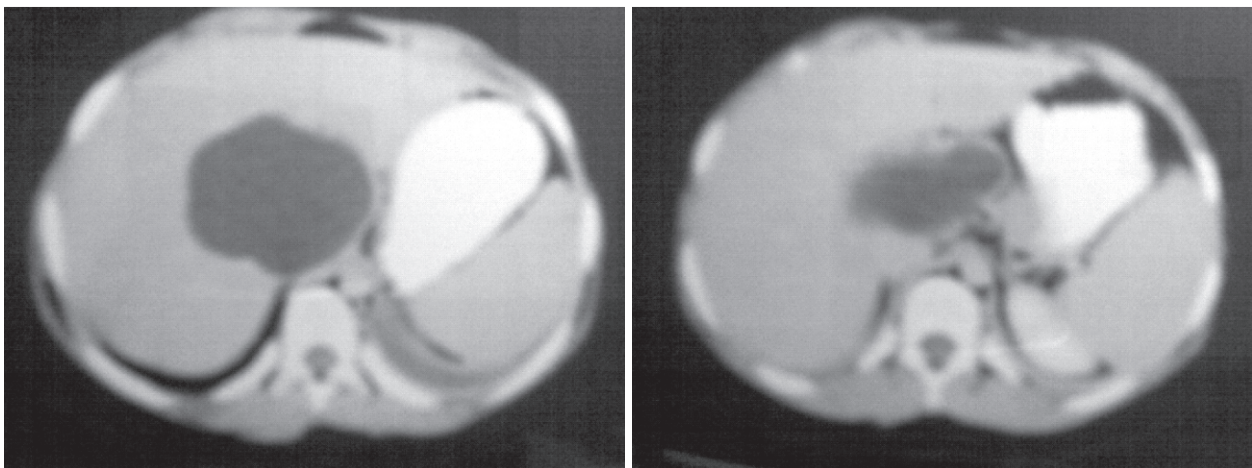
Grade E pancreatitis: CT is showing diffuse involvement of the pancreas, multiple fluid collections, pseudocyst formation and ascites.

Fig.4.

collections were noted in 32 (18%) cases which were grouped in grade D and E respectively (Fig.3 and 4). Fluid accumulation may occur within the pancreas, or outside the gland in the lesser sac, anterior and posterior pararenal spaces, around the left lobe of liver, in and around the spleen, and in the mediastinum. Large fluid collection in the retroperitoneum have a tendency to dissect fascial planes and drain inferiorly collecting over the psoas muscles, and occasionally further down within the pelvis.¹¹ In this study common sites for extrapancreatic fluid collection were in the lesser sac and the pararenal spaces.

The introduction of ultrasonography and computed tomography has permitted noninvasive evaluation of the anatomy of pancreas and peripancreatic retroperitoneum.¹³ However, gas filled gut loops may obscure the pancreas from full

ultrasonographic evaluation and comparison of ultrasonography in patients with acute pancreatitis have shown that CT scan is significantly more accurate in this setting.¹¹ One of the intra abdominal complication we observed in our study was pseudocysts in 25 cases. Size index of less than 15 cm² were seen in 23 cases while size index of more than 15 cm² were noted in 2 cases and 10 were also clinically apparent.(Fig.5) Pseudocysts having size index of 15 cm² or larger should be followed by regular ultrasonography or CT scanning because they are likely to enlarge and require treatment while smaller pseudocysts resolves spontaneously.¹⁴ Intrahepatic pseudocyst formation as a complication of acute pancreatitis occurs extremely rarely and the penetration or dissection of splenic parenchyma by pancreatic pseudocyst is also very rare.¹⁵ We found two cases of intrapancreatic pseudocysts and one case of



Pancreatic pseudocyst: There is an about 10 cm pseudocyst in the region of pancreas and involving adjacent part of liver with left side pleural effusion

Fig.5.



Pancreatic abscess: CT shows Grade D pancreatitis with abscess formation in the pancreatic tail region

Fig.6.

intra hepatic pseudocyst while adjacent organ involvement such as spleen and left kidney was noted in 6 cases.(Fig.5) Abscesses were seen only in three patients while intra or extra pancreatic gas was seen in none of our cases. (Fig.6) Abscesses have been reported in one to nine percent of patients with acute pancreatitis and are associated with a mortality rate of 22 to 57%. In some patients with infected abscesses there is associated perforation of the colon or duodenum.¹⁰ However we did not find any case of associated intestinal perforation.

Pleural effusion was present in 69 cases, out of these 23 were bilateral, 44 left sided while only two were right sided. Ascites was seen in 12 cases.

Chronic pancreatitis is a major source of morbidity and is defined as a chronic inflammatory condition characterized by fibrosis with destruction of the pancreatic tissue that typically cause pain and loss of function.¹⁶ Acute on chronic pancreatitis was observed in 9 cases with associated pancreatic calcifications (6 cases), a focal mass (1 case), and pancreatic ductal dilatation (2 cases). Pancreatic calcifications are more common in acute exacerbation of chronic pancreatitis.¹² Alcohol abuse is the main cause of chronic pancreatitis in United States, however no definite cause is determined in 30% of patients.¹⁶ However in Pakistan alcohol abuse is not very common so history of alcohol ingestion was present in none of our cases while probable etiology of the pancreatitis could be inferred from 28 (15%) scans. In 20 cases gallstones were detected and 8 patients fatty liver was present along with biochemical evidence of hyperlipidemia. The diagnosis of gallstone pancreatitis was based on ultrasonographic and ERCP findings.

CONCLUSION

1. Abdominal CT scan plays an important role in the quick and accurate diagnosis and staging of pancreatitis.
2. CT findings alone cannot prove or exclude the presence of acute pancreatitis, but when the clinical picture is consistent; CT may give valuable confirmation of the diagnosis.
3. CT can assess the degree of pancreatic involvement by the disease process and enables detection of complications.

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