

Role of Imaging in Diagnosing Acute Pancreatitis & its Complications

Dr. Vrushti Gandhi, Dr. Purvi Desai, Dr. Anju Sharma

Abstract: Acute pancreatitis is a sudden inflammation of the pancreas. It can have severe complications and high mortality despite treatment. Imaging plays crucial role in diagnosing acute pancreatitis, its severity and complications. **Methodology:** A total of 40 cases were studied in this study. Out of which 15 had fluid collections with 5 of them having co-existing pleural effusion, 10 had pseudocyst. 5 patients had parenchymal necrosis while 4 had collection associated with necrosis. Only 6 patients had rare vascular complications like pseudo aneurysm and thrombosis. **Result:** 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 the pancreas may not be visualized. Extra pancreatic spread of inflammation and vascular complications may not be picked up by Ultrasonography. These limitations can be overcome with the use of CT which yields more diagnostic information in the evaluation of acute pancreatitis and its complications. Ultrasonography is the initial investigation. Enlargement, altered echogenicity, surrounding edema are suggestive of acute pancreatitis, whereas, fluid collections, pseudocyst formations, parenchymal necrosis, necrosis related collections and many more are its complications. CT is a confirmative investigation in diagnosis and staging of acute pancreatitis and its complications.

Keywords: abdominal CT, abdominal ultrasound, acute pancreatitis, complications of acute pancreatitis, pancreatic necrosis

1. Introduction

This study focuses on USG & CT Scan imaging modalities and on their application in the evaluation of inflammatory lesions of the pancreas. It also deals with the relative advantages of one over the other. The various findings as imaged by both these modalities are studied. The cases were examined by CT or ultrasonography and, in some cases, by both modalities to arrive at conclusion. Results obtained from the study are concluded at the end of the paper.

2. Methodology

CT scans were performed in supine position in a „SIEMENS SOMATOM EMOTION“ 6 Slice CT machine in suspended inspiration using a kVp of 130 and mAs of 100. The window width was set between 1200-1500. USG was performed by „ESAOTE MYLAB 60 „using convex probe for anatomy evaluation of pancreas and flat probe for pancreatic echotexture study.

Pancreas was evaluated in terms of size, shape, echotexture, density and contrast enhancement pattern. Any intrapancreatic or peripancreatic fluid collection, peripancreatic fat edema and necrosis was studied.

3. Discussion

Ultrasonography is indicated early in an acute episode of pancreatitis, to help evaluate the presence of gall bladder and / or common bile duct stones. It has limited applications in the early staging of the disease. Abnormal ultrasound findings are seen in 33 to 90% of patients with acute pancreatitis.

The most important contribution on CT is the detection of the primary cause of the inflammatory process so that remedial steps can be taken.

The activation of intraacinar zymogen granules, impeded protein secretion, auto digestion and cell death with the

release of trypsin and proinflammatory mediators leads to the development of acute pancreatitis and its complications.

4. Complications of Acute Pancreatitis

- **Local** :Acute fluid collections, acute pseudocyst, abscess, pancreatic necrosis, disconnected duct, chronic pancreatitis
- **Remote abdominal** :Peritonitis; diabetes; jaundice; cholecystitis; cholangitis; renal, splenic, or portal vein thrombosis; pseudoaneurysm; gastrointestinal bleeding; ileus; splenic complications (pseudocyst, abscess, hemorrhage, infarction, rupture); vascular complications (splenic, gastroduodenal artery); splenic vein thrombosis; and “left-sided portal hypertension,” as described by Mallick and Winslet [20]
- **Systemic** :Systemic inflammatory response syndrome, disseminated intravascular coagulopathy, respiratory failure (adult respiratory distress syndrome, pleural effusion, atelectasis), renal failure, cardiovascular shock, cerebrovascular accident, hypocalcemia, hyperglycemia, hyperlipidemia

Atlanta classification

- a) Acute pancreatitis is divided into two types:
 - Edematous pancreatitis
 - Necrotising pancreatitis
- b) Fluid collections associated with edematous pancreatitis is divided into two types:
 - APFCs: acute peri pancreatic fluid collections- collections that do not have enhancing capsule around it
 - Pseudocysts: forms after development of capsule, i.e after 4 weeks
- c) Fluid collections associated with necrotising pancreatitis is divided into two types:
 - ANC :acute necrotising collection without an enhancing capsule
 - WON : walled off necrosis forms after development of capsule, i.e after 4 weeksAll four types of collection can be sterile or infected.

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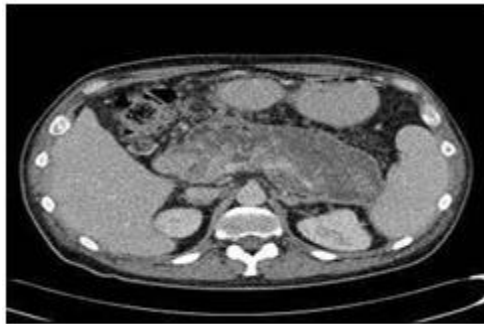
Most important distinction between collections is presence of non liquefied material.

Modified CT Severity Index in Acute Pancreatitis		
Pancreatic Inflammation	Pancreatic Necrosis	Extrapancreatic complications
0. Normal pancreas	0. None	2. One or more of pleural effusion, ascites, vascular complications, parenchymal complications and/or gastrointestinal involvement
2. Intrinsic pancreatic abnormality with or without inflammatory changes in peripancreatic fat	2. < 30%	
4. Pancreatic or peripancreatic fluid collection or peripancreatic fat necrosis	4. > 30%	
Total score : 0-2 Mild , 4-6 Moderate , 8-10 Severe		

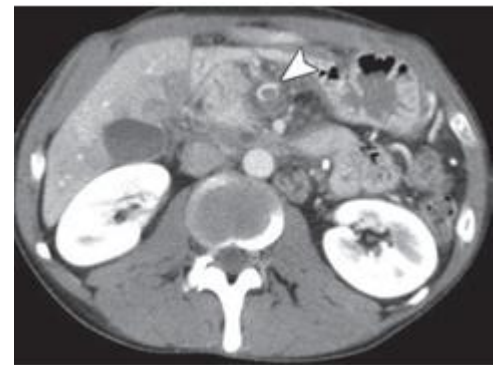
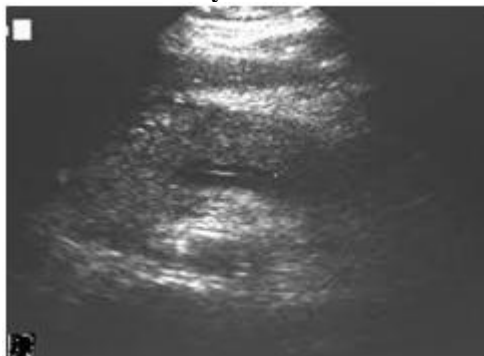


Unenhanced CT scan shows large pancreatic pseudocyst (arrow) that is compressing and displacing stomach anteriorly (arrowhead).

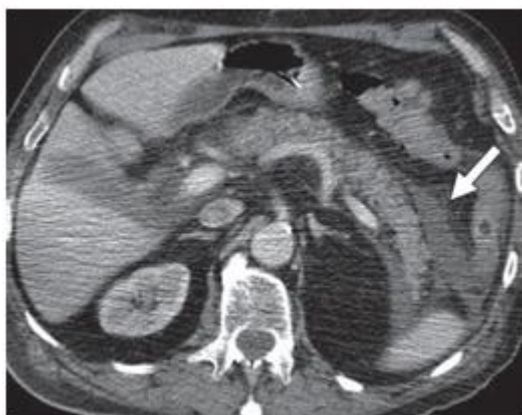
Acute necrotising pancreatitis



Bulky Pancreas



CT of 40-year-old man with partial superior mesenteric vein thrombosis complicating acute pancreatitis. CT scan shows filling defect in superior mesenteric vein (arrowhead).



Pancreas (arrow) enhanced uniformly after contrast administration, thus showing no evidence of necrosis.

5. Summary

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 the pancreas may not be visualized. 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 both acute and chronic pancreatitis.

Alcohol forms a major cause of pancreatitis. Pain abdomen in epigastrium is main complaint in pancreatitis. Ultrasonography is the initial investigation. Enlargement, altered echogenicity, surrounding edema are suggestive of acute pancreatitis, whereas, calcification, ductal dilatation and atrophy are suggestive of chronic pancreatitis. CT is a confirmative investigation in diagnosis and staging of Acute or Chronic pancreatitis.

6. Conclusion

Maximum number of cases was between 16—62 years of age. Pain abdomen in the epigastrium and periumbilical region radiating to the back, nausea and vomiting were the most frequent presenting complaints. Ultrasonography visualized pancreas on about 70% patients whereas CT visualized pancreas in 100% patients. Alteration in the size and echogenicity were the most common ultrasonography

findings. Bulky hypoechoic pancreas was considered diagnostic of acute pancreatitis on ultrasonography.

Intrapancreatic and peripancreatic fluid collections were diagnosed on USG where as for the exact extent and capsule enhancement , CT was performed and results were obtained.

Ultrasonography has a PPV of 100% and Sensitivity of 59% in patients in whom pancreas were visualized.

CT visualized pancreas in all patients. Estimation of size, peripancreatic edema was diagnostic of acute pancreatitis. Extra pancreatic spread of inflammation, extent of fluid collection, vascular complications were better noted on CT. CT has a PPV of 100% and Sensitivity of 96%.

Thus it is seen that both Ultrasonography and CT have roles to play in the diagnosis of acute pancreatitis and its complications and both are complementary to each other.

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