Original article

A COMPARTIVE STUDY OF USG AND CT SCAN EVAULATION OF PATIENT OF ACUTE AND CHRONIC PANCREATITIS

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ABSTRACT
Background: Pancreatitis is a condition of inflammation of pancreas with high rate of morbidity and mortality. USG is useful in the initial radiological assessment of the pancreas, extent of involvement and to evaluate other abdominal organs affected by it. CT scan provides a cross-sectional anatomy of the organ, its internal structure, focal or diffuse involvement and involvement of adjacent structures. This study is done to evaluate the role of USG and CT scan in patients of pancreatitis admitted to L.G. hospital,AMC MET medical college,ahmedabad, Gujarat, India. Aim was to understand the role of CT and USG in determination of diagnosis of pancreatitis and to highlight and evaluate the cases in which USG failed to diagnose the cases which were helped through by CT.

Methods: This study was done in department of radio diagnosis at L.G hospital, AMC MET medical college, Ahmedabad, Gujarat, India, over a period from may 2018 to september 2018. Each patient was studied taking into consideration relevant clinical and laboratory reports. USG of patients was done using LOQIC P5 machine. CT scan was done using PHILIPS 16 Slice CT scan machine.

Results: Advantages of Ultrasound are non-invasiveness, lack of radiation hazard and by ability to demonstrate structural changes in organ is first investigation of choice in pancreatitis. However,limitations of USG are fails imaging in conditions with excess of bowel gas or fatty patient. Detailed characterization of the inflammatory process and peroper extent of necrosis of the gland is not properly evaluated by USG.. CT is superior to ultrasound for precise detection of size, parenchymal involement, main pancreatic duct, calcification, pseudocyst, ascites, pleural effusion, necrosis and peri pancreatic region and hence helps to determine exact extent of inflammation of the organ, multi-system involvement and prognosis.

Conclusions: Ultrasound by non-invasiveness, easy availability, cost parameters, lack of radiation hazard and by ability to demonstrate structural changes in organ is first investigation of choice in pancreatitis. However, ultrasonography lacks in detailed characterization of the

extent of involvement of the organ and adjacent structures. CT is superior to ultrasound for precise detection and extension of the pancreatitis and it has better sensitivity and specificity than ultrasonography.

INTRODUCTION

Pancreas is a soft, lobulated and elongated retroperitoneal organ. It lies transversely over the posterior abdominal wall, at the level of vertebrae L1 and L2. The entire organ lies posterior to the stomach, separated from it by the lesser sac. It lies anterior to the inferior vena cava, aorta, splenic vein and left adrenal gland. Pancreas is located in anterior pararenal space of the retro peritoneum, just anterior to peri renal fascia(gerota fascia) and posterior to parietal peritoneum.[1]

Pancreatitis especially in its acute form is a common disease with potentially serious morbidities and mortality. Multiple imaging modalities play a important role in the evaluation of the disease process and its associated complications. Understanding the pathogenesis of this disease, indications for imaging, modality and imaging protocol selection, staging systems, and the merits and demerits of various modalities can help in the patient care.

Acute pancreatitis is defined as an acute, mainly diffuse, process of the pancreas that exhibits great variation in the degree of involvement of the gland, the adjacent retroperitoneal tissues and other remote organ systems. Gallstones and alcohol abuse are the most common causes of acute pancreatitis.

Chronic pancreatitis is a syndrome of destructive inflammatory condition arising from long-standing pancreatic injury.[2] According to the Marseilles classification it is defined as a continuing inflammatory disease of the pancreas characterized by irreversible morphological damage typically causing pain and/or permanent loss of function.[3]

The Revised Atlanta classification of acute pancreatitis is an international multidisciplinary classification of the severity of acute pancreatitis, updating the 1992 Atlanta classification. It was initially revised in 2012 and then further updated in 2016 [4].

The worldwide consensus aims for an internationally agreed-upon classification of acute ancreatitis severity, with standardised terminology for pancreatitis and its complications.

Classification

The classification system is based on both local and systemic determinants of severity, with:

- local determinants related to the presence or absence of
  - (peri)pancreatic necrosis
    - sterile or infected
- systemic determinants related to presence or absence of
  - organ failure

▪ transient or persistent

The grade of severity (mild, moderate, severe, and critical) is based on combinations of these determinants.

Furthermore, a discrimination was made between two clinical phases of pancreatitis:

- **early** (1st week): in which severity is based on the presence or absence of systemic organ failure
- **late** (>1st week): in which severity is based on the presence of local complication or persistent systemic organ failure

Radiographic features[5,6]

USG is used in the diagnosis and assessment of imaging of organs and soft tissue structures. Because of its non-invasive nature and continuing improvements in imaging quality, ultrasound imaging has a key role in assessing pancreas. It can diagnose pancreatitis in initial stage and exclude other causes of abdominal pain. With increasing operator experience and advances in technology USG can evaluate pancreatitis in majority of cases.

MDCT (multi detector CT) has multiple detector rows and faster with slice thickness of 0.5 mm and improved spatial resolution and 3D reformatting to delineate anatomy clearly. It permits arterial, pancreatic and portal venous phase and contrast uses iodinated medium.

METHODS

This study was done in department of radio diagnosis, L.G. hospital, ahmedabad, Gujarat, India, from after taking permission from institutional review board, human ethics committee, ahmedabad, Gujarat, India. Patients were examined using Ultrasound and CT scan as imaging modalities after obtaining consent for the same. Patient with relevant clinical history were examined. Serum amylase, serum lipase were correlated with the imaging findings as and when required.

Equipment
• USG machine: LOGIQ P5
• CT scan machine: 16 slice PHILIPS

Inclusion criteria
- Refered to our department with complain of abdominal pain and suspected diagnosis of pancreatitis.

- Already diagnosed case of pancreatitis referred to Radiology department.

Exclusion criteria
• Patients refusing consent to participate in the study

• Pregnant females
• Elevated serum creatinine levels (>1.5 mg/dl).

RESULT

The present study was carried out at department of radio diagnosis, LG hospital and AMC MET medical college, Ahmedabad, Gujarat, India, from May 2018 to September 2018. A total 50 patients were examined and comparison done between the modalities of USG and CT scan. The observations are as follows.

Table 1: Age and Gender wise distribution

AGE (in years)						
SEX	11-20	21-30	31-40	41-50	51-70	TOTAL
MALE	2(4.7%)	10(4.2%)	13(30.9%)	12(28.5%)	5(11.9%)	42(84%)
FEMALE	1(12.5%)	2(25%)	0(0%)	0(0%)	5(62.5%)	08(16%)
TOTAL	3(6%)	12(24%)	13(26%)	12(24%)	10(20%)	50(100%)

In our study 42 (84%) patients are males and 8 (16%) are females, between age groups of 11-70 years. The peak incidence was noted in the age group of 31-40 years, which comprised 13 (26%) of patients. Of all age groups, males in 31-40 years formed the bulk of study i.e. 13 (30.9%).

Table 2: Various common symptoms in acute and chronic pancreatitis

SYMPTOMS	Abdominal pain	Vomiting	Fever	weight loss
ACUTE PANCREATITIS	30(73.1%)	22(70.9%)	19(67.8%)	4(57.14%)
CHRONIC PANCREATITIS	11(26.8%)	9(29.03%)	9(32014%)	3(42.85%)
TOTAL	41	31	28	7

Pain in abdomen (82%) is most common complaint of both the types of pancreatitis. Vomiting (60%) is second most common complaint in present study followed by fever (56%) and least common is weight loss (14%).

Table 3: Value of serum amylase and lipase in acute and chronic pancreatitis

	Serum Amylase (28-100 U/L)	Serum lipase (0-160 U/L)	Total
Acute pancreatitis	25	17	42
Chronic pancreatitis	10	8	18

In our study, out of 50 cases of pancreatitis, raised S. amylase is commonly associated with acute pancreatitis 25 (50%) patients than chronic 10 (20%) pancreatitis, whereas raised S. lipase is also prominent feature of acute pancreatitis.

Table 4: USG DIAGNOSIS

Diagnosis	Frequency
Obscured	09(18%)
Acute edematous pancreatitis	15(30%)
Acute on chronic pancreatitis	05(10%)
Acute pancreatitis with peripancreatic fluid collection	01(2%)
Acute pancreatitis with pseudocyst formation	01(2%)
Chronic pancreatitis	12(24%)
Pseudocyst	07(14%)
Total	50

Table 5:CT DIAGNOSIS

Diagnosis	Frequency
Acute edematous pancreatitis	15(30%)
Acute on chronic pancreatitis	09(18%)
Acute pancreatitis with peripancreatic fluid collection	03(6%)
Acute pancreatitis with pseudocyst formation	02(4%)
Chronic pancreatitis	16(35%)
Pseudocyst	05(10%)
Total	50

Table 6: parenchymal involvement on USG AND CT SCAN

		CT (parenchyma)		
		Yes	No	Total
USG (parenchyma)	Yes	30(96.7%)	01(3.2%)	31(62%)
	No	15(78.9%)	04(21%)	19(38%)
	Total	45(90%)	05(10%)	50(100%)
Mc nermar p-value		0.0041		
Pearson chi square		4.15		

In a study of 50 patients, USG determine parenchymal echotexture of 31 (62%) patients and CT determined parenchymal echotexture of 45 (90%) patients which proves that CT fared a better role in evaluating PARENCHYMA of the gland in comparison of USG (P value=0.0041).

Table 7: MAIN PANCREATIC DUCT INVOLVEMENT

		CT (MPD)		
		Yes	No	Total
USG (parenchyma)	Yes	04(80%)	01(20%)	05(10%)
	No	07(15.5%)	38(84.4%)	45(90%)
	Total	11(22%)	39(78%)	50(100%)
Mc nermar p-value		0.0009		
Pearson chi square		10.89		

In a our study of 50 patients, USG determined MPD of 5 (10%) patients and CT determined MPD of 11 (22%) patients which proves that CT played a better role in evaluating MPD of the gland in comparison of USG (P value=0.0009).

Table 8: CALCIFICATION IN USG AND CT SCAN

		CT (Calcreation)		
		Yes	No	Total
USG (parenchyma)	Yes	02(66.6%)	01(33.3%)	03(6%)
	No	05(10.6%)	42(89.3%)	47(94%)
	Total	07(16%)	42(84%)	50(100%)
Mc nermar p-value		0.006		
Pearson chi square		7.3		

In a study of 50 patients, USG determined calcification of 3(6%) patients and CT determined calcification of 7(16%) patients which proves that CT fared a better role in evaluating CALCIFICATION of the gland in comparison of USG (P value=0.006).

DISCUSSION

In our study, the patients were examined by USG using convex and linear probe in transverse and longitudinal planes. All the patients were followed up for a CT scan examination who were diagnosed pancreatitis, in whom clinical examination and laboratory parameters favoured pancreatitis but USG was suboptimal. The key role of CT scan is to determine the inflammation of pancreas in which USG was non-diagnostic or sub optimally examined. Also, it plays a key role to determine extent of the affected gland, multisystem involvement and complications as

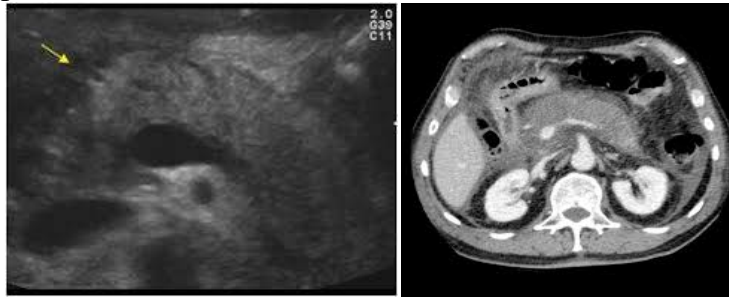early diagnosis and management becomes critical to avoid catastrophic consequences of pancreatitis.

Figure 1.   figure 2.

Figure 1 showed axial section of USG enlarged pancreas with slight inhomogenous echopattern of pancreas. No evidence of dilated duct or calcification or peripancreatic fluid collection was seen.

Figure 2 showed axial section of contrast enhanced CT scan of abdomen showed enlarged pancreatic parenchyma with minimal peripancreatic fluid collection, minimal ascites and bilateral thickening of gerota's fascia. figure 1 and 2 showed features of acute pancreatitis.
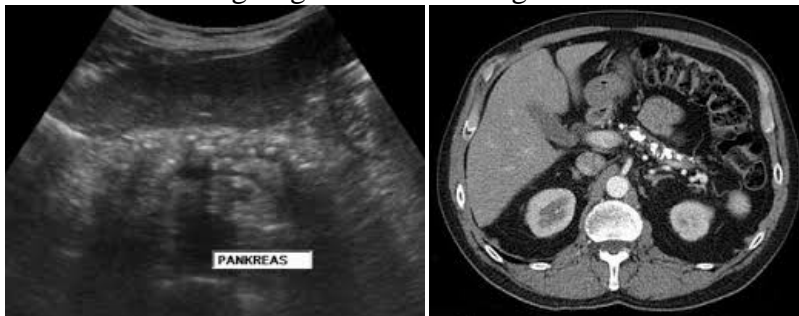

Figure 3.   figure 4.

Figure 3 and 4 respectively are USG and contrast enhanced scan of abdomen showed atrophic pancreatic parenchyma with multiple pancreatic parenchymal calcification diagnostic of chronic pancreatitis.
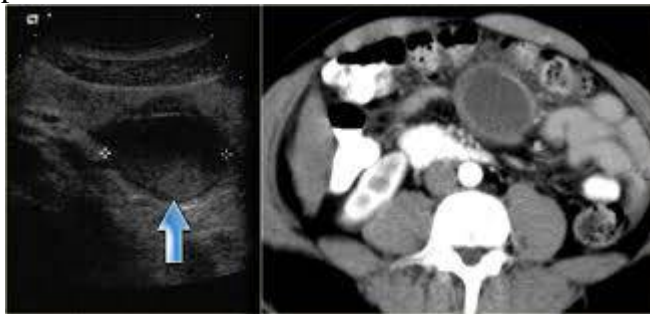

Figure 5   figure 6

USG finding in figure 5 showed well defined cystic lesion with internal echos in relation to body of pancreas. Contrast CT scan in figure 6 showed well defined fluid density collection in relation to body of pancreas. Both UAG and CT scan findings are suggestive of pesudocyst.

Silverstein et al study a prospective study done on 102 patients consecutively to determine role of USG and CT scan in pancreatitis. Our present study included 50 patients who underwent USG as well as CT scan examination with 42 (84%) males and 8 (16%) females, with males being

more affected than females. Of these most patients were of age 31-40 of being 13 (26%) patients' findings like that of Silverstein et al of 65 among 102 patients.[7]
Alcohol and gall stones are major etiological agents in pancreatitis. O'Connor et al study approximates 70% etiology of pancreatitis due to gall stones and alcohol. Silverstein et al study had 57 patients with alcohol history and 6 with gall stones in comparison to present study which had 25 and 5 patients respectively.[8]

The advantages of USG are its easy accessibility, non-invasive nature and it is radiation free. Its less time consuming so in emergency situations when the patients' conditions is rapidly declining it is easily used as an initial diagnostic tool.

CONCLUSION

Ultrasound by non-invasiveness, lack of radiation hazard and by ability to demonstrate structural changes in organ is initial investigation of choice in evaluation of pancreatitis. Ultrasound can detect presence of inflammation and characterize the size, shape and echo texture of the gland, but because pancreas is retroperitoneal organ it is difficult to easily evaluate it.

CT scan of abdomen with axial and coronal reconstruction is pre-requisite for detailed evaluation of pancreas. CECT scan show better delineation and margins and extent of the gland than USG. CT scan is better than USG in determining the size, parenchyma, necrosis, calcification and complications associated with pancreatitis.

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