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Original Research Article

USG and CT scan evaluation of patients of acute and chronic pancreatitis- a cross-sectional, comparative study

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ABSTRACT

Background: Pancreatitis is a condition of inflammation of pancreas with high rate of morbidity and mortality. USG provides the initial radiological assessment of the organ, clue of the extent of involvement and an opportunity to evaluate other abdominal organs. 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 Sir Takhtsinhji hospital, government medical college, Bhavnagar, 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 Sir Takhtsinhji hospital, government medical college, Bhavnagar, Gujarat, India, over a period of one year from June 2015 to June 2016. Each patient was studied taking into consideration relevant clinical and laboratory factors. USG of patients was done using My Lab 40 or My Lab 20 plus machine. CT scan was done using GE 16 Slice CT scan machine.
Results: Ultrasound by non-invasiveness, lack of radiation hazard and by ability to demonstrate structural changes in organ is first investigation of choice in pancreatitis. However, USG fails imaging in conditions with excess of bowel gas or fatty patient. It lacks in detailed characterization of the inflammatory process and does not delineate extent of necrosis of the gland. CT is superior to ultrasound for precise detection of size, parenchyma, MPD, 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.

Keywords: CT Scan, Necrosis, Pancreatitis, Pseudocyst, USG

INTRODUCTION

Pancreas is a soft, lobulated and elongated 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.[1,2] Pancreas is in anterior pararenal space of the retro peritoneum, just anterior to peri renal (gerota fascia) and posterior to parietal peritoneum.[3]

Pancreatitis is one of the common emergency conditions that presents to the hospital in which patients' condition detoriates rapidly in certain cases while being mild and self-limiting in others. Rapid assessment becomes a necessity to avoid potential catastrophic consequences. Diagnosis relies on laboratory investigations and radiological imaging.

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 is progressively achieving a key role in assessing pancreas. It can diagnose pancreatitis and exclude other causes of abdominal pain. With increasing operator experience and advances in technology USG can evaluate pancreatitis in majority of cases.[4]

MDCT (multi detector CT) has multiple detector rows and 20 times 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.[5]

METHODS

This study was done in department of radio diagnosis, Sir Takhtsinhji general hospital, Bhavnagar, Gujarat, India, from June 2015 to June 2016 after taking permission from institutional review board, human ethics committee, Bhavnagar, 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 and standing/supine abdominal radiographs were correlated with the imaging findings as and when required.

Equipment

- USG machine: ESAOTE My Lab 40, ESAOTE My Lab 20 plus
- CT scan machine: 16 slice GE

Inclusion criteria

- Age: 20 to 50 years.
- Gender: Both
- Referred to our department with complaints of abdominal pain and suspected diagnosis of pancreatitis
- Already diagnosed cases of pancreatitis and referred to radiology department.

Exclusion criteria

- Patients refusing consent to participate in the study
- Pregnant females
- Elevated serum creatinine levels (>1.5 mg/dl).

Stastical analysis

Stastical analysis was done after collecting all necessary data and using proper stastical methods.

RESULTS

The present study was carried out at department of radio diagnosis, Sir T hospital and government medical college, Bhavnagar, Gujarat, India, from June 2015 to June 2016. A total 50 patients were examined and comparison done between the modalities of USG and CT scan. The salient observations are as follows.

Table 1: Demographic profile.

		Age (in years)				
		11-20	**21-30**	**31-40**	**41-50**	**Total**
Sex	Male	3 (6%)	15 (30%)	8 (16%)	12 (24%)	38 (76%)
	Female	1 (2%)	1 (2%)	5 (10%)	5 (10%)	12 (24%)
Total		4 (8%)	16 (32%)	13 (26%)	17 (34%)	50

Table 2: Symptomatology with respect to both types.

	Symptoms			
	Abdominal pain	**Vomiting**	**Fever**	**Weight loss**
Acute pancreatitis	27 (54%)	21 (42%)	18 (36%)	4 (8%)
Chronic pancreatitis	14 (28%)	9 (18%)	10 (20%)	3 (6%)
Total	41 (82%)	30 (60%)	28 (56%)	7 (14%)

The study comprised of 38 (76%) males and 12 (24%) females, between age groups of 20-50 years. The peak incidence was observed in the age group of 41-50 years, which comprised 17 (34%) of patients. Of both the sexes

and all age groups, males in 21-30 years formed the bulk of study i.e. 15 (30%).

Pain in abdomen (82%) is most common complaint in clinical scenario 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: Association of pancreatitis with laboratory investigations.

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

In present 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 prominent feature of chronic pancreatitis.

Table 4: USG diagnosis of lesions.

Diagnosis	Frequency
Obscured	10 (20%)
Normal	6 (12%)
Acute edematous pancreatitis	10 (20%)
Acute on chronic pancreatitis	2 (4%)
Acute pancreatitis with peri pancreatic fluid collection	3 (6%)
Acute pancreatitis with pseudocyst	6 (12%)
Chronic pancreatitis	6 (12%)
Chronic pancreatitis with pseudocyst	3 (6%)
Pseudocyst	4 (8%)
Total	50

Table 5: CT diagnosis of lesions.

Diagnosis	Frequency
Acute edematous pancreatitis	14 (28%)
Acute necrotising pancreatitis	4 (8%)
Acute pancreatitis with pseudocyst	7 (14%)
Acute pancreatitis with other complications	5 (10%)
Acute on chronic pancreatitis	6 (12%)
Chronic pancreatitis	7 (14%)
Chronic pancreatitis with pseudocyst	3 (6%)
Pseudocyst	4 (8%)
Total	50 (100%)

From the below tabulated analysis, it was deducted that CT was better evaluating the factors of parenchyma, MPD, calcification, pseudocyst collection, ascites, Pl. effusion, necrosis, complications and adjacent areas of the pancreas in comparison to USG and helped in better to determine the pathological process of pancreas and surrounding extent and involvement.

Table 6: CT (parenchyma).

CT (parenchyma)				
		Yes	No	Total
USG (parenchyma)	Yes	21(42%)	5 (10%)	26 (52%)
	No	14(28%)	10 (20%)	24 (48%)
	Total	35(70%)	15 (30%)	50
Mc nemar p-value		0.0897		
Pearson chi square		2.991		

Table 7: CT (MPD).

CT (MPD)				
		Yes	No	Total
USG (parenchyma)	Yes	6 (12%)	1 (2%)	7 (14%)
	No	4 (8%)	39 (78%)	43 (86%)
	Total	10 (20%)	40 (80%)	50
Mc nemar p-value		0.375		
Pearson chi square		21.968		

In a study of 50 patients, USG determine parenchymal echotexture of 26 (58%) patients and CT determined parenchymal echotexture of 35 (70%) patients which proves that CT fared a better role in evaluating PARENCHYMA of the gland in comparison of USG (P value=0.0897).

Table 8: CT (calcification).

CT (calcification)				
		Yes	No	Total
USG (calcification)	Yes	11 (22%)	0 (0%)	11 (22%)
	No	6 (12%)	33 (66%)	39 (78%)
	Total	17 (34%)	33 (66%)	50
Mc Nemar p-value		0.031		
Pearson chi square		27.376		

In a study of 50 patients, USG determined MPD of 7 (14%) patients and CT determined MPD of 10 (20%) patients which proves that CT fared a better role in evaluating MPD of the gland in comparison of USG (P value=0.375). In a study of 50 patients, USG determined calcification of 17(34%) patients and CT determined calcification of 11(22%) patients which proves that CT fared a better role in evaluating CALCIFICATION of the gland in comparison of USG (P value=0.031).

DISCUSSION

In current study, the patients were examined by USG using linear and sectoral 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.

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 38 (76%) males and 12 (24%) females, with males being more affected than females. Of these most patients were of age 41-50 of being 17 (34%) patients' findings like that of Silverstein et al of 65 among 102 patients.[6]

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 23 and 4 patients respectively.[7]

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. But in emergency majority of patients in present study amounting to 82% presented with acute abdominal pain who are in distress with a rigid abdomen at times and with a poor general condition. USG of which 26 % patients were either examined to a suboptimal level or diagnosed to have normal gland. This leads to a diagnostic dilemma and a follow up CT Scan becomes mandatory for the patient.

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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