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RADIOLOGY

COMPARISON OF ULTRASOUND AND CT IN THE EVALUATION OF PANCREATIC LESIONS.

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ABSTRACT

Introduction : Pancreas is a unique marvel of the body. It combines two diverse streams of function into a single structural entity. Computed Tomography with its higher sensitivity emerges as the imaging technique of utmost importance in evaluation of the nature and extent of pancreatic lesions.so the purpose of the study was to compare and contrast the role of Ultrasound and CT in the evaluation of pancreatic lesions.

Methodology : This is a prospective study of 50 patients with pancreatic lesions. In the present study an attempt is made to evaluate the efficiency of Ultrasound and CT in detecting and diagnosing pancreatic lesions Ultrasound scan was performed and in C.T. scan evidence of enhancement pattern of lesion, local extension, vascular involvement are noted in addition.

Results : In this study included 50 patients suspected to have pancreatic pathology. Of these 40 patients are found to have pancreatic pathology on ultrasound / CT. CT detected 40 cases to be positive. Ultrasound did not detect 5 cases which are positive on CT. Out of 50 cases 11 cases are diagnosed as Acute pancreatitis, 13 cases as chronic pancreatitis, 9 cases as isolated pseudocysts, 6 cases as neoplasms, one case of pancreatic abscess. 10 cases are found normal.

Conclusion : The overall sensitivity and specificity for CT are 95% and 90% respectively. This study clearly indicates that CT is the method of choice for detecting a pancreatic lesion, its extent and defining its etiology.

KEYWORDS : ULTRASOUND, CT, PANCREATIC LESIONS.

Introduction :

Pancreas is a unique marvel of the body. It combines two diverse streams of function into a single structural entity. Approximately 80-85% of pancreas is an exocrine gland that secrets enzymes necessary for digestion of food. The remaining portion of pancreatic substance consists of islets of Langerhans which secrete insulin, glucagon and a variety of other hormones. The two components of pancreas are affected by quite different lesions; hence the approaches needed to evaluate the status of pancreatic architecture as well as function are different.[1]

The advent of radio immunoassay, a technique developed by Berson and Rosalyn Yello (1970) for assaying insulin, heralded a new era in the understanding of metabolic disorders. However, the techniques employed for imaging the pancreas like angiography, radionuclide scanning and hypotonic duodenography are either rarely used now are obsolete. Till the early 1970's pancreas had remained the "Hidden organ". In conventional radiography, three dimensional structures are projected as two dimensional images, limiting the visualization of pancreas. [2] The evolution in diagnostic imaging techniques over the last three decades is marked by the advent of Endoscopic Retrograde Cholangio Pancreatography (ERCP), Ultrasonography, Computed Tomography, Magnetic Resonance Imaging and Fine Needle Aspiration Cytology (FNAC). 3Interventional techniques such as endoscopy (or) transhepatic biliary drainage and percutaneous drainage of fluid collections have winded the horizons of radiologist in the assessment and management of patients with pancreatic pathology.

In early 1970's, Sonography has started to represent the most important diagnostic modality for direct visualization of pancreas, at a time when direct reproducible imaging of the gland was not achievable by other techniques. Advent of CT did not produce any decrease in the utility of Ultrasound for studying pancreatic disease. Indeed modern real time equipment which allows quick and comprehensive exploration of abdomen, pancreas and its ductal system, resulted in further increase in application of ultrasound in clinical practice and imaging. 4 Because Ultrasound examination is inexpensive, non-invasive, reliable and well accepted by the patient, it is currently one of the first imaging techniques performed for the pancreatic lesions.

Computed Tomography invented in the year 1971 by G.N.Hounsfield, incorporates several unique features which facilitate pancreatic imaging in finer detail. Haaga and Alfidi (1976)were amongst the earliest investigators to evaluate the role of C.T. in the assessment of pancreatic and peripancreatic abnormalities. [5] The improved spatial resolution and contrast sensitivity available with the present gene ration of C.T. Scanners has further enhanced our capability to evaluate pancreatic lesions unlike angiography and ERCP which are difficult to perform as well as interpret. Computed Tomography with its higher sensitivity emerges as the imaging technique of utmost importance in evaluation of the nature and extent of pancreatic lesions.so the purpose of the study was to compare and contrast the role of Ultrasound and CT in the evaluation of pancreatic lesions.

MATERIALS & METHODS

This is a prospective study of 50 patients with pancreatic lesions. In the present study an attempt is made to evaluate the efficiency of Ultrasound and CT in detecting and diagnosing pancreatic lesions and also to contrast between them. The appearance of pancreatic lesions on ultrasound and CT and their correlation with age and sex and different clinical settings are studied. The patients are referred to our department from various departments, mainly from the departments of Surgery, Medicine and Pediatrics with a clinical suspicion of pancreatic pathology.

The patients are referred from departments like Surgery, Medicine and Pediatrics. Most of the patients presented with signs and symptoms relating to the epigastric region and right hypochondrium with unexplained pain, vomiting, loss of weight and loss of appetite etc. In all the cases, a detailed clinical history is taken and thorough clinical examination is done. The blood and laboratory investigations and the clinical diagnosis are recorded in the proforma. The patients who are subjected for the study had clinical complaints like fever, nausea, vomiting, jaundice, loss of weight and loss of appetite etc., these patients are subjected to ultrasound and C.T. examination.

The ultrasound equipments used are Philips Envisor HD and Philips HD7. These ultrasound machines are equipped with a curvilinear probe of 3.5 MHz frequency and a linear probe of 7.5 MHZ frequency.

The Computed Tomography scanner is Siemens Emotion Single slice Spiral which is a third generation Machine with a smallest Slice thickness of 1mm.

In case of adult patients, the patients are kept nil orally 12 hours prior to the procedure with proper instructions being given for good bowel preparation to minimize the problem of bowel interface. In the pediatric age group instructions regarding bowel preparation are not insisted upon Supplemented regimens such as filling stomach with water are done.

Ultrasound scan is performed placing the patient in supine position and the scan is done in long axis of gland as well as perpendicular to the long axis. The patient is scanned in other positions such as prone,

oblique, erect, left and right lateral decubitus, and sitting partially upright whenever necessary.

Preliminary topogram was done for all the cases. Regularly 10mm slices are taken and 5mm or 2mm contiguous slices are imaged in the area of interest. Plain scans are performed after the oral administration of contrast and during the intravenous injection of a bolus of contrast. Intravenous contrast is administered in a bolus of 150 to 180 ml of 76% iodinated agent through a peripheral vein. The bolus is given in a uniphasic (2.5 ml/sec) or biphasic manner (2.5 to 5 ml/sec for a total of 50ml, then 1 ml/sec until a total 50 – 180ml is given). The scan sequence is initiated 30-40 seconds after the bolus injection has started. 2mm sections are used in the region of interest wherever necessary. Other associated findings are also noted. In all cases the ultrasound and CT are done and following features are noted. The glandular size, nature of lesion whether solid/ cystic, whether diffuse / focal involvement, whether there are multiple or single lesions and any necrosis, calcifications and duct pathology are noted. In C.T. scan evidence of enhancement pattern of lesion, local extension, vascular involvement are noted in addition.

RESULTS

In a present study included 50 patients suspected to have pancreatic pathology. Of these 40 patients are found to have pancreatic pathology on ultrasound / CT. CT detected 40 cases to be positive. Ultrasound did not detect 5 cases which are positive on CT.

Table 1 : Summary of cases

S.No.	DIAGNOSIS	No.Of. Cases	PERCENTAGE
1.	Acute pancreatitis	11	16%
2.	Chronic pancreatitis	13	26%
3.	Isolated Pseudocysts	9	18%
4.	Neoplasms	6	14%
5.	Pancreatic abscess	1	2%
6.	Normal	10	20%

In my study out of 50 cases 11 cases are diagnosed as Acute pancreatitis, 13 cases as chronic pancreatitis, 9 cases as isolated pseudocysts, 6 cases as neoplasms, one case of pancreatic abscess. 10 cases are found normal.

IV. Age profile of patients with pancreatic lesions

S.No.	Age group in year	No.of Cases	Percentage
1.	61-70	3	6%
2.	51-60	17	34%
3.	41-50	13	26%
4.	31-40	11	22%
5.	21-30	5	10%
6.	11-20	-	-
7.	0-10	1	2%

In my study 50 cases are divided in to seven groups in the following manner. Maximum number of patients are in the age group of 51-61 years with 17 cases (34%), next being 13 cases (26%) in age group of 41-50 years next is between 31-40 years with 11 cases (22%) 21-30 years with 5 cases (10%) 61-70 years with 3 cases (6%), 0-10 years with 1 cases (2%) and in 11-20 years no case is found.

In my study CT detected 11 cases of Acute Pancreatitis out of 11 cases two cases are found negative on MR imaging. One case of acute pancreatitis which is found negative on CT is detected on further imaging. Ultrasound detected 7 cases to be positive for Acute Pancreatitis. Ultrasound did not detect two cases of Acute pancreatitis which are negative on CT are also not detected by ultra-sound. Out of 7 cases detected positive, two cases are found negative on MR imaging. So, the Sensitivity and specificity of US for acute pancreatitis are less than those of CT.

Out of 8 cases of acute pancreatitis, 3 cases (37.5%) are associated with necrotic changes, 4 cases (50%) with Pseudocysts, 5 cases with ascites (62.5%), 3 cases with pleural effusion (37.5%) two cases with fluid collection in peripancreatic space, one with abscess. However no vascular anomalies are detected. Ultrasound and CT detected well various sizes of Pseudopancreatic cysts. In my study both ultrasound and CT had 100% detection rate.

Mass lesion and associated findings are detected well on ultrasound and CT, but the extent of lesions into peripancreatic fat planes and adjacent structures is confirmed on CT which is doubtful on ultrasound. CT detected 6 cases of neoplasms. One case which is not detected on CT & USG has been detected on MRI. So the detection rate for CT in case of neoplasms is 85%. Ultrasound also showed 85% detection rate, but was less accurate in delineating the extent of lesion.

DISCUSSION

In the present study 50 patients attending Narayana Medical College & Hospital, Nellore, who are clinically suspected to have pancreatic pathology are evaluated with ultrasound and CT. The age and sex distribution of patient's in my study are similar to Eli. Karasawa et al 1983[110].Their study revealed that maximum numbers of patients are males with a sex ratio of 3:2 and maximum age group is after 50yrs.

On ultrasound out of 50 cases, 35 cases are found positive and 15 cases are found negative. Out of 15 cases, 7 cases are positive on further imaging 5 cases are found positive on CT (Two are acute pancreatitis, three are chronic pancreatitis) two cases which were also negative on CT are found positive. Thus the sensitivity of CT to detect pancreatic lesions is 83%.

Thus the sensitivity and specificity of ultrasound found in my study here are closer to those found in the study conducted by various studies [5,6].

The echogenecity of pancreas is highly variable and depends upon the timing of examination. In one study 1987 [7] in his study of 50 cases with acute pancreatitis, revealed decreased echogenecity of the gland in 56%, wherein our study showed altered echotexture in 50% of cases.

The complications of acute pancreatitis are well detected on CT. CT differentiates between necrotic and non-necrotic areas. CTSI is a useful tool in assessing the severity and outcome of Acute Pancreatitis compared to APACHE II and Ranson scoring. (Ting-kai, Chi ming lee 2005)[8].

In my study 2 cases with CTSI of 8 had bad prognosis.In a study conducted by Megibow in 1990[9], the findings are CTSI of 0 – 1 is associated – No mortality & morbidity.2 is associated with 4% morbidity. 2–10 is associated with 17% mortality and 92% morbidity.

In my study of chronic pancreatitis, alteration in size of gland (atrophy) is noted in 79.3% cases, duct dilatation in 71.3%, calcification in 79.3% and 23% showed pseudocyst formation. The calculi may be diffuse or confined to specific area. They are limited to the head or tail in about quarter of all cases and rarely solitary calculus can be identified [8,9]. In my study, pancreatic calcifications were noted in 10 patients (79.3%).

The study suggests that CT could be used in non-resolving cases of acute pancreatitis to detect areas of necrosis and to detect mild forms of pancreatitis in case of strong clinical suspicion. In case of neoplasms the study shows that CT is always superior to ultrasound in staging and knowing the resectability and extension of mass lesions.

The overall sensitivity and specificity for CT are 95% and 90% respectively. They are superior to sensitivity and specificity of US (83% and 88%) in detecting pancreatic lesions. This study concludes that CT is the initial and best modality for pancreatic lesions, having higher sensitivity (95% CT Vs US 83%) and higher specificity (90% CT Vs US 88%) when compared to ultrasound. This study clearly indicates that CT is the method of choice for detecting a pancreatic lesion, its extent and defining its etiology.

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