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Role of CT in Imaging of Pancreatic Disorders

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Abstract: ***CT is highly accurate, non invasive imaging modality of choice in evaluation of pancreas. It enables the imaging of entire pancreas from the surrounding fat and bowel air along with imaging of other abdominal organs. The evolving role of CT in the study of pancreas is not only in its ability to directly define the presence of an abnormality but it also surpasses the other imaging modalities in being able to demonstrate the extent of the disease and its spread to contiguous areas by virtue of its being a non-organ specific investigation. The ability of CT to image the pancreas adequately regardless of the bowel gas and fat gives it an advantage over ultrasound.***

Keywords: Role of CT in Imaging of Pancreatic Disorders

1. Objectives

- To study age and size distribution in pancreatic diseases.
- To study and document feature of acute and chronic pancreatitis.
- To differentiate inflammatory and neoplastic conditions with their characteristic imaging features.
- To classify and grade pancreatitis with the help of CT imaging features.

2. Methods

Over a period of 3 months, 50 patients of different age groups in whom there was clinical suspicion of pancreatic disorder were studied. This includes 36 male and 14 female patients. Each patient had been studied by using plain and contrast computed tomography contrast dedicated pancreatic imaging on : Third Generation 128 slice spiral CT- Siemens Company. Informed consent also taken from each patient.

Inclusion criteria: All patients with clinical suspicion of pancreatic disorder complaining pain in abdomen and raised serum amylase levels.

3. Results

Most common age group of patients was 23 – 35, average 33 years. Male: female ratio- 2.5:1

Inflammatory diseases were found to be more common than neoplastic masses.

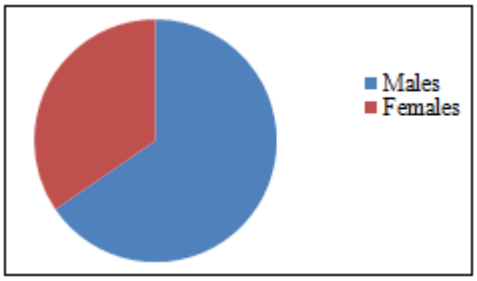
Acute pancreatitis was the predominant pancreatic pathology in our study, followed by chronic pancreatitis, pancreatic carcinoma and pancreatic trauma.

Average age of patient with chronic pancreatitis was 41 years. Chronic pancreatitis was showing pancreatic duct dilatation, pancreatic atrophy and pancreatic calcification. Pseudocysts were associated with chronic pancreatitis.

Pancreatic carcinomas extent and metastases was studied accordingly. Average age of patients with pancreatic carcinoma was 56 years.

Table 1: Age distribution of pancreatic disorders diagnosed on CT (n=50)

	No	%
Male	36	72
Female	14	28



Comments: Pancreatic disorders were more common in males than in females in this study. The commonest age group affected was between 30 to 50 years.

Table 2 : Distribution of patients according to various pancreatic pathologies.

Pathology	No.	%
Acute pancreatitis	37	74
Chronic pancreatitis	10	20
Pancreatic carcinoma	02	4.5
Other	01	1.5
Total	50	100

Comments: The other constitute of only one case of pancreatic cyst associated with VHL (von Hipple Lindau) syndrome. The commonest pathology in this study was acute pancreatitis followed by chronic pancreatitis and pancreatic carcinoma.

Table 3: Age and sex distribution of acute pancreatitis (n=37)

	No	%
Male	29	78
Female	08	22

Comments: Acute pancreatitis was more common in males than in females in this study. The commonest age group affected was between 30-50 yrs.

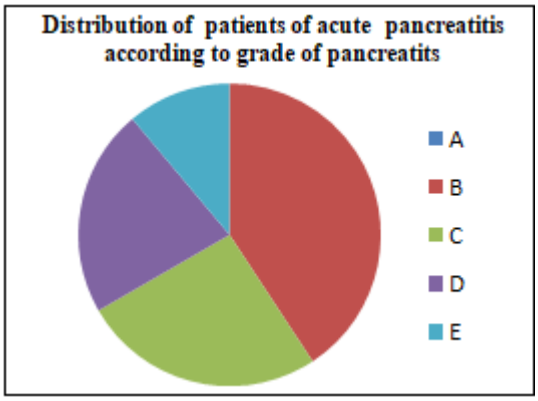
Table 4: Various CT signs of acute pancreatitis

Abnormality	No.	%
1. Contour changes	33	90
2. Diffuse enlargement	13	35
3. Focal enlargement	22	60
4. Peripancreatic fluid collection	24	65
5. Pseudocyst	11	30
6. Coexistent gall stones	7	18
7. Necrosis	9	25
8. Extrapancreatic manifestations	12	33

Comments: Fluid accumulation is defined as a localized collection of pancreatic fluid in the pancreas, lesser sac, anterior, pararenal space or subperitoneal space. a12 patients had extrapancreatic fluid accumulation, while 24 patients had peripancreatic fluid accumulation. Extrapancreatic fluid collections noted in lesser sac and subperitoneal space.

Table 5: Distribution of patients of acute pancreatitis according to grade of pancreatitis (n =37)

Grade	No. of patients	%
A	-	00
B	11	25
C	7	20
D	6	15
E	3	10



Grading:
Grade A: Normal pancreas.

Grade B: Focal or diffuse enlargement of the gland, including contour irregularity, non homogenous attenuation of gland, dilatation of the pancreatic duct,foci of small fluid collections with in the gland.

Grade C: Intrinsic pancreatic abnormality associated with haziness and streaky densities representing inflammatory changes in the peripancreatic fat.

Grade D: Single ill defined fluid collection.

Grade E: Two or multiple poorly defined fluid collections as presence of gas in or adjacent to pancreas.

Table 7: Age and Sex distribution of chronic pancreatitis.(n-10)

	No	%
Male	08	80
Female	02	20

Comments: Incidence of chronic pancreatitis was more in males as compared to females. The commonest age group affected was between 20-40 years.

Table 8: Distribution of signs of Chronic pancreatitis.

Signs	No.	%
1. Calcification	5	50
2. Atrophy	7	70
3. Fat infiltration	1	10
4. Pancreatic duct calcification	3	30
5. Pancreatic duct dilatation	4	40
6. Pseudocyst	2	20
7. Associated acute pancreatitis	3	30
8. Gall stones	1	10

Comments: Pancreatic ductal dilatation is defined as maximum AP diameter of the duct ≥5mm in the pancreatic head and ≥3mm in the body and tail.

Pancreatic Neoplasms

Table 9: Age and Sex distribution (n=2)

	No	%
Male	01	50
Female	01	50

Comments : The commonest age group affected in this study was elderly ie. Above 40 years with almost equal sex incidence.

Pancreatic neoplasms: Majority of the neoplasms are solid, adenocarcinomas representing 95% of these. They arise from the epithelium of the main pancreatic duct, accessory duct or their side branches.The larger size of tumors at presentation could be due to the fact that pancreatic neoplasms are notoriously asymptomatic when small and only on enlarging in size causes symptoms of obstructive jaundice, that they are detected.

4. Discussion

In our two and half years experience with patients referred for CT scanning of abdomen for pancreatic region, we singled out 50 patients for our study. Acute pancreatitis: In our study 37 patients were diagnosed as having acute pancreatitis. (72%). 12 patients (28%) were of the male sex and this was correlated with the high incidence of alcohol abuse in these patients as being the commonest cause of acute pancreatitis. The cause of acute pancreatitis in 24 of 36 patients to be due to alcohol abuse. Peak age of incidence was noted in the 30-50 years age range. In our study, 13 of 37 patients (35%) had diffuse enlargement of the pancreas, with focal enlargement of the pancreas seen in the 22 patients (60%).

In our study, 24 patients (65%) had acute fluid accumulations.

In our study, the natural history of acute fluid collections could not be followed up, as our patients could not afford rescans. In our study we had 11 cases of pseudocyst, 7 in intrapancreatic locations and 4 in lesser sac. The commonest site of pseudocyst; a late sequlae of the disease, in our study

was intrapancreatic location (66%) in acute pancreatitis. CT is a better investigation than US for detection of remote pseudocysts.

In our study, no patient had Grade A, 25% had Grade B, 18.75% Grade C, 43.75% Grade D and 12.50% Grade E pancreatitis. The patients who developed two or multiple poorly defined fluid collections were of Grade E pancreatitis. Further pleural effusion in 50% cases and ascites in 25% were found in more sever grades, Grade D and E pancreatitis. The patients of Grade A, B, C had no or less number of complications like pleural effusion and ascites. Pancreatic necrosis described as focal nonenhancing low attenuation areas was noted in 6 patients (37.5%) in our study. Necrosis was not found in Grade A and B pancreatitis, but was found 33.33% in Grade C, 50% in Grade D and 16.66% in Grade E pancreatitis. These findings correlated with Balthazar E J et al (1990) [5] noted total necrosis being 20.4%. Necrosis was not found in Grade A and B pancreatitis, but was found 30% in Grade C, 35% in Grade D and 10% in grade E. Most patients with Grade D and E pancreatitis exhibited higher incidence of pancreatic necrosis detected in our study could be attributed to spiral acquisition of data during peak pancreatic parenchymal enhancement, thus allowing good discrimination between necrosed and viable portions of the gland.

Chronic pancreatitis: In our study of total 10 patients were diagnosed on CT having chronic pancreatitis of these 8 were males (80%) and 2 were females (20%) with maximum patients being in the age range of 20 to 40 years (18-70 year range). The commonest findings of chronic pancreatitis in our study were pancreatic atrophy (70%) (7 out of 10 cases), pancreatic calcification (ductal and parenchymal) 33.33% (5 out of 10 cases).

1 out of 5 patients showed dilatation of the duct up to the Ampulla of Vater, While this sign is useful in ruling out a proximal
pancreatic malignancy, it does not exclude an ampullary carcinoma. In our study pancreatic calcification was seen in 5 out of 10 patients (50%) showed presence of intraductal and parenchymal calcification. Intraductal calcification was noted in 5 patients while parenchymal calcification noted in 3 patients. In our study we were able to differentiate intraparenchymal from intraductal calcification. This distinction could be important from the management point of view in patients with chronic pancreatitis. Pseudocyst had an incidence of 20% in our study (20 out of 24 patients). We found 2 pseudocysts in 10 patients. One patient had the pseudocyst in the spleen. In our study incidence of pseudocyst was higher as compared to other studies. This could be attributed to later presentation of our patients of chronic pancreatitis with more severe disease and due to bias of clinical selection of patients undergoing CT.

Patients with pseudocysts >6 cms presented with abdominal pain and an epigastria lump. 6 pseudocysts >6 cms were drained surgically. Pancreatic atrophy was noted in 70% (7 out of 10) patients with chronic pancreatitis. Out of 17 patients, 13 patients show diffuse atrophy and 4 patients shows focal atrophy. Of these patients, 45.8% had associated pancreatic ductal dilatation.

Pancreatic neoplasms: Majority of the neoplasms are solid, adenocarcinomas representing 95% of these. They arise from the epithelium of the main pancreatic duct, accessory duct or their side branches.The larger size of tumors at presentation could be due to the fact that pancreatic neoplasms are notoriously asymptomatic when small and only on enlarging in size causes symptoms of obstructive jaundice, that they are detected.

5. Conclusion

In present study an attempt has been made to evaluate the role of computed tomography for evaluation of pancreatic diseases. In this study, a total number of 50 patients of pancreatic pathology were studied using spiral CT (36 male and 14 female patients). Patients were diagnosed as having chronic pancreatitis, 37 acute pancreatitis, 2 pancreatic neoplasms and 1 had simple pancreatic cyst. In conclusion, therefore, CT alone is an excellent noninvasive imaging modality with a sensitivity of about 94% in diagnosing pancreatic diseases when used judiciously in good clinical settings and accuracy of almost 100% when used in conjunction with other imaging modalities like ERCP, angiography and biopsy whenever indicated.

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