

ROLE OF RADIOLOGY IN PANCREATIC DISORDERS

Rifat Masud, *Akhtar Waheed, **Aurangzeb, **Fakhar Ilyas Malik, **Atif Mian

PAC Hospital Kamra, *AFIRM, Rawalpindi **Combined Military Hospital Sialkot

ABSTRACT

Objective: To find out mode of presentation and role of image modalities in pancreatic lesions in patients referred to radiology department.

Study Design: Prospective study.

Place and Duration of study: Radiology departments of CMH Muzaffarabad and CMH Sialkot from Jan 2003 to Jan 2006.

Patients and Methods: This study was conducted at CMH Muzaffarabad in collaboration with Kashmir CT Scan installed at CMH Muzaffarabad and CMH Sialkot in collaboration with PVT-CT Scans. Radiology departments of CMH Muzaffarabad and CMH Sialkot are equipped with ultrasound and fluoroscopic facilities. We evaluated 50 patients of different pancreatic lesions referred to our radiology department.

Results: Pancreatic lesions were more common in men (70%) than women (30%). Large group of patients (90%) belong to old age group. Out of 50 cases, 60% patients presented with jaundice, 20% with acute abdomen, 10% with mass abdomen and 10% with mixed symptoms. Ultrasonograph (USG) has been the main imaging modality in our study. All patients initially scanned with USG, patients diagnosed as mass pancreas on USG were advised CT scan, percutaneous transhepatic cholangiogram (PTC)/endoscopic retrograde cholangiopancreatogram (ERCP), and USG guided FNAC. In 15 (30%) cases ultrasound was inconclusive, in 10 patients pancreas was not clearly visualized and in 05 cases pancreas was normal looking. CT scan is more sensitive in picking up pancreatic lesions. CT scan was done in 24 (48%) patients. The results are shown in table. In our study 26 (52%) patients were of pancreatitis (Acute/chronic) and 20 (40%) of growth pancreas, 04 (8%) misc. cases (Divisum pancreas 02, annular pancreas 01, retropancreatic haemangioma 01).

Conclusion: It is concluded that pancreatic lesions present as acute abdomen, mass epigastrium and jaundice. In our set up USG is the main imaging modality to diagnose the pancreatic lesions. CT scan, PTC and ultrasound guided FNAC used as complementary tool.

Keywords: Pancreas, Imaging modalities, Ultrasonograph (USG), PTC/ERCP, CT scan.

INTRODUCTION

Imaging modalities for pancreas include plain radiography, contrast studies (barium meal studies, PTC / Endoscopic retrograde cholangio-pancreatography (ERCP), Angiography), ultrasonography, CT Scanning, Magnetic resonance imaging (MRI) including Magnetic resonance angiogram (MRA) and Magnetic resonance cholangiopancreatogram (MRCP). Pancreatic

disorders of radiological importance are annular pancreas, pancreas divisum, Mucoviscidosis, pancreatitis (acute, chronic) pancreatic cysts, pancreatic neoplasms (Exocrine / Endocrine). Clinically, patients of pancreatic disorders, present in a variety of ways, like acute abdomen, Jaundice or mass abdomen. Plain radiography (abdomen/ chest) show many signs like dilatation of bowel loops, sentinel loop, colon cut off sign, calcification in pancreatic region, pleural effusion, elevated diaphragm, avascular necrosis of bones etc [1-3]. Contrast studies (Barium, PTC, and ERCP) may show widening of "C" loop of duodenum, antral

Correspondence: Dr. Rifat Masud, Classified Radiologist, PAC Hospital, Kamra
Email: rifatmasud@hotmail.com

Received: 12 Oct 2006; Accepted 19 Dec 2006

'pad' sign, Frostburg's reverse (fig. 3) sign, 1 narrowing of distal common bile duct [1-3].

ERCP provides information about ductal system like beaded dilatation of pancreatic duct, pancreatic duct occlusion, scrambled egg appearance and double duct sign. The role of angiography has been reduced since the introduction of USG, CT Scan, ERCP, MRI /MRA & MRCP. Percutaneous transhepatic portography is method for localizing endocrine tumors [6-7]. Ultrasonographic features of pancreatic disorders are swollen /enlarged pancreas, echogenic texture with or without collections (intra or extra pancreatic) and pseudocyst formation in case of pancreatitis. Pancreatic tumor may occur in any portion of the pancreas as cystic / solid or complex mass with secondary changes like mets liver, dilated biliary channels, ascites and vascular encasement. Colour Doppler can assess vascular encasement. Endoscopic ultrasonography (EUS) displays the anatomy /pathology of pancreas, pancreatic / biliary ducts, peri pancreatic vessels and lymph nodes in great detail [8-10]. Ultrasound guided fine needle aspiration cytology (FNAC) helps in diagnosis of irresectable pancreatic tumor. Endovascular (intra portal) ultrasonography provides important information about the resectability of pancreatic cancer [13] CT scan of pancreas is the preferred technique; it displays entire pancreas and surrounding tissues in detail. Signs of acute/chronic pancreatitis are diffuse /focal enlargement with decreased attenuation of pancreas, thickened Gerota's fascia, calcification, dilated main pancreatic duct (MPD) and fluid collection. CT features of pancreatic tumors are mass of low/high or mixed density, dilated MPD/CBD ascites, liver mets, peri pancreatic enlarged lymph nodes, vessels occlusion or encasement. Localization of pancreatic Islet cell tumors remains a challenge for the radiologist, despite the availability of several imaging modalities. However with special CT techniques Islet cell tumor specially gastrinoma and insulinoma can be accurately localized [13,14].

MRI with recent technical advances has improved the abilities to image the normal and abnormal pancreas. MRI/MRA and MRCP can provide one stop shopping for assessing pancreatic pathology [12,15,18].

This study was conducted to find out the made of presentation and role of image modalities in pancreatic lesions in patients referred to radiology department.

RESULTS

Majority patients (90%) belong to the old age group but younger age group was by no mean exempt. The disease is more common in men (35 cases) than in woman (15 cases). Out of 50 cases, 60% patients presented with Jaundice, 20% with acute abdomen, 10% with mass abdomen and 10% mixed symptoms. In our set up ultrasound was the primary non-invasive imaging modality. So all patients were initially scanned with ultrasound (fig.1 & 2).

Patients diagnosed as pancreatitis were advised serum amylase / LFTs and follow up ultrasound scan to monitor the complications. Almost all of the cases had plain x-ray (chest and abdomen) but 5 (10%) cases showed evidence of pleural effusion, raised hemidiaphragm, colon cut off sign and sentinel loop. Seven (14%) cases showed widening of 'C' loop of duodenum, antral pad sign and extrinsic compression of stomach/ constriction second part of duodenum on barium meal examination (fig.3).

Patients diagnosed as mass pancreas on ultrasonography were advised to have CT scan, PTC, ERCP and Ultrasound guided FNAC. In 15 (30%) cases ultrasound was inconclusive, in five patients pancreas was normal looking (CT Scan showed pancreatitis in 02, two cases diagnosed on ERCP as pancreas divisum and 01 as annular pancreas on barium meal.) and in 10 cases pancreas not clearly visualized because of gas echoes and fluid collection CT Scan showed pancreatitis in 8 cases and mass in 2 cases (fig.4).

The choice of PTC and ERCP was decided after ultrasound. In 15 (30%) patients with dilated intrahepatic biliary channels PTC was done. In 10 (20%) patients who had no dilated

Table-1: Acute pancreatitis M=23

Sonographic Features	No of Patients	Percentage	Frequency
Enlarged Pancreas	21	91.3	20.3
Normal Pancreas	02	8.7	1.9
Hypoechoic	21	91.3	20.3
Mixed texture	-	-	-
Normal texture	02	8.7	1.9
Fluid Collection (Intra and extra Pancreatic)	05	21.8	4.8

Table-2: Chronic Pancreatitis M=03

Sonographic Features	No of Patients	Percentage	Frequency
Shrunken Pancreas	02	66.6	14.8
Focal Enlargement	01	33.4	7.4
Hyperechoic	02	66.6	14.8
Mixed texture	01	33.4	7.4
Calcification	03	100.0	22.2
MPD Dilatation	02	66.6	14.8
Gall stones	02	66.6	14.8

Table-3: Growth / Mass Pancreas N=20

Sonographic Features	No of Patients	Percentage	Frequency
Growth Head of Pancreas	13	65.0	14.4
Growth Body of Pancreas	03	15.0	3.3
Growth Tail of Pancreas	02	10.0	2.2
Diffuse involving Head / body tail	02	10.0	2.2
Hyper / Isoechoic	06	30.0	6.6
Hypoechoic	08	40.0	8.8
Mixed	06	30.0	6.6
Dilated Biliary channel	15	75.0	16.6
Enlarged Gall Bladder	10	50.0	11.2
Mets Liver	03	15.0	3.3
pleural effusion and ascites	04	20.0	4.4
Lymph adenopathy	02	10.0	2.2

Table-4: Misc Pancreatic Lesions

Lesions	No of Pts	Diagnosed on
Pancreatic Divisum	02	ERCP
Annular Pancreas	01	Barium Meal and ERCP
Retro Pancreatic Haemangioma	01	Diagnosed post op histopathology

Table-5, Percutaneous transhepatic cholangiography (PTC) was done in 15 cases

Abnormalities seen on PTC	No of Patients	Percentage	Frequency
Dilated Intrahepatic Biliary Channel	15	100.0	22.2
Dilated CBD with smooth tapering lower end	02	13.3	3.9
Dilated CBD with abrupt cut off and gloved finger appearance	13	86.7	19.2

Table-6: CT scan was advised only in selected cases (24), because of cost effectiveness

CT features	No of Patient	Percentage	Frequency
Growth pancreatic head/body and tail	12	50	11.2
Pancreatitis with and without fluid collections/calcification	11	48	10.6
Retropancreatic mass	01	2	0.2

intrahepatic channels but they had obstructive symptoms, ERCP was advised (fig.5 & 6).

CT scan is more sensitive in picking up pancreatic lesions. CT scan was done in 24 (48%) patients. The type of pancreatic lesions

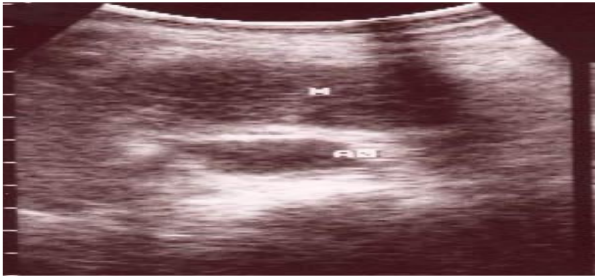


Fig.1: USG, Pancreatic Mass

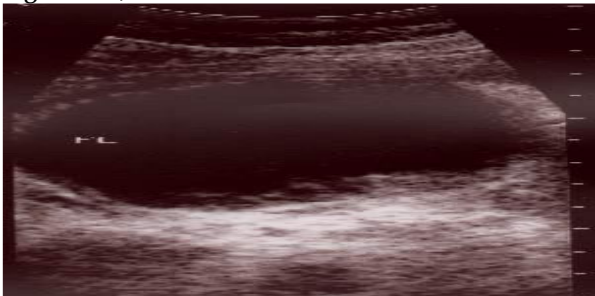


Fig.2: USG Pseudocyst Pancreas



Fig.3: Ba. Meal showing, constriction, second, part of duodenum (Annular, pancreas)

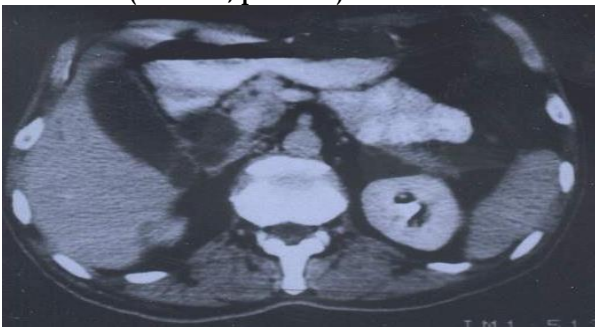


Fig. 4: CT scan shows growth pancreatic head

were 23 (46%) cases of acute pancreatitis (including pseudocyst, pancreatic abscess and other fluid collections), 3 (6%) cases of chronic pancreatitis 13 (26%) cases of growth/ mass head of pancreas 3 (6%) cases of growth body of pancreas 2 (4%) cases of growth tail of pancreas, 2 (4%) cases of pancreatic divisum, 1 (2%) case of annular pancreas, 1 (2%) case of retropancreatic mass (Haemangioma) and 2 (4%) cases of diffusely involving head /body and tail. Sonographic features are shown in table.



Fig.5 (PTC showing dilated CBD/narrowed distal end)



Fig.6: ERCP Showing dilated MPD with calcification

DISCUSSION

The task of this project was enormous, Most of the patients (out of 50) were of either pancreatitis (26) or of neoplastic (21) pancreatic disease Most of our patients presented with Jaundice, pain or mass epigastrium. Two patients presented in a very odd manner, one at 32 weeks pregnancy with pain right hypochondrium and other at postpartum with right renal colic but Sonography revealed acute pancreatitis in both cases. All cases were correlated with Laboratory findings including histopathology. Histopathology confirmed diagnosis in twelve cases. In 09 cases specimen was taken per-operatively and in 03 cases USG guided FNA done. Types of tumors on histopathology were adenocarcinoma diff (06), adenocarcinoma undiff (03), clear cell carcinoma (02), retroperitoneal haemangioma (01). Balthazar, Simchuk, Gurleyik, et al. Mentioned in their study of 55 patients with acute pancreatitis that multidetector row CT (MDCT) is the standard mean of confirming the diagnosis and identifying necrosis or other local complications in acute pancreatitis. CT severity index (CTSI) assesses the degree of necrosis and local complications in predicting

severity index [20-22]. Heirich, et al. Showed that the diagnosis and staging of pancreatic cancers are best made by CT (MDCT) and EUS with fine needle aspiration (FNA). The combination positron emission tomography (PET) and CT (MDCT) has been used for staging purpose is cost effective [23]. The selection of imaging modalities was tailored to the clinical situation and according to availability of imaging modality. Ultrasound was utilized in almost all cases. Ultrasound facilitated diagnosis in majority of our patients. CT scan was next modality which was frequently utilized but in selected cases. PTC and ERCP were used as complementary methods in selected cases prior to surgery to map the ductal anatomy and in few cases where CT scan and ultrasound findings were indeterminate. Aslam, et al states that MDCT evaluation of pancreatic masses facilitate early detection of small pancreatic lesion [24]. Istvan pulay, et al discusses the limitation of diagnostic method and how newer techniques may be of value in differential diagnosis. CT has 70-90% sensitivity and 80-100% specificity respectively. The specificity and sensitivity of ultrasonography in advanced cases of pancreatic masses is 90% but low in early stages. The overall sensitivity of ERCP is 20-40% but in ductal cancers sensitivity approaches 95% [25]. We performed PTCs with ordinary LP needles (22G) because of unavailability of Chiba needle and its high cost especially at Muzaffarabad (AJK), with 100% success rate. All cases were followed with serial sonograms till their recovery.

CONCLUSION

It is concluded that pancreatic lesions present as acute abdomen, mass epigastrium and jaundice. In our set up USG is the main imaging modality to diagnose the pancreatic lesions. CT scan, PTC and ultrasound guided FNAC are used as complementary tool.

REFERENCES

- Sutton D etc. In a text book of radiology and imaging 7th ed; Edinburgh Churchill living stone 2003; 787-824.
- Clark, L.R, etc. Pancreatic imaging, Radiological clinic of North America, 1985; 23: 3; 489-99.
- Arjun S Takhar, Ponni Palania - p pan, et al. Recent developments in diagnosis of pancreatic cancer. *BMJ*. 2004; 329: 668-73.
- Dehnert W, "Disorders of liver, biliary tract, pancreas and spleen" *Radiology review manual*, ed.1993, 446-7.
- G Delorune Berlin, *Radiology of pancreas* edited by Al Beart & Co, 1994.
- Khurram, AA Durrani ERCP evaluation of Patients with obstructive jaundice. *JCPSP*. 2003; 13: 6: 325-7.
- PC Bornman & IJ Beckingham. ABC of diseases of liver, pancreas and biliary system, pancreatic tumors, chronic pancreatitis. *BMJ*. 2001, 322; 721-3: 660-3.
- Roger C. Sanders MD. *Clinical sonography* third edition. 1998; 219-29.
- William D Middleton, Alfred B Kurtz, Barbra S, Hertzberg, *Ultrasound The Requisites*, second ed, 2004; 191-207.
- Francis S. Weil, *Pancreas, Ultrasound diagnosis of digestive diseases* 3rd ed. Berlin, Heidelberg, Newyork; springer-verlag; 1990; 1730291.
- Badrudin, Burhanuddin, Firoza Khatoon, Khalid Ahmed, Accuracy of Provisional diagnosis in Jaundice patients. *Pakistan Journal of Medical sciences*. April-June 1993.
- Tonsok Kim, Takamichi Murakami etal, pancreatic mass due to chronic pancreatitis, correlation of CT and MR imaging features with pathologic findings, *AMJ Roen*, 2001; 177: 367-71.
- Tetsuya Kaueko, MD. Akimasa Nakao, MD, Akio Harada MD, intra portal endovascular ultrasonography in pancreatic cancer- A new technique for the diagnosis of portal vein invasion, *surgery* 1994; 115: 438-44
- Lu Dsketal. Two phase helical CT for pancreatic tumors, pancreatic versus hepatic phase enhancement of tumors, pancreas, and vascular structures *Radiology* 1996; 697-701.
- Toshivuki Miyazaki, MR cholangio- pancreatography using HASTE (Half-Fourier Acquisition Single Shot Turbo Spin-ECHO) sequences. *AJR* 1996; 166; 1297-1303.
- Zaman RK et al, 3-D CT of pancreatic neoplasm reproduced in imaging from *AJR* 1994; 162; 1425-29.
- Wolf gangschina, Reinhold Fiiggor et al. Diagnosis and staging of pancreatic cancer. *Am J Roentgenol*. 2002; 179: 717-24
- Hagga, J. R. MR1 of the pancreas, the radiological clinic of North America, W. B. Sandres, Co. London, 22; 4: 869-77.
- uller PR. Pancreatic Biopsy: Striving for excellence, *Radiology* 1993; 87: 15.
- Balthazar EJ, Robinson DL, Megibow AJ, Ranso JH. Acute pancreatitis. Value of CT in establishing prognosis. *Radiology* 1990; 174: 331-36.

21. Simchuk EJ, Traverso LW, Nukui Y, Kozerek RA. Computed tomography severity index is predictor of outcomes for severe pancreatitis. *AMJ Surg* 2000;179:352-5.
22. Gurleyek G, Emir S, Kilicoglu, et al. Computed tomography severity index, APACHE-II score and serum CRP concentration for predicting the severity of Acute pancreatitis. *JOP* 2005; 6: 562-7.
23. Heinrich S, Goerres GW, Schafer M, et al. Positron emission tomography (PET)/Computed tomography influences on the management of respectable pancreatic cancer and its cost effectiveness. *Ann Surg* 2005; 242: 235-43.
24. Rizwan Aslam, MD, Judy Yee, MD. MDCT of pancreatic masses. *Appl Radiol*, 2006; 35: 4: 10-21.
- Istvan Pulay, Tibo F Tihanyi, et al. Pancreatic head masses; what can be done? Classification; The clinical point of view. *JOP.J Pancreas* (online) 2000; 1: 3: 85-

.....