Bangladesh Med Res Counc Bull 2016; 42: 120-124

Role of MDCT Scan in the Evaluation of Pancreatic Mass with Histopathological Correlation

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Abstract

Diagonstic imaging plays a critical role in evaluation of the adenocarcinoma of the pancreas- the 4th leading cause of death for the cancer globally. The purpose of this study was to determine the role of multidetector computed tomography (MDCT) in evaluation of pancreatic tumors. The prospective and study was carried out in Dhaka, Bangladesh during the period of July, 2013 to December 2014. Amongst 47 publish with suspected pancreatic lesion (having positive CT scan findings). Patients underwent histopathology of their lesions, the report of which was used as gold standard for comparing the role of CT scan in evaluating such lesions. Pancreatic disease was found to be more prevalent in males. The commonest age group was 56-65 years. On the average malignant lesions were more common in elder age group than the benign ones. Head of the pancreas was the commonest site for malignant pancreatic mass. Main pancreatic duct (MPD) dilatation was found to be a harbinger for malignant condition of pancreas. 72.3% patients showed MPD dilatation most of which proved to be malignant. Some 45% patients showed common bile duct (CBD) dilatation all of which presented clinically with jaundice. Out of 47 patients 33 (60.3%) were diagnosed to have malignant lesions while 14 (39.7%) had benign lesions. Finding of the study suggest that CT scan may be a useful tool for assessing and changing of Parcrease mass lesions.

Key word: Adenocarcinoma of Pancreas, MDCT scan, Parcrease mass lesions

Introduction

Adenocarcinoma is the most common non-endocrine malignancy of the pancreas. It is the 4th leading cause of death from cancer worldwide. The overall five-year survival rate is only 4%.[1] Because of its silent course, late clinical symptoms and rapid growth pattern, it has been known as a 'silent killer'. About two third of pancreatic masses arise in the head of the pancreas.[2] Despite the recent advances in imaging and treatment, pancreatic adenocarcinoma continues to be a lethal disease. While newer diagnostic techniques have improved the accuracy for detecting these tumors, no significant inroads have been made in finding 'early' cancers. Most tumors are diagnosed late and approximately 85% of tumors are unresectable at the time of diagnosis.[3] In a study in Bangladesh ranks 3rd in the prevalence of pancreatic cancer amongst the south Asian countries.[4]

Despite the fact that tumor serum marker CA 19.9 is considered a sensitive but nonspecific marker for the diagnosis of adenocarcinoma of the pancreas, it is rarely positive in tumors less than one cm in diameter. Therefore diagnostic imaging plays a critical role in the evaluation of the disease.[5] The imaging techniques for diagnosis and staging include US, contrast enhanced multidetector computed tomography (MDCT), magnetic resonance imaging (MRI), positron emission technology (PET), computed tomography (CT), endoscopic retrograde

cholangio pancreatography (ERCP) and endoscopic Ultrasonography (EUS).

However, the multiplanar imaging still suffered from stair-stepping artifacts. This drawback was overcome with the introduction of multidetector computed tomography (MDCT) in late 1990s. In contrast to single-detector helical CT scanners, these scanners use multiple detector rows, are 10 times faster, and can obtain 16–64 slices per rotation at a slice thickness of 0.5 mm. The MDCT has improved volume coverage speed and spatial resolution along z-axis, and allows three-dimensional reformatting due to isotropic voxels and exquisite multiplanar reconstruction of pancreatic anatomy.[6]

Most of the authors are of opinion that the pancreatic parenchymal phase and the portal venous phase (dual phase) are sufficient for the detection of the pancreatic adenocarcinoma and the arterial phase may be reserved for those patients who require CT angiography (CTA). Thus, the biphasic contrast-enhanced MDCT is a very effective diagnostic tool in the detection and accurate preoperative staging of pancreatic malignancies, which remain a challenge for radiologists. The addition of multidetector CTA improves the accuracy of diagnosing unresectable pancreatic carcinoma.

Although CT remains the most effective imaging modality for evaluation of the pancreas, magnetic resonance imaging (MRI) is increasingly used for further identification and characterization of pancreatic diseases. MRI involves expensive equipment and meticulous attention to the image technique. Other technical limitations are movement artifacts due to bowel peristalsis and breathing. Because the high sensitivity and specificity of MRI in detection and staging small tumors has not been achieved consistently and universally, debate continues about the superiority of MRI over CT.

Although MRI, PET, EUS etc can provide valuable and distinctive information on pancreatic mass, multisection CT should be used first in the detection of pancreatic adenocarcinoma. Carefully timed CT scan acquisition can maximize the difference in attenuation between neoplastic mass and the pancreatic parenchyma and allows accurate diagnosis, staging as well as assessment of local resectability. On one hand CT scan is an affordable, quick, available investigation for a patient with pancreatic mass. On the other hand, it is a very effective procedure that can elucidate maximum information regarding a pancreatic mass lesion.

Current study aims at providing evidence based recommendations for the radiologists for i) Choosing a procedure for establishing diagnosis of pancreatic mass lesions through analysis of accuracy, sensitivity, specificity and predictive capacity against a gold standard procedure, Histopathology in the current series; ii) evaluation of the accuracy of preoperative computed tomography (CT) in predicting the location and type of pancreatic lesion and malignant transformation of pancreratic tumours.

Materials and Methods

This prospective study was carried out on consecutive patients with suspected pancreatic mass in the Department of Radiology and Imaging, Sir Salimullah Medical College & Mitford Hospital, Dhaka during the period of January 2013 to December 2014. This study was attempted to do on 50 patients and among them three were dropped due to unavailability of histopathological reports. Therefore 47 patients were finally included in this study. At first patient suggestive of pancreatic mass were evaluated by detailed clinical history and clinical examination. Subsequently CT scan was done in all clinically suspected patients of pancreatic mass lesion. CT scans were reviewed to detect pancreatic mass as well as to characterise them into either benign or malignant by looking radiological signs. Histopathology was done in all cases with suspected pancreatic mass (positive CT findings) and patients were followed up to final diagnosis. Finally CT scan reports were compared with histopathological diagnosis.

This study was performed using a 16 slice multi detector CT (Somatom, Siemens Healthcare;

Germany). Low residue diet was prescribed 24 h before the procedure and the patient was instructed to come to CT unit after completing fasting for about 4-6 hours before examination. Reassurance and brief explanation of the procedure to the patient were given. All patients were examined in supine position.

After taking permission from relevant authority data were collected from the patients and their attendants. Prior written consent was taken from the patients and their attendants after explaining the procedural aspects of the study to them. All the other relevant data were collected from the history sheet, investigation papers. Computed Tomography findings were recorded in a structured data collection sheet. Histopathological diagnosis was recorded. Using computer software statistical package for social sciences (SPSS) data were processed and analyzed. The test statistics were used to analyse the data for descriptive statistics, Chi-square test or Fischer's exact probability test for comparison of data presented in categorical scale. The level of significance was set at 0.05 and p <0.05 were considered as significant.

Results

In this study, pancreatic lesions were more common in males (78.7%) than females (21.3%). The age group mostly affected by pancreatic mass lesions in this study was 56 - 75 years. The commonest age group amongst the patients was 56-65 years (53.2 %) followed by 66-75 years age group (25.5%) patients (table I).

Table I: Distribution of the patients by demographic characteristics

Characteristics	Frequency	Percentage (%)
Age Group		
46-55	8	17.0
56-65	25	53.2
66-75	12	25.5
>75	2	4.3
Sex		
Male	37	78.7
Female	10	21.3

63.8% of tumors occupied the head of the pancreas, 17% involved the body, 6.4% the tail and 12.8% diffusely involved the organ (table II).

Table II: Distribution of pancreatic lesions.

Location of the Lesion	Frequency	Percentage (%)
Head	30	63.8
Body	8	17.0
Tail	3	6.4
Diffuse	6	12.8
Total	47	100.0

Out of 47 patients, 33 (60.3%) were diagnosed to have malignant lesions while 14 (39.7%) of them had benign lesions. Of the 33 malignant cases, 17 (36.2%) had carcinoma pancreas, 13 (27.7%) had carcinoma with metastasis and 3 (6.4%) patients had extrapancreatic malignancy (lymphoma and ampullary growth). Out of 14 benign lesions 8 (17%) patients had pseudocyst, 2 (4.3%) had inflammatory mass, 2 (4.3%) had abscess, 1 (2.1%) had necrosis and 1 (2.1%) patient had tuberculosis (table III).

Table III: Distribution of Histopathological Diagnosis.

Malignant Tumor (n=33)	Frequency	Percent
Carcinoma Pancreas	**17**	**36.2**
Carcinoma with metastasis	**13**	**27.7**
Ampulary growth	**3**	**6.4**
Benign Tumor (14)		
Pseudocyst	**8**	**17.0**
Inflammatory mass	**2**	**4.3**
Pancreatic Abscess	**2**	**4.3**
Necrosis	**1**	**2.1**
TB	**1**	**2.1**

In this study, multi slice CT in the selected 47 patients resulted in a sensitivity of 87.5% in detection of pancreatic masses. The specificity was 66.6%, PPV 84.8%, NPV 71.4% and diagnostic accuracy was 80.8% (table IV).

Table IV: Sensitivity, specificity, PPV, NPV and accuracy of CT

Test statistics	Percentage (%)
Sensitivity	87.5
Specificity	66.6
PPV	84.8
NPV	71.4
Accuracy	80.8

Discussion

When pancreatic mass is suspected clinically, various imaging modalities have been employed for further evaluation of this mass. The use of non-invasive techniques including US and CT

permits a more frequent diagnosis of pancreatic neoplastic lesions. Recent improvements in imaging techniques have made it possible to improve the diagnostic accuracy for detection, staging, and indicating surgical resectability of pancreatic cancer.

Multislice CT is the most efficient non invasive technique in the assessment of pancreatic cancer. It allows excellent visualization of the pancreatic cancer during the different stages of contrast enhancement, thereby facilitates detection of small pancreatic lesions and evaluation of peripancreatic structures.

Current study was an endeavor to evaluate the role of MDCT in the evaluation of different pancreatic mass lesions. It was conducted among 47 patients of suspected pancreatic mass lesion. All of them underwent CT scan for their current pathology and subsequently histopathology was performed. Histopathology report was used as a foundation for confirming the actual diagnosis of patients and was used as a gold standard for comparing the procedure.

In this study, data were obtained from clinical examination, multislice CT and finally histopath -ological examination. In this study, pancreatic lesions were more common in males 78.7% than females 21.3%, this is in agreement with Jemal et al who stated that pancreatic neoplasm is greater in men than in women. [7]

The age group mostly affected by pancreatic mass lesions in this study is 56-75 years. Jemal et al found that those aged 60-80 years are the most affected group with pancreatic neoplasm and uncommon in those younger than 40 years. [7] The commonest age group among the patients was 56-65 yrs (53.2 %) followed by 66-75 yrs age group (25.5%) patients.

Becher and Stommer reported that 60% of pancreatic tumors occupied the head of pancreas, 10% the body, about 5% the tail and the remaining 25% were diffusely involved. [8] In the current study, 63.8% of tumors occupied the head of the pancreas, 17% involved the body, 6.4% the tail and 12.8% diffusely involved the organ.

Out of 47 patients, 33 (60.3%) were diagnosed to have malignant lesions while 14 (39.7%) had benign lesions. Out of 33 malignant cases, 17 (36.2%) had carcinoma pancreas, 13 (27.7%) had carcinoma with metastasis and 3 (6.4%) patients had extrapancreatic malignancy (lymphoma and ampullary growth). When pathological process disrupts normal peripancreatic plain a number of peripancreatic pathologies may mimic pancreatic mass. This is the explanation of two extrapancreatic malignancy was discovered in the study. This drawback of cross sectional imaging is supported by Mahmoud AD.[9] Out of 14 benign lesions 8 (17%) patients had pseudocyst, 2 (4.3%) had inflammatory mass, 2 (4.3%) had abscess, 1 (2.1%) had necrosis and 1 (2.1%) patient had tuberculosis.

With CT scan 28 out of 47 patients were true positive and 10 were found to be true negative. Five benign cases were diagnosed as malignant in CT report. Hence they were false positive, while 4 malignant cases were reportedly benign and they were false negative cases. In the present analysis, positive refers to the malignant cases and negative refers to the benign patients. In this study, multi slice CT in the selected 47 patients resulted in a sensitivity of 87.5% in detection of pancreatic masses. The better evaluation of peripancreatic fat plane disruption or fascial plane thickening and extension or invasion of growth probably was responsible for such a high sensitivity of CT scan over other conventional imaging techniques. Scaglion et al reported sensitivity as high as 90 to 97% in the detection of pancreatic masses. [10] In conclusion, Contrast-enhanced multiphase pancreatic imaging by multislice computerized tomography (MSCT) with its post processing techniques represents the image of choice for diagnosis and evaluation of pancreatic masses.

Conclusion

Findings of this study support that the excellent soft tissue resolution, better evaluation of peripancreatic fat plane disruption or fascial plane thickening and extension or invasion of growth proved CT scan may be a useful tool for assessing and characterization of pancreatic mass lesions. A large scale study with greater logistic support and adequate randomisation is thus recommended.

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