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Original Article

Assessment of Pancreatic Lesions using MDCT: An Observational Study

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ABSTRACT:

Background: Imaging is a vital component in the assessment of pancreatic disease. Computerized tomography (CT) became the imaging modality of choice in assessing pancreatic pathology. Improvements in multidetector CT (MDCT) and its better temporal and spatial resolution help in providing accurate timing of multiphasic imaging. In view of the high prevalence and mortality rate due to focal pancreatic lesions, early reliable diagnosis is vital and so this study was taken up. The objective of the study is to know the reliability of MDCT in focal pancreatic lesions.

Methods: This is a kind of observational study done on 100 patients with pancreatic lesions diagnosed clinically or as per ultrasonography (USG) at Fathima Institute of Medical Sciences, Kadapa, Andhra Pradesh, India. Demographic variables, USG findings, MDCT findings, histopathological examination (HPE) diagnosis, vascular and lymph nodal invasion, and metastasis were assessed. Diagnostic accuracy of MDCT was assessed by comparing it with HPE findings.

Results: Pseudocyst was found in 44% of patients, and Malignancy in the head of pancreas was seen in 14% of patients. Carcinoma in head and body was seen in 8%. Serous cystadenoma was seen in 8% of patients as per MDCT. MDCT was 100% accurate in detecting malignancy and IPMN. It was 90.9% accurate in detecting mucinous cystadenoma, 66.67% accurate in detecting serous cystadenoma, 86.36% accurate in detecting pseudocyst.

Conclusion: MDCT plays a vital role in detecting various pancreatic lesions, including malignancies. Early detection of these dangerous lesions accurately can help in proper clinical management of patients.

Keywords: Pancreatic lesions, MDCT, multiphasic imaging, pancreatic malignancy, computerized tomography

How to Cite

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INTRODUCTION:

Imaging is a vital component in the assessment of pancreatic disease. Computerized tomography (CT) became the imaging modality of choice in assessing pancreatic pathology.[1] Improvements in multidetector CT (MDCT) and its better temporal and spatial resolution help in providing accurate timing of multiphasic imaging. It shows more reliability in pancreatic lesion detection and characterization. Challenging scenarios include timely detection of adenocarcinoma of the pancreas, occult neoplasms in acute or chronic pancreatitis, and staging of pancreatic malignancy before surgery.

By enhancing the contrast between pancreatic lesions and parenchyma on CT scans, we can improve CT performance in detecting pancreatic disease. Various studies showed the relevance of tube voltage, conspicuity of lesion and attenuation value of contrast like iodine. Attenuation increases by using low-voltage X-rays due to enhanced photo-electric effect.[2-3] This low-voltage technique was not commonly accepted for abdominal scanning due to high noise level. With recent development of dual-energy CT (DECT), which is equipped with 2 two X-ray tubes and 2 detectors, it is possible to obtain two CT acquisitions at two energy levels.[4-5] Pancreas can be well imaged with high temporal resolution with MDCT. Advantages of MDCT include thin slice collimation, multiphasic imaging and near isotropic resolution. Quick scan times and shorter volume acquisitions allow contrast enhancement of major vessels. Benign and malignant lesions can be evaluated most efficiently with the help of MDCT with the added advantage of it being non-invasive. It allows better visualization and identification of small and large pancreatic lesions and assessment of structures around the pancreas.

MDCT can reliably depict the tumor morphology, anatomy of the duct and relationship to surrounding organs in cases of pancreatic neoplasms. Studies on computed tomography (CT) and magnetic resonance imaging (MRI) showed a high prevalence of pancreatic cysts in subjects even without having any history of symptoms. The prevalence of pancreatic disease is around 2.5%,[6-7] and this raises with increasing age. 10% of patients aged above 70 years will have a pancreatic cyst. Dhir et al. reported an incidence of 0.5-2.4 per 1 lakh men and 0.2-1.8 per 1 lakh women in India, and higher rates were seen among males in urban areas of western and northern India.[8] 16% of patients present with the disease confined to the pancreas[9] and around 85%-90% have surgically unresectable tumours by the time of diagnosis. In view of the high prevalence and mortality rate due to focal pancreatic lesions, early reliable diagnosis is vital. Hence this study was taken up to know the reliability of MDCT in focal pancreatic lesions.

MATERIALS AND METHODS:

Type of study and study site:
This is a kind of observational study done on 50 patients with pancreatic lesions who were referred to the department of radiology from departments of gastroenterology and medicine for MDCT at Fathima Institute of Medical Sciences, Kadapa, Andhra Pradesh, India.

Study duration: The study was done for 6 months from January 2022 to June 2022.

Sampling method: Convenience sampling

Sample size calculation:
As per **Lee et al**[10]., the prevalence of pancreatic cysts was 13.5%

The sample size is calculated as follows:

$$N=Z^2PQ/E^2$$

N-sample size

P-Prevalence

P=13.5%

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Q=1-P

E-Error: 10%,

95% confidence limits

N=45

45 is the minimum sample size.

So, we included 50 patients considering incomplete data in some cases.

Inclusion criteria

- Patients with focal pancreatic lesions diagnosed as per USG
- Patients aged above 18 years of any gender
- Patients who provided informed consent

Exclusion criteria

- Pregnant and lactating women
- Patients who were lost to follow up
- Patients who are allergic to contrast
- Patients with severe hepatic and renal failure

Material used:

GE Multi-slice CT was used for all patients. Slice thickness was 2.5 mm. multi-planar reconstruction was done at 3 to 7 mm. Axial and sagittal or coronal, curved multiplanar reconstructions were done and studied. Initially plain CT axial sections were taken, followed by contrast study. Iohexol or omnipaque intravenous contrast that contains 350 mg iodine/ml at a dose of 1.75 ml /kg was used.

Parameters assessed:

- Age, Gender
- USG findings
- MDCT findings
- Location of lesion
- Vascular invasion
- Lymph nodal invasion
- Distant metastasis
- HPE findings

Ethical considerations:

Permission from the IEC attached to the Fathima Institute of Medical Sciences was taken before conducting the study. All patients were explained the complete process and benefits of their data for the study. After he/she accepts, an informed consent form was provided in the local language or and the person was asked to sign it or put a thumb impression.

Statistical analysis:

Data analysis was done using Epi Info software version 7.2.5. The results were expressed as mean ± S.D, percentages. The diagnostic accuracy of MDCT was assessed by comparing it with HPE diagnosis.

RESULTS:

Age distribution:

32% of patients were in aged 51-60 years, 26% were aged 41-50 years, 18% were aged 31-40 years and 24% were aged 61-70 years. The mean age was 56.7±9.2 years.

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Table 1: Age distribution of patients

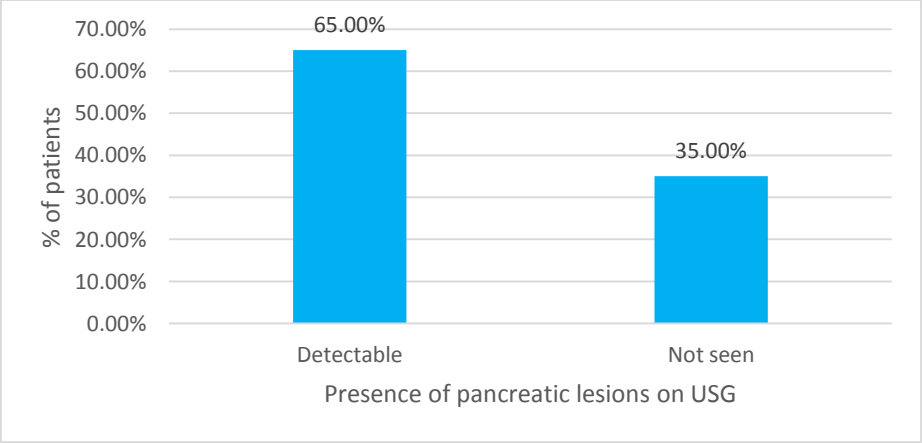
AGE GROUP	Frequency	Percent
21-30	Nil	Nil
31-40	9	18%
41-50	13	26%
51-60	16	32%
61-70	12	24%
Total	50	100.00%

Gender: 78% of patients were males.

Location of lesions: 52% of lesions were seen in the head of pancreas. 24% in tail and 24% were found on the body of pancreas. There were no multiple lesions in our study.

USG findings:
Pancreatic lesions were detected in USG among 70% patients.

Figure 1: USG findings among patients



MDCT findings:

Pseudocyst was found in 44% of patients, Malignancy in the head of pancreas was seen in 14% of patients. Carcinoma in head and body was seen in 8% Mucinous cystadenoma was seen in 22% patients. Intraductal papillary mucinous neoplasms (IPMN) was seen in 4% patients. Serous cystadenoma was seen in 8% of patients.

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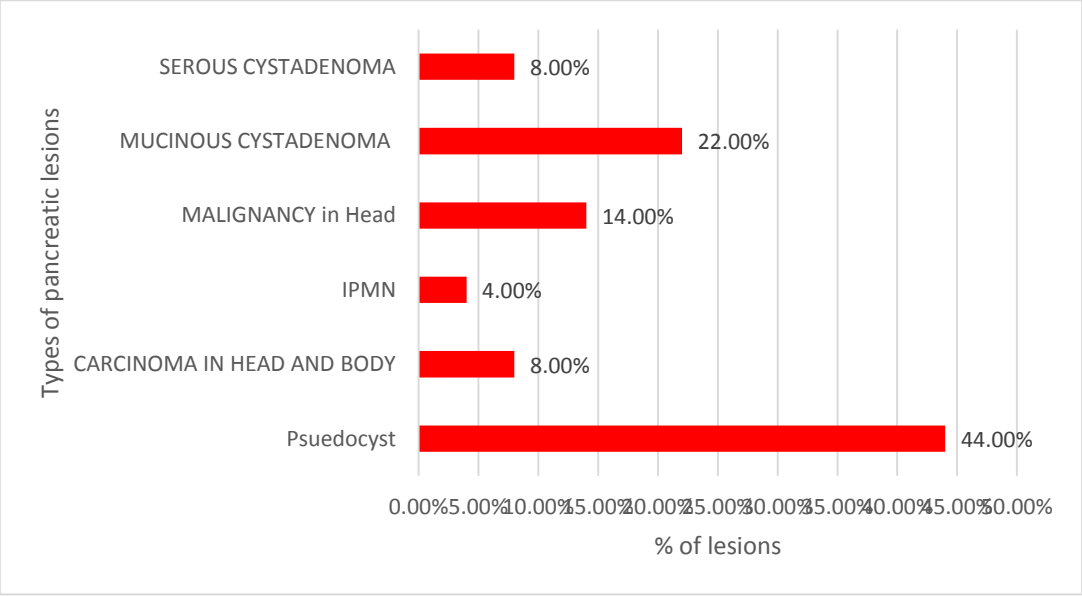
Figure 2: MDCT findings



Location of lesion:

Vascular invasion: It was seen in 22% of patients.

Lymph nodal invasion: It was seen in 10% of patients.

Distant metastasis: It was seen in 8% of patients among 22% of patients with carcinoma.

Table 2: Distant metastasis among patients

ANY DISTANT METASTASIS	Frequency	Percent
No	7	14%
N/A (non-malignant lesions)	39	78%
Present	4	8%
Total	39	100.00%

HPE findings:

Pseudocyst was seen in 38% of patients in HPE. Malignancy was seen in 22% of patients. Serous cystadenoma was seen in 12% of patients, mucinous cystadenoma in 20% of patients. There was no abnormality in 4% of patients. IPMN was seen in 4% of patients.

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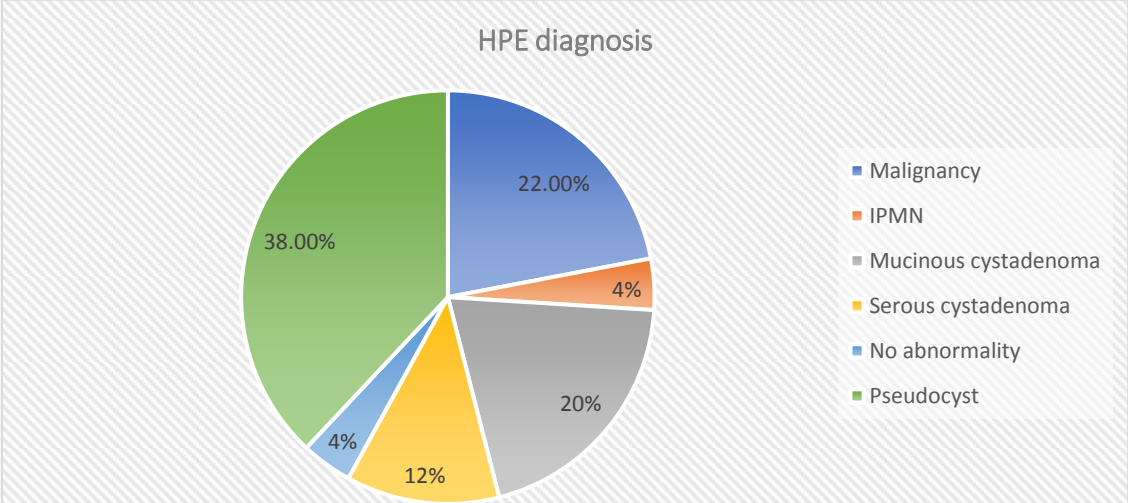
Figure 4: HPE diagnosis of pancreatic lesions.



Comparison of MDCT with HPE diagnosis:
MDCT was 100% accurate in detecting malignancy and IPMN. It was 90.9% accurate in detecting mucinous cystadenoma, 66.67% accurate in detecting serous cystadenoma, 86.36% accurate in detecting pseudocyst. Overall diagnostic accuracy of MDCT in correctly detecting various pancreatic lesions was 89%.

Table 3: Comparison of MDCT with HPE findings

TYPE OF LESION	HPE DIAGNOSIS (%)	MDCT DIAGNOSIS (%)	ACCURACY OF MDCT
Malignancy	22%	22%	100%
IPMN	4%	4%	100%
Mucinous cystadenoma	20%	22%	90.90%
Serous cystadenoma	12%	8%	66.67%
Pseudocyst	38%	44%	86.36%
TOTAL			89%

DISCUSSION:

This was an observational study conducted at Fathima Institute of medical sciences, a tertiary care centre with well-equipped facilities on 50 patients with pancreatic lesions using MDCT.

Comparison with other studies:

Most of the patients were aged 51-60 years. The mean age was 56.7±9.2 years. Most of the patients were males. This implies that pancreatic cysts are common in 5th decade of life and among males. **Azzaz** et al.[11] did a study to detect

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the accuracy of MDCT in assessing various pancreatic lesions and eradicating the possibility of cancer. Their study included 42 patients. The age of patients ranged from 36 to 80 years. The mean age was 58.8 years. It was almost similar to our study. There were 24 males and 18 females. Male preponderance was similar to our study.

The most common location of pancreatic lesions was head in our study. **Takikawa** et al [12] reported that the location was common in the head of the pancreas, similar to our study, which was seen in 48.5% of patients.

Pseudocyst was most common lesion in our study. Mucinous cystadenoma was seen in 22% of patients. Serous cystadenoma was seen in 8% of patients. **R chang** et al.[13] did a study on 21745 subjects who were asymptomatic, as a part of health screening in Seoul, Korea. Pancreatic cystic lesions were seen among 457 patients. The commonest lesion was IPMN, in contrast to our study. It was seen in 82% of patients. Serous cystic neoplasm was seen in 4% of patients, mucinous cyst neoplasm was seen in 2%, and indeterminate cysts in 12% of patients.: Indeterminate cysts were not seen in our study.

The sensitivity of CT in the detection of pancreatic cancers lies between 75%–100%.[14]
MDCT was 100% accurate in detecting malignancy and IPMN. It was 90.9% accurate in detecting mucinous cystadenoma, 66.67% accurate in detecting serous cystadenoma, 86.36% accurate in detecting pseudocyst as per our study findings. **Singhal S et al.**[15] wanted to compare the staging of cancer of pancreas by MDCT with surgery. MDCT showed a sensitivity of 82.3% and specificity of 87.5% in detecting malignancies. The sensitivity and specificity were 100% and 93.3% in assessing vascular invasion.
In the study done by **Gupta S**[16], the overall diagnostic accuracy of MDCT in detecting pancreatic lesions was 83%. The accuracy increased to 86% when MDCT was combined with endoscopic ultrasound.
We highly recommend studies on the sensitivity of CT in detecting pancreatic lesions as per the size of lesion.
Dwaoud et al.[17] included 20 patients with pancreatic masses in his study. Among them, 16 patients were males and 4 were females, and their age range was 30–70 years. The mean age was 58.0 years, almost similar to our study MDCT findings were compared with HPE findings. Malignancy was seen in 12 patients, was seen in Adenocarcinoma as reported by pathological studies was found in 8 patients, IPMN in 2 patients, mucinous cyst adenocarcinoma in one patient, pancreatic pseudo cyst in two patients and mucinous cystadenoma in 4 patients. We didn't assess patients who were suitable for tumor resection in our study. This is one of the limitations of our study.
Hossain MS et al.[18] assessed the role MDCT in evaluating pancreatic tumors. 47 patients were included. Commonest site of malignancy was head, similar to our study. Overall 60.3% of subjects had malignant lesions and 39% had benign lesions. In contrast, in our study, benign lesions were commonly seen.
Rushdina MK[19] et al wanted to know the efficacy of MDCT in characterizing pancreatic lesions. Results showed that contrast-enhanced MDCT plays important role in detecting malignant tumors.
Hussanein SA[20] study was conducted to diagnose and stage pancreatic head cancer using recent advances MDCT. 40 patients with 30 males and 10 females were included. As per MDCT criteria, 82.5% of patients had no metastasis. The authors concluded that curved planar reformations and three-dimensional volume rendering techniques had an ability to detect 90% of cases with ductal involvement and biliary obstruction.

CONCLUSION:

Our study proved that MDCT plays a vital role in detecting various types of pancreatic lesions. Its accuracy is comparable with the gold standard diagnostic test histopathological examination. Being non-invasive it helps to accurately detect serious lesions, which in turn helps patients to take timely treatment.

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Declaration:

The study is self-sponsored.

There were no conflicts of interest.

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