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COMPARISON OF ENDOSCOPIC ULTRASOUND AND COMPUTED TOMOGRAPHY FOR EVALUATION OF PANCREATIC MASS LESIONS ASSUMING HISTOPATHOLOGY AS GOLD STANDARD

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Abstract
Background-Diagnostic imaging is an important tool to evaluate pancreatic neoplasms. Accurate detection and staging are essential for ensuring appropriate selection of patients who will benefit from surgery and for preventing unnecessary surgeries in patients with unresectable disease. Ultrasound (US), multidetector computed tomography (MDCT) with multiplanar reconstruction and magnetic resonance imaging (MRI) can help to do a correct diagnosis.
Methods- Hospital based cross-sectional and quantitative study. Patients with suspected pancreatic mass lesions referred to Department of Radiodiagnosis and Modern Imaging and to Department of Gastroenterology for MDCT and EUS respectively.
Results- EUS sensitivity was 98.00%, specificity was 75.00% and by CT scan sensitivity was 93.00%, specificity was 88.00% for mass detection. EUS sensitivity was 88.00%, specificity was 72.00% and of CT scan sensitivity was 76.00%, specificity was 100.00% in detection of vascular involvement. EUS sensitivity was 86.00%, specificity was 74.00% and by CT scan sensitivity was 92.00%, specificity was 100.00% for detection of lymphadenopathy.
Conclusion- In conclusion, our results showed that CT with pancreas protocoland EUS correlate moderatelywell in terms of mass detection, masssize, vascular involvement and lymphadenopathy.
Keywords: CT, EUS, Pancreatic lesion.

Introduction

Pancreatic adenocarcinoma is known to be one of the leading causes of cancer deaths, with a poor overall 5-year survival rate of only 4%.[1]

The incidence of pancreatic adenocarcinoma is still increasing; because of its silent course, late clinical symptoms and rapid growth patterns, it has been named the “silent killer”.[2]

Diagnostic imaging is an important tool to evaluate pancreatic neoplasms. Accurate detection and staging are essential for ensuring appropriate selection of patients who will benefit from surgery and for preventing unnecessary surgeries in patients with unresectable disease. Ultrasound (US), multidetector computed tomography (MDCT) with multiplanar reconstruction and magnetic resonance imaging (MRI) can help to do a correct diagnosis.[3,4]

In this study, we conducted a prospective study to compare EUS and MDCT in determining local and vascular invasion of a suspected pancreatic cancer and deciding its resectability.

Material and methods

STUDY TYPE: Hospital based cross-sectional and quantitative study

STUDY DESIGN: Analytical type of observational study

STUDY DURATION:

Data collection for study was started after approval from the institutional research andreview board, up to June 2019 or till samplesize achieved,Than it took another 2 months to processing the dataand write the thesis.

STUDY LOCATION:

Department of Radio-diagnosis and ModernImaging SMS Medical college Jaipur, Rajasthan.

STUDY AREA:

Out-patient and in-patient of Gastroenterology and Surgery Department, SMS Hospital Jaipur, Rajasthan.

EQUIPMENT:

128 slice Philips Ingenia CT Scanner and Olympus EU-ME2 (EUS Machine).

SAMPLE SIZE

Sample size is calculated at 95% confidence level and alpha error of 0.05 assuming expected correlation coeffiecient of .60 in the diagnostic ability of MDCT and EUS for the presence of malignancy in pancreatic mass lesions as per the reference article at a study power of 80% the sample size is 40 cases of pancreatic mass lesions.

STATISTICAL ANALYSIS

Data was expressed in terms of sensitivity and specificity of both modalities with appropriate and necessary tabular presentation.

Diagnostic accuracy of both modalities was calculated.

Quantitative data was analysed by mean values and S.D.

Qualitative data was analysed in terms of percentage and proportions.

Difference in proportions was analysed with Chisquare test and difference in Means were analysed with unpaired "t" test.

For significance p value less than .05 was considered significant.

SAMPLING TECHNIQUE:

Every eligible case was included in study.

STUDY UNIVERSE:

Patients with suspected pancreatic mass lesions referred to Department of Radiodiagnosis and Modern Imaging and to Department of Gastroenterology for MDCT and EUS respectively.

INCLUSION CRITERIA

- Criteria for Study Inclusion
- Patients with pancreatic mass detected on ultrasound
- Those who gave written informed consent were included in study

EXCLUSION CRITERIA

- Patients with history of sensitivity to Contrast Media.
- Renal insufficiency (creatinine level >1.5 mg)
- Non compliant patient.

METHODOLOGY

Patients selected after applying inclusion and exclusion criteria.Prior to examinations, written and informed consent was taken from the patient/guardian.

Prior to MDCT scan proper precautions were taken and patients were excluded if MDCT is contraindicated due to any reason.

TECHNIQUE

- MDCT PANCREATIC IMAGING PROTOCOL
- Oral contrast- Total volume 1500 ml OF WATER, 30 min before scan
- Intravenous contrast- 100 ml nonionic(IOHEXOL) contrast

Pre-contrast phase-
Detector collimation (mm)- 4 ×2.5
Reconstructed slice width-(mm)- 5

Arterial phase
Scan delay after iv contrast(s)- 30
Detector collimation (mm)- 4×1
Reconstructed slice width (mm)- 3/1.25

Portal phase
Scan delay after iv contrast(s)- 70
Detector collimation (mm)- 4×2-5
Reconstructed slice width (mm)- 5

Results

Table 1: Age wise distribution of cases

Age group(years)	No of cases	Percentage
45-60	4	10.00
61-75	35	87.50
>75	1	2.50
Total	40	100.00

In present study, 87.50% cases were from 61-75 years age group followed by 10.00% cases were from 45-60 years age group and 2.50% cases were from more than 75 years age group.

Table 2: Agreement results between CT and EUS for mass detection

Mass detection	EUS		CT	
	No	Percentage	No	Percentage
No mass	3	7.5	3	7.5
Indeterminate	3	7.5	2	5
Mass detect	34	85.00	35	87.50
Total	40	100.00	40	100.00
p-value	0.898			

In present study 87.50% cases mass detected by CT scan and in 85.00% cases mass detected by EUS.

Table 3: Agreement results between CT and EUS for vascular involvement

vascular involvement	EUS		CT	
	No	Percentage	No	Percentage
Vascular involvement detected	32	80.00	36	90.00
Vascular involvement not detected	8	20.00	4	10.00
Total	40	100.00	40	100.00
p-value	0.348			

In present study 90.00% cases Vascular involvement detected by CT scan and in 80.00% cases Vascular involvement detect by EUS.

Table 4: Agreement results between CT and EUS for Lymphadenopathy

Lymphadenopathy	EUS		CT	
	No	Percentage	No	Percentage
Lymphadenopathydetected	29	72.5	38	95.00
Lymphadenopathy not detected	11	27.5	2	5.00
Total	40	100.00	40	100.00
p-value	0.01(S)			

In present study 95.00% cases lymphadenopathy detected by CT scan and in 72.50% cases lymphadenopathy detected by EUS.

Table 5: Diagnostic accuracy for mass detection

	EUS	CT
Sensitivity	98.00%	93.00%
Specificity	75.00%	88.00%
PPV	96.00%	98.00%
NPV	86.00%	70.00%

In present study EUS sensitivity was 98.00%, specificity was 75.00% and in CT scan sensitivity was 93.00%, specificity was 88.00% for mass detection.

Table 6: Diagnostic accuracy for vascular involvement

	EUS	CT
Sensitivity	88.00%	76.00%
Specificity	72.00%	100.00%
PPV	62.00%	100.00%
NPV	92.00%	66.00%

In present study EUS sensitivity was 88.00%, specificity was 72.00% and in CT scan sensitivity was 76.00%, specificity was 100.00% in vascular involvement.

Table 7: Diagnostic accuracy for lymphadenopathy.

	EUS	CT
Sensitivity	86.00%	92.00%
Specificity	74.00%	100.00%
PPV	68.00%	100.00%
NPV	90.00%	68.00%

In present study EUS sensitivity was 86.00%, specificity was 74.00% and in CT scan sensitivity was 92.00%, specificity was 100.00% in lymphadenopathy.

Discussion

The overall five-year survival rate of pancreatic cancer is approximately 5%, however, the prognosis of different types of PCNs vary. SCNs are regarded as benign with a rare possibility of malignant transformation, whereas MCNs and IPMNs are considered to have a malignant potential. SPNs are low grade malignant lesions. Therefore, timely and accurate diagnosis of PCNs is particularly important to prevent the progression of cystic neoplasms to cancer. Whether or not EUS imaging provides accurate diagnostic information regarding pancreatic cysts is controversial.[5]

In present study EUS sensitivity was 98.00% , specificity was 75.00% and in CT scan sensitivity was 93.00% , specificity was 88.00% for mass detection.EUS sensitivity was 88.00% , specificity was 72.00% and in CT scan sensitivity was 76.00% , specificity was 100.00% in vascular involvement.EUS sensitivity was 86.00% , specificity was 74.00% and in CT scan sensitivity was 92.00% , specificity was 100.00% in lymphnode involvement detection.

The study indicate that EUS was the optimal diagnostic method in distinguishing non-neoplastic cysts from PCNs and in characterizing the PCNs, outperforming both CT and MRI. [6] Similarly, Lu et alfound that EUS was able to identify PCNs better when compared to using CT and MRI. In our study, the sensitivity of EUS for diagnosing PCNs and the accuracy for characterizing PCNs were higher than those previously reported. [7]In our study, almost all of the patients had undergone CT prior to undergoing EUS; it is possible that the CT imaging reports may have influenced the diagnosis by EUS.

Computed tomography (CT) and endoscopic ultrasound (EUS) with or without fine needle biopsy (or FNAC) have been widely used for diagnosing and staging of pancreatic cancer. There have been extensive studies comparing the accuracy, sensitivity

and specificity of single phasic, helical CT and EUS in terms diagnosing and staging of pancreatic cancer. In a systemic review involving 30studies and 1554 patients, EUS is superior to conventional CT inidentifying vascular involvement. The sensitivity of EUS and CT was72% and 63% and the specificity of EUS and CT was 89% and 92%.[8] A metanalysis showed EUS has a sensitivity of 91% and the specificity of 94%.[9] However, other studies have showed variable results and conflicting conclusion. Currently, there is no consensus in which image modality is better at diagnosis and pre-operative evaluation of pancreatic cancer. In recent years, a special CT protocol was created to evaluate the pancreas. It consists of a pre-contrast scan, multiple post-contrast phases including arterial phase 20-30s, venous phase 60-70s,with or without delayed phase. It also has high resolution and thin sections, specifically axial section thickness of about 1e4 mm. In theory, it should be superior to conventional CT and EUS in evaluationof the vasculature around a pancreatic mass. However, there have been a limited number of studies investigating this. In a study including 25 patients, was shown that CT with pancreas protocol has a sensitivity of 84%, specificity of 98%, positive predictive valueof 95% and negative predictive value of 93%.[90]In recent studies including 25 patients, multiphasic CT has been shown to have anegative predictive value of 87% (20/23 patients) for overall resectability.[10-11] These studies are limited by small sample size. In addition, the concordance between EUS and CT with pancreas protocol in detecting and staging of pancreatic cancer has not been evaluated in those studies.

Our study evaluated the concordance between CT with pancreas protocol and EUS in terms of pancreatic mass detection, mass size, vascular involvement and lymph node involvement. Those patients all had less aggressive histological type of pancreatic cancer (eg. Neuroendocrinetumors). Supplemental analyses also found no significant relationship between the length of time between CT and EUS andthe rate of agreement between the two modalities.

In summary, our results showed that CT with pancreas protocol and EUS correlate moderately well in terms of mass detection, masssize, vascular involvement and lymph node involvement. Agreement between two tests was somewhat lower for more specific details, including which specific blood vessels and lymph nodes were involved. Each test may provide additional information about diagnosis and staging of pancreatic cancer. Clinicians should usecaution in relying on a single modality to make decisions. With the aggressive presentation of most pancreas cancers and the importance of proper staging, it would seem that CT with pancreas protocol and if available a skilled gastroenterologist who can perform EUS together can provide complimentary information regarding pancreatic masses. While the intent of this study was to only compare CT and EUS as preoperative staging modalities, futuredirection from our group will include steps to investigate how CTand EUS correlate with final surgical and pathologic findings.

Conclusion

In conclusion, our results showed that CT with pancreas protocoland EUS correlate moderatelywell in terms of mass detection, masssize, vascular involvement and lymphadenopathy.

Each test may provide additional information aboutdiagnosis and staging of the pancreatic cancer. Clinicians should usecaution in relying on a single modality to make decisions. With theaggressive presentation of most pancreas cancers and the importanceof proper staging, it would seem that CT with pancreas protocoland if available a skilled gastroenterologist who can performEUS together can provide complimentary information regarding pancreatic masses.

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