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STUDY TO KNOW THE MULTI DETECTOR COMPUTED ANGIOGRAPHY ACCURACY FOR DIAGNOSIS OF CORONARY ARTERY DISEASE

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Abstract:

Objectives: *To compare the accuracy of conventional coronary angiography and MDCT angiography to detect significant coronary artery stenosis.*

Study Design: *An analytical and Observational Study.*

Place and Duration: *The study was performed in the Cardiology Department of Ch. Pervaiz Elahi Institute of Cardiology for the Period of One year from July 2016 to July 2017 in patients with moderate MDCT undergoing middle-range coronary artery disease (CAD).*

Materials and Methods*: A total of 30 patients were enrolled and this observation was examined in conventional coronary angiography in an analytical study. 64 slices (WI, GE, Lightspeed VCT, USA) for scanning all patients. With Judkins transfemoral technique Conventional coronary angiography was done. The results of MDCT angiography detected coronary artery disease (CAD) following the modified classification model of the 17-segment American Heart Association. Two independent observers evaluated the stenosis and classified the mean lumen narrowing as 50%. These were compared with the CCA in the same 17-segment model. Diagnostic accuracy measures were calculated as true negative, true positive, false negative and false positive results. With this positive and negative sensitivity predictive values of specificity were recorded.*

Results*: The study population mean age was 46.8 ± 9.3. The mean calcium score was 185.9 ± 250 HU. A total of 483 segments were analyzed. Analysis of these segments revealed that 93 (19.3%) segments were true positive, 367 (75.98%) were true negative, 11 (2.3%) were false positive and 12 (2.5%) were false negative. The sensitivity of detection of MDDT coronary artery disease was found to be 88.5% while the specificity was 97%. In order to detect this coronary artery disease, 96.8 was the CRT negative predictive value and 89.4 % was the positive predictive value.*

CONCLUSION: *MDCT coronary angiography (64 slices) provides high specificity and NPV to relieve significant stenosis in patients suspected of having CAD. MDCT angiography can be used as a tool for diagnosis of noninvasive coronary artery disease.*

Key words: *MDCT, angiography, stenosis.*

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INTRODUCTION:

In developed countries Coronary artery disease (CAD) is the major cause of mortality and morbidity and more than 25% of deaths in our world. Atherosclerotic disease will be the leading cause of global morbidity and mortality in 2020, which has serious implications for South Asian countries. For the ischemia detection, the non-invasive test was performed before the arrival of 64-slice MDCT. Coronary angiography allowed 5 of the noninvasive CAD to be detected with high diagnostic accuracy. Unpublished images for the detection of CAD have developed significantly over the past 50 years. New CT systems allow a significant increase in temporal and spatial resolution, also shortening the acquisition time of images and visualizing the vibrating heart. For this reason, MDCT angiography has gained popularity for CAD detection. Until now, rapidly developing MDCT in the United States is a noninvasive diagnostic method of cardiac imaging. U. The percentage of difficult reports has decreased from 3% to 10% in 64-part systems, to 40% in 20-part systems with 4-part systems. Most importantly, negative studies of MDCT exclude CAD, indicating that CAD more acceptable as a non-invasive tool to exclude a CAD significantly and invasive angiography or avoid additional images. For this reason, the study was planned to know the MDCT diagnostic accuracy.

MATERIALS AND METHODS:

This analytical and Observational study was performed in the Cardiology Department of Ch. Pervaiz Elahi Institute of Cardiology for the Period of One year from July 2016 to July 2017. Patients enrolled with chest pain and at least one coronary artery disease risk factor (CAD), with moderate CAD in the 30-70 age range, were selected for the study. Patients with a history of myocardial infarction. Patients with past PCI, stenting, CABG, or other cardiac surgeons. Arrhythmias, ICD, Heart Rate Patients. Beta-blockers or hemodynamically unstable patients with contraindications to iodine contrast. The patient can not hold his breath for 15 seconds. Renal insufficient Patients with (creatinine> 1.5 mg / dl). Body mass index> 40 Kg / m2 Patients and a calcium score higher than 1000 Agatons were excluded. A total of thirty patients were enrolled after the informed consent. Conventional coronary angiograms were performed 1 to 2 weeks after MDCT angiogram. Sampling technique was a suitable example. The first scintigraphy was performed with an unconfirmed ECG for the calcium score. Data collection was performed in a 5-10 second pause. Synchronization is achieved by calculating venoarterial transition time using a small bolus (15 ml) and a retrospective analysis of the healing pattern (using a contrast over time as the "data acquisition and contrast enhancement" assay). The nonionic contrast injection was applied at a rate of 65-100 ml at a rate of 5 ml / s followed by a 40 ml saline solution. The intake of the data was initiated after a calculated delay of 10 seconds after bolus infusion. The scan parameters were as follows: detector configuration 64 mm x 0625 mm, 40 mm collimation, 350 ms turnover time, tube voltage 120 kV, ECG 250-750 mA effective modulus, 0.4 mm resolution, thickness 0.6 mm cut only with one sector Temporary resolution of 175 ms. Electrocardiographically blocked data sets were automatically restructured at seventy five percent length of the cycle R-R. Additional increases of 10% were restructured from 0% to 90%. 64 parallel cross-sections Simultaneous acquisition allowed the images of the complete coronary tree to take up to 6-8 s of a single breed.

MDCT image evaluation: All the scans were analyzed independently by two doctors' consensus. All patients total calcium scores were expressed and calculated as the Agatston score. Patients with a calcium score greater than 1000 Agatstons were not included.

RESULTS:

Basic demographic data are shown in Table 1. A total of 483 sections were analyzed for the presence of true negative, true positive, false negatives and false positive. In conventional angiography, the distribution of the lesion was 1 (3.3%), 15 (50.0%) proximal tendon arteries and 16 (53.3%) patients, leaving the main trunk disease. %) had middle trunk disease.

Table 1: Baseline Demographic Variables

Characteristics	Numbers (Percentages)
Age mean years	46.8±9.3
Males	22(73.3%)
Females	8(26.7%)
Diabetes Mellitus	8(26.7%)
Smoking	10(33.3%)
Hypertension	17(56.7%)
Family History	12(40%)
Dyslipidemia	2(6.7%)
Height mean Cm	162.08±9.3
Weight mean Kg	68.35±15.3
Calcium Score	185.9±250

Proximal circumflex stenosis was observed in 4 patients (13.3%), in the middle LCX 9 (30%) and in the distal margin 1 (3.3%). Significant stenosis was detected in 6 (20%) patients in the segment proximal to the right coronary artery, 15 (50%) patients in the middle RCA and 3 patients (10%) in the distal RCA. A segment analysis of MDCT and CCA angiography was performed in accordance with 17-segment American Heart Association model for individual arteries and is shown in Table 2.

Table-2: MDCT and Conventional angiographic finding of coronary artery of the study population.

Variables		True positive	True negative	False positive	False negative	Accuracy
LMCA		1(3.3%)	29(96.7%)	0	0	**1.0**
LAD		46(30.7%)	99(66%)	4(2.7%)	1(0.7%)	0.95
	Proximal	15(50%)	12(40%)	2(6.7%)	1(3.3%)	0.90
	Mid	16(53.3%)	13(43.3%)	1(3.3%)	0	0.967
	Distal	5(16.7%)	25(83.3%)	0	0	1.0
	D1	9(30%)	20(66.7%)	1(3.3%)	0	0.967
	D2	1(3.3%)	29(96.7%)	0	0	1.0
LCX		17(11.3%)	126(84%)	2(1.3%)	5(3.3%)	0.953
	Proximal	4(13.3%)	25(83.3%)	1(3.3%)	0	0.967
	Mid	9(30%)	20(66.7%)	0	1(3.3%)	0.967
	Distal	1(3.3%)	28(93.3%)	0	1(3.3%)	0.967
	OM 1	3(10%)	24(80%)	1(3.3%)	2(6.7%)	0.90
	OM2	0	29(96.7%)	0	1(3.3%)	0.96
RCA		28(18.7%)	111(74%)	5(3.3%)	6(4%)	
	Proximal	6(20%)	22(73%)	2(6.7%)	0	0.93
	Mid	15(50%)	15(50%)	0	0	1.0
	Distal	3(10%)	24(80%)	3(10%)	0	0.9
	PDA	2(6.7%)	26(86.7%)	0	2(6.7%)	0.93
	PLV	2(6.7%)	24(80%)	0	4(13.3%)	0.86
Ramus intermediate		1(3.3%)	2(6.7%)	0	0	1.0

Table 2 shows the analysis of all segments in three main coronary arteries. Of the 150 segments in LAD, 46 (30.7%) were true positive, 99 (66%) were true negative, 4 (2.7%) were false positive and 1 (0.7%) were false negative. In the left circumflex, 17 (11.3%) were segment positive, 126 (84%) were true negative, 2 (1.3%) were false positive and 5 (3.3%) were false negative. Right coronary 28 (18.7%) were true positive, 111 (74%) were true negative, 5 (3.3%) were false positive and 6 (4%) were false negative. The sensitivity of MDCT for detecting significant coronary disease was 88.5. while the specificity was 97%. 89.4% was the positive predictive value and 96.8% was the negative predictive value of MDCT in detecting coronary artery disease.

DISCUSSION:

The use of mortality and morbidity in developed countries, as well as more than 25% of deaths in our world. Atherosclerotic disease will be the major cause of mortality and morbidity globally in 2020; This trend has serious implications for South Asian countries. MDCT is a minimally invasive coronary imaging tool. The 64-slice scanner has an improved acquisition time and the entire scan can be performed in 6-8 seconds. Before becoming a clinically accepted modality, it should be visualized correctly and comparable to CCA in all relevant parts of the coronary arteries. In this study, it was observed that the 64-slice MDCT scanner correlated perfectly with CCA and correctly and consistently identified the presence or absence of significant lesions in coronary arteries. Luminal stenosis and atherosclerotic plaque can provide reliable information about the presence, severity and features. In this study, it was observed that MDCT had a sensitivity of 88.5% and a specificity of 97% for the detection of significant coronary artery disease. The positive predictive value

was 89.4% and the negative predictive value of MDCT was 96.8%. Our results are consistent with other studies. The CACTUS test should have high specificity and sensitivity of MDCT up to 75% and 99%. Our results also show similar results. Vanhoenacker et al. Compared to previous generation scanners, 64-slice CT showed a significant improvement in accuracy in detecting coronary artery stenosis. The average weighted sensitivity for the coronary artery stenosis detection was 83% for 16-slice CT, 84% for four-slice CT and 93% for 64-slice CT; 93, 96 and 96%. Maffei et al. specificity, Sensitivity and negative and positive predictive value of MDCT were 99%, 92%, 94% and 99%, respectively. Patients with tachycardia or arrhythmia have poor quality images. Comprehensive calcification also removes the quality of the image. Image quality can be improved with dual source CT. The new technique can easily visualize almost all coronary segments without motion artifacts.18 New software techniques have reduced motion artifacts and false positive test results. The 256-slice MDCT system has a better time resolution by taking the entire scan in a single cardac cycle with high precision and specificity. Karlsberg and colleagues have shown that MDCT reduces CPE and also morbidity and mortality. Many patients with CCA can be avoided and used with noninvasive tests such as ETT, Spekt and myocardial perfusion images. Our study also showed high sensitivity and specificity with excellent negative predictive value. For this reason, unnecessary CCA can be avoided, which leads to cost savings and reduces mortality and morbidity. MDCT can also provide information on the forecast. Van Werkhoven et al. In their work, they have shown that risk assessment can be done with MDCT. In their study, Aldrovandi and colleagues found that MDCT in patients with normal coronary arteries had a 100% negative predictive value for cardiac events after 24 months of follow-up. Cademartiri and colleagues showed that 100%, 95%, and 100% of MDCT angiography had significant specificity, sensitivity and predictive negative value for patients with calcium scoring and patients with zero calcium scores, respectively.

CONCLUSION:

Coronary angiography with 64 slice MDCT provides high enough specificity and NPV to detect significant stenosis in patients with symptomatic or asymptomatic CAD. MDCT angiography can be used as a tool for noninvasive diagnosis of coronary artery disease.

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