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THE ROLE OF MULTI SLICE COMPUTED TOMOGRAPHY IN EVALUATION OF CORONORY ARTERY DISEASE IN DIABETIC PATEINTS

Thesis

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AHA	American Heart Association
BMI	Body Mass Index
bpm	Beat per Minute
CAD	Coronary Artery Disease
CHD	Coronary Heart Disease
CTCA	Computed Tomography Coronary Angiography
EBCT	Electron Beam Computed Tomography
HU	Hounsfield Unit
KV	Kilo Volt
LAD	Left Anterior Descending
LAO	Left Anterior Oblique
LCX	Left Circumflex
LMC	Left Main Coronary
LMT	Left Main Trunk
mAS	mill-Ampere Second
MDCT	Multidetector Computed Tomography
MIP	Maximum Intensity Projection
MPR	Multiplanar Reformation
MSCT	Multislice Computed Tomography
NPV	Negative Predictive Value
PDA	Posterior Descending Artery
PPV	Positive Predictive Value
RAO	Right Anterior Oblique

RCA	Right Coronary Artery
SD	Standard Deviation
VR	Volume Rendering

INTRODUCTION

The current epidemic of diabetes and its complications are on a dramatic rise both in the developed and the developing world. The number of Americans with diabetes has tripled from 1980 to 2007, reaching 17.4 million ***(Schwartz et al., 2012)***. Coronary artery disease (CAD) is often asymptomatic in these patients until the onset of myocardial infarction (MI) or sudden cardiac death. The American College of Cardiology (ACC)/ American Diabetes Association (ADA) recommends that cardiac testing be done irrespective of the presence of CAD symptoms in diabetics, with two or more atherogenic risk factors ***(Chopra and Peter, 2012)***.

Cardiovascular complications are the leading cause of morbidity and mortality in individuals with type 2 diabetes mellitus. The overall prevalence of coronary artery disease (CAD) has been reported to be as high as 60% in patients with diabetes referred for stress testing. Moreover, in patients with diabetes mellitus, CAD has frequently progressed to an advanced state before it becomes clinically manifest ***(Schwartz et al., 2012)***.

Patients with diabetes have more extensive coronary disease than those without diabetes, resulting in more challenging percutaneous coronary intervention or surgical (coronary artery bypass graft) revascularization and more residual jeopardized myocardium ***(Syed, 2010)***.

Recently, multi-slice computed tomography (MSCT) has been proposed as an alternative imaging modality to evaluate patients with known or suspected CAD. MSCT allows anatomical, non-invasive imaging of the coronary arteries, including detection of coronary atherosclerosis by assessing the coronary artery calcium (CAC) burden (calcium score) and by performing non-invasive angiography. With the 64-slice MSCT, high sensitivity (up to 93%) and specificity (up to 96%) for the detection of significant (≥50% luminal narrowing) stenoses have been reported, and this technique has been weighted against conventional coronary angiography (CCA) ***(Nasti et al., 2011)***.

With the recent development of the latest models of Multislice CT (MSCT) such as 16, 64, 128 dual source, 256 and 320 slice CT scanners, the diagnostic accuracy of MSCT angiogram in CAD has significantly improved.The clinical application of CT angiogram is of enormous value

in the evaluation of patients who have a low likelihood of CAD . MSCT has further contributed to better image quality in cardiac imaging by the introduction of dual source CT in 2006, as the temporal resolution is shortened from 165 to 83 ms and heart rate dependence is eliminated. Several meta-analysis of 64 slice CT studies have reported an impressive range of results in sensitivity and specificity (99% sensitivity and 89% specificity in 28 studies) ***(Chopra and Peter, 2012)***.

Therefore MSCT, (especially with 64 slice or more CT), has developed as an effective alternative to invasive coronary angiography, for the detection of CAD. It can be used as a highly sensitive screening modality, that achieves high diagnostic accuracy for the detection of significant CAD ***(Chopra and Peter, 2012)***.