INTRODUCTION

Multidetector CT represents the latest breakthrough in CT technology making an obvious quantum leap in clinical performance. Today many terms have been used to describe this new technology; multislice helical CT, multirow helical CT, multidetector helical row CT, multisectional helical CT and mulitchannel helical CT. ***(Indrajit IK et al, 2004)***

Two beneficial areas of MDCT technology are a) an improved scan speed and b) availability of isotropic imaging. Improved scan speed enables better coverage in a single breath hold, provides a significant reduction in patient movement artifacts and encourages better use of contrast media. The other feature of MDCT that provides spectacularly useful images is "isotropic" imaging defined as identical resolution of a structure in all dimensions. This valuable feature is of importance in 3D imaging, where stair step artifacts are virtually eliminated and the anatomical edges are well defined. Therefore, MDCT facilitates a wide range of clinical applications ranging from 3D imaging to perfusion imaging to CT Fluoroscopy. ***(Indrajit IK et al, 2004)***

The advantages of MDCT are important to many applications of CT scanning, including survey exams in oncologic or trauma patients and the characterization of focal lung and liver lesions through the creation of thin sections retrospectively. However, the greatest impact has been on CT angiography, cardiac imaging, virtual endoscopy, and high resolution imaging. ***(Berland LL and Smith JK, 1998)***

MDCT augments CT angiography by a) allowing multiphasic studies of vascular system (i.e. arterial and venous phases) due to faster scan times and optimal use of contrast, b) accurate delineation of narrow vessels due to the improved z axis resolution and c) peripheral runoff angiography due to longer scan and volume coverage. Overall, vascular protocols as CTA of the intracranial vessels, thoracoabdominal aorta, pulmonary arteries and coronaries greatly benefit from the high speed of MDCT. ***(Indrajit IK et al, 2004)***

For imaging of the heart, MDCT has been evaluated for assessment of the myocardium and myocardial perfusion and viability, cardiac function and wall motion, heart valves and cardiac tumors . For these applications, however, CT is in considerable competition with less invasive or more comprehensive imaging modalities such as echocardiography or cardiac magnetic resonance imaging. Until recently, CT applications for the assessment of CAD per se were almost exclusively directed at the detection and quantification of coronary arterial calcium. To date, the diagnostic value of CT coronary calcium measurements and the exact role of this marker for cardiac risk stratification remain unclear and controversial. ***(Schoepf J et al, 2004)***

However, the introduction and ongoing technical improvement of fast ECG-synchronized CT image acquisition in the heart have enabled imaging of the coronary arterial tree with a combination of speed and spatial resolution that has hitherto been unparalleled by other noninvasive imaging modalities. To date, the central rationale of this application has been the noninvasive detection and grading of coronary artery stenosis, with the ultimate goal of replacing diagnostic invasive conventional CA ***(Schoepf J et al, 2004)***. Invasive CA requires hospitalization and places the patient at low risk but definite potentially life threatening side effects, including arrhythmia, stroke, coronary artery dissection, and even death ***(Martin HK et al, 2005)***.

Unlike conventional angiography, moreover, the cross-sectional nature of CT additionally may enable assessment of the vessel wall. The potential of this technique for noninvasive identification, characterization, and quantification of atherosclerotic lesions and total disease burden within the coronary arteries is currently being evaluated. ***(Schoepf J et al, 2004)***

Coronary artery disease (CAD) can be considered as a (coronary iceberg) with a small percentage of patients symptomatizing with angina pectoris while most patients are asymptomatic leaving the heart to suffer in silence. The most alarming public health problem regarding coronary artery disease is the development of acute coronary syndromes and sudden death. The eastern mediterranean region suffers from a very high death rate from cardiovascular diseases with ischemic heart diseases (IHD) being the leading cause of death ***(Conti CR, 2002).***

The accuracy of CT coronary angiography for noninvasive detection of coronary artery stenosis is an area of active research. Depending on the study design and the number of patients or arteries excluded from analysis, published series in which four– to sixteen detector row CT technology was used found the sensitivity of noninvasive CT angiography for the detection of hemodynamically significant coronary artery stenosis in proximal portions of the coronary arteries to range between 80% and 90%. The most encouraging observation is the high rate of agreement among the majority of these studies with regard to the high negative predictive value of a negative CT coronary angiogram suggesting a potentially important role of noninvasive CT coronary angiography for reliable ruling out of severe CAD in the large population of patients with equivocal clinical presentation and findings, without costly invasive work-up for exclusion of the remote possibility of stenotic CAD ***(Nieman K et al, 2002; and Ropers D et al, 2003)***. Also, the accuracy of CT surpasses the accuracy of MR imaging for the detection of coronary artery stenosis ***(Kim W et al, 2001 and Bogaert J et al, 2003)***.

The advent of faster CT scanners with added detector elements increases the number of assessable coronary arteries ***(Nieman K et al., 2002)***. Also, improves the overall accuracy of noninvasive CT coronary angiography for stenoses detection ***(Nieman K et al, 2002 and Ropers D et al, 2003)***.

AIM OF THE WORK

To highlight the strengths and limitations of MDCT coronary angiography as a recent promising non-invasive diagnostic tool in assessment of known or suspected coronary artery diseases.