Combined CT coronary angiography and SPECT myocardial perfusion imaging in diagnosis of coronary artery disease.

THESIS

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Mohamed Anwar Abo Mesallam

List of Contents

List of Abbreviations

2D	Two dimensional
3D	Three dimensional
AMI	Acute myocardial infarction
BMI	Body mass index
bpm	Beat per minute
CAD	Coronary artery disease
CAG	Coronary angiography
CAT	Computed axial tomography
CPR	Curved planer reformation
CRP	C-reactive protein
CT	Computed tomography
CTCA	CT coronary angiography
DM	Diabetes mellitus
ECG	Electrocardiogram
EDV	End diastolic volume
ESV	End systolic volume
FH	Family History
GE	General electric
HLA	Horizontal long axis
HTN	Hypertension
HU	Hounsfield units
IDDM	Insulin dependent diabetes mellitus
Kg	Kilo gram
KV	Kilo voltage
LAD	Left anterior descending artery
LCX	Left circumflex artery

LDL	Low density lipoprotein
LM	Left main coronary artery
LV	Left ventricle
LVEF	Left ventricular ejection fraction
MA	Milli ampere
MIBI	Methoxyisobutyl isonitrile
MIP	Maximum intensity projection
MPI	Myocardial perfusion imaging
MPR	Multi planar reformation
MSCT	Multi slice CT
MI	Myocardial infarction
NIDDM	Non-insulin dependent diabetes mellitus
NPV	Negative predictive value
OSEM	Ordered subsets expectation maximization
PAI-1	Plasminogen activator inhibitor-1
PDA	Posterior descending artery
PMTs	Photomultiplier tubes
PL	Postero-lateral artery
PPV	Positive predictive value
QGS	Quantitative gated SPECT
RCA	Right coronary artery
RF	Radiofrequency
SA	Short axis
SD	Standard deviation
SDS	Summed difference score
SRS	Summed rest score
SSS	Summed stress score
SMCs	Smooth muscle cells

SPECT	Single photon emission computed tomography
SSD	Shaded surface displays
Tc	Technetium
VLA	Vertical long axis
VR	Volume rendering

Index of Figures

Index of tables

Combined CT coronary angiography and SPECT myocardial perfusion imaging in diagnosis of coronary artery disease.

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Abstract

Purpose of this study is to assess the benefits of combined CTCA and SPECT myocardial perfusion imaging over usage only one of them as diagnostic device especially in population at risk for coronary artery disease. ***Methods***: The study included 40 patients16 females and 24 males presented with risk factors or clinical suspicion for coronary artery disease referred from Cardiologists to Radio-diagnosis Department. Each patient included in the study was subjected to full history taking, reviewing medical sheet including: -

Risk factors (diabetes, hypertension, hyper-lipidaemia, smoking, obesity, history of ischemic heart disease or ICU admission and positive family history for ischemic heart disease), Chest pain (onset, course, duration, relation to exertion, sites of radiation, relieving factor), History of cardiac investigation (stress ECG, echocardiography, cardiac catheterization) if done. ***Results***: Using combined SPECT-MPI /CTCA results as referred criteria, the positive predictive value (PPV) and specificity for CTCA predicting abnormal hemodynamics are relatively low, where is (PPV) and specificity for SPECT-MPI are relatively high. Combined SPECT-MPI /CTCA Improves diagnostic performance in the mis-matched results and the equivocal lesions. ***Conclusion***: CTCA and SPECT-MPI provide different and complementary information on CAD, namely, detection of atherosclerosis versus detection of ischemia, correlating lesion location with functional significance, factors which are extremely important for the decision-making process.

Key Words: CTCA – SPECT-MPI.

Introduction

Each year, an estimated 1.5 percent of the population presents to primary care providers with chest pain. Moreover, coronary artery disease (CAD) is responsible for 8 to 10 percent of emergency department visits ***(Fihn et al., 2012).***

Reduction in the prevalence, morbidity, and mortality related to CAD is an important public health goal given the significant disease burden and contribution to total health care costs. Accurate, early diagnosis of CAD is important for initiation of appropriate treatment and reduction of CAD-related morbidity and mortality ***(Gottlieb et al., 2010).***

Historically, invasive coronary angiography (ICA) has been considered the standard reference diagnostic test for anatomic CAD and provides information on coronary artery anatomy and lumen obstruction. Angiography may overestimate or underestimate disease as estimation is influenced by a variety of technical factors as well as the complexity of coronary anatomy and plaque configuration. Many lesions are eccentric, so the apparent degree of stenosis can vary depending on the angle of visualization, and reproducibility on measurement of stenosis is considered only moderate ***(Cheng et al., 2011).***

Standard ICA also does not necessarily detect outward remodeling of the coronary artery, which may present a situation in which there is a large amount of plaque volume without significant lumen obstruction. Complications of ICA include those related to local anesthesia and use of contrast material, as well as infection, local vascular injury, myocardial infarction, stroke, and death ***(Yoo et al., 2011).***

Because of the cost and risk of ICA, noninvasive testing is more appropriate as a first-line diagnostic test for patients presenting with chest pain or other symptoms of IHD and who are deemed to be stable and not experiencing acute coronary events ***(Dedic et al., 2013).***

Noninvasive diagnostic tests can be broadly divided into two categories: functional tests and anatomic tests.