Role of ^{99m}Tc- SPECT-CT myocardial perfusion (MPI) is sensitive and accurate in the management of coronary artery disease

Karan Peepre

Abstract

Myocardial Perfusion Imaging in Nuclear cardiology is a headway specialty that is convenient from technological and radiopharmaceutical point of view. It is found that there has been an increase in the accuracy & sensitivity of myocardial perfusion imaging (MPI) with gated single photon emission computed tomography (SPECT) using ^{99m}Tc- sestamibi for assessing the diagnosis and prognosis of coronary artery disease. Furthermore, SPECT/CT with ECG gating allows the simultaneous assessment of both myocardial perfusion imaging (MPI) and left ventricular function (LVF). With rising concern for early detection of CAD and its effective treatment, MPI is ideally placed to provide complete functional assessment for the patient, regardless of their treadmill capacity. On the basis of Myocardial Perfusion Studies of 166 patients in one year with moderate to severe coronary artery disease (CAD) performed at All India Institute of Medical Sciences Raipur India, using $^{(99m)}$Tc-methoxy-isobutyl-isonitrile ($^{(99m)}$Tc-MIBI). Out of which TMT stress positive findings are 45 and 48 patients were normal and in pharmacological stress 37 were positive and 13 were normal. Also there were only rest scans in which 15 were positive and 8 were normal. The aim of this study was to find the accuracy and sensitivity in the management of coronary artery disease (CAD). Acquisition parameters for stress and rest phases to achieve the highest sensitivity and accuracy rate for $^{(99m)}$Tc-MIBI SPECT. Myocardial perfusion imaging (MPI) with SPECT was performed on the basis of one-day protocol with stress- and rest-phase images obtained at 45 to 60 minutes after injection of 8mCi & 22mCi $^{(99m)}$Tc-MIBI respectively. According to the parameters of image acquisition at stress/rest phases, sensitivity and specificity of one-day protocols for MPI with $^{(99m)}$Tc-MIBI is represented in following table respectively.

Introduction

Coronary artery disease (CAD) is that the commonest sort of heart condition. It's the leading explanation for death within both men and ladies. CAD happens when the arteries that provide blood to cardiac muscle become hardened and narrowed. Heart condition is that the most prevalent fatal chronic disease afflicting older Americans. It accounts for about 32 percent of all deaths and is that the leading explanation for death for both men and ladies aged 65 years and older (Anderson & Smith, 2005). It's also a serious explanation for illness; 37 percent of men and 27 percent of girls over age 65 reported having a heart disease in 2001/2002 (Federal Interagency Forum on Aging-Related Statistics, 2004). Men have higher heart condition mortality rates than women in the least ages with the gap declining as age increases (Khaw & Barrett-Connor, 1992; Markides, 1992). SPECT/CT Imaging: Clinical Utility of an Emerging Technology, Single-photon- emission computerized tomography (SPECT) has been utilized in general medicine, nuclear cardiology, and nuclear neurology for several decades to supply three-dimensional images of radiotracer distribution, SPECT data, generally, have proved superior to those of planar imaging, use of SPECT data has occasionally been but optimal due to an inability to supply accurate anatomic localization of an identified abnormality. By combining SPECT with an anatomic imaging modality like computerized tomography (CT), technique becomes more sensitive for accuracy.

The extent and severity of stress ischemia are strong predictors of coronary artery disease (CAD) events. Prognosis related to myocardial perfusion single photon emission computerized tomography (MPS) abnormalities on the resting scan because it relates to worry ischemia has been incompletely described. Quite 50% of patients who undergo cardiac catheterization have had a assay with MPI. In stable symptomatic patients, PET and SPECT MPI have high diagnostic accuracy for the detection of serious epicardial CAD. In comparison with SPECT, PET MPI offers technical advantages including reliable attenuation correction and improved counts with a decreased radiation dose. Consequently, PET may significantly improve diagnostic accuracy compared with SPECT. However, in expert laboratories, SPECT MPI that routinely incorporates attenuation correction and ECG gating could also be equally accurate. A growing body of evidence supports the diagnostic value of stress myocardial perfusion imaging within the detection of coronary artery disease in women. Data have shown that stress myocardial perfusion imaging consistently features a significantly higher diagnostic accuracy than exercise testing alone. Additionally, exercise SPECT myocardial

Karan Peepre

All India Institute of Medical Sciences, India, E-mail: drkaranpeepre786@yahoo.co.in

Karan Peepre.

perfusion imaging is more accurate in diagnosing coronary artery disease than planar imaging. The technetium-^{99m} (Tc-99m)-labeled isonitriles (sestamibi and tetrofosmin), which bind to mitochondrial membranes, emerged as superior imaging agents with single photon emission tomography (SPECT) imaging. When any of those imaging agents are injected intravenously during either exercise or pharmacologic stress, myocardial defects in tracer uptake represent either abnormal regional flow reserve or myocardial scar reflecting of coronary artery disease (CAD). The main clinical indications for stress SPECT or PET myocardial perfusion imaging are for detection of CAD because the explanation for pain and risk stratification for prognostication. Patients with normal stress myocardial perfusion scans have a superb prognosis with 50% uptake compared to normal uptake have a far better long-term outcome with revascularization than with medical therapy with enhanced left ventricular function and improved survival.

Conclusion

It is observed that is a safe and feasible technique for detecting coronary artery disease in patients. The Coronary artery disease (CAD) risk may be optimally estimated by use of a combination of resting MPI, reflecting a patient's burden of disease, and MPI with provocative ischemia. Myocardial perfusion imaging helps in making clinical decision for revascularization. It marks extent and severity of myocardial ischemia and myocardial viability which is useful guide for deciding between revascularization and medical therapy. This research shows MPI plays a very important role and very sensitive making decision during management of CAD. Our study shows that patients with moderate or severe ischemia derive benefit from revascularization.

Results

Statistic	Value	95% CI
Sensitivity	90.43%	82.60% to 95.53%
Specificity	83.33%	72.70% to 91.08%
Positive Likelihood Ratio	5.43	3.22 to 9.13
Negative Likelihood Ratio	0.11	0.06 to 0.22
Disease prevalence (*)	56.63%	48.73% to 64.29%
Positive Predictive Value (*)	87.63%	80.80% to 92.26%
Negative Predictive Value (*)	86.96%	78.03% to 92.60%
Accuracy (*)	87.35%	81.31% to 92.00%

This work is partly presented at 4th World Congress on Cardiology and Cardiac Nursing, June 15-16, 2020