Radiation dose reduction through re-imaging patients with suspected artifact related abnormalities studied with a stress first SPECT/CT myocardial perfusion protocol

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Abstract

Objectives The objective of this study was to determine the potential clinical benefits on diagnostic normalcy and radiation dose reduction of re-imaging the stress distribution in a population of patients scanned with a stress first myocardial perfusion protocol found to have unexpected abnormalities possibly related to motion or normalization artifacts.

Methods All patients referred for a clinically indicated stress myocardial perfusion study in 2011 (n=2,341) imaged with a stress first, stress only if normal, protocol were reviewed. Patients were injected with Tc-99m sestamibi during symptom-limited maximal exercise stress or regadenoson vasodilator stress. If abnormal, the patient were injected at rest and imaged using the same standard gated SPECT/CT protocol used for stress. Of this population, 231 patients (9.9%) had the stress images repeated because of suspected artifacts, generally due to motion or normalization errors. Retrospective analyses to determine the number patients that did not require high dose rest injection studies because of quality improvement with re-imaging and the associated clinical outcomes were performed.

Results Studies reported as normal after re-imaging that did not require a rest scan was 109 (47.2%) while 122 (52.8%) required a rest scan despite re-imaging. Of the cases that required rest imaging, 40 (17.3%) were reported as normal while 82 (35.5%) were abnormal. Among cases without previously documented disease (n=160), 68.1% were normal after repeat imaging and did not require high dose rest imaging. Hard cardiac events (death or MI) did not occur in any normal case. Of abnormal studies with angiographic correlates, 65% had confirmation of disease (n=24).

Conclusions Patients with abnormal findings suspected to be artifact on a stress first protocol can frequently be studied without rest injection by re-imaging. This approach results in significantly reduced radiation dose and improved diagnostic accuracy, especially in cases without prior documented disease.