

Feasibility of Myocardial Perfusion Imaging with Radiation Dose Reduction: Preliminary Experience

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Purpose: The accepted myocardial perfusion imaging (MPI) stress rest study with technetium 99m agents is limited by high radiation dose 10-25 mSv. Recently, several iterative reconstruction software was applied as part of image processing in order to reduce acquisition time. The aim of this study is to assess the feasibility of reducing technetium dose instead of reducing acquisition time with "evolution for cardiac" software.

Methods: The study is done randomly, by one of 2 protocols. Protocol one is the "accepted protocol" stress rest or rest stress study by accepted dose injections of Tc sestamibi (low dose 8-12 mCi, high dose 24 -36 mCi) with time acquisition and image processing are performed as accepted. Protocol 2 is the "half dose protocol" that is performed with injection of half doses of Tc sestamibi and processed by "revolution for cardiac" software. The radiation doses of technetium 99m is adjusted for each patient weight, and recorded by mCi, Becquerel's units and effective dose equivalent by millisieverts (mSv). The study was approved by local Helsinki committee, each patient signed on inform consent.

Results: Preliminary results on the first 12 patients are presented. 6 women, 6 women with mean weight 78.6 ± 23.2 . The mean radiation dose in patients with half dose protocol was 5.75 ± 0.99 mCi and 17.34 ± 1.20 mCi compared to 12.68 ± 5.76 and 32.52 ± 3.02 the accepted radiation dose ($p < 0.001$). Total effective dose for stress rest study was 7.19 ± 0.21 mSv in half dose protocol compared to 14.40 ± 0.61 in accepted dose protocol ($p < 0.001$). All patients except one showed good image quality. Eight of 12 patients who underwent stress only protocol exposed to 1.9 ± 0.19 mSv only.

Conclusions: MPI with radiation dose reduction by half is feasible with preserved image quality. Further experience is needed in order to tailor dose radiation reduction per patient and assess its diagnostic accuracy.