OPTIMIZATION OF UNJUSTIFIED HIGH RESTING TC-99M MIBI DOSE BY ADDITIONAL PRONE SPECT IMAGING FOLLOWING STRESS SPECT: AN OBSERVATIONAL STUDY

Samreen Iqbal[1], Nosheen Fatima[1,2], Sharjeel Nazeer[1], Hina Aftab[1], Dr. Asad Jalil[1], Dr. Tooba[1]

1. NUCLEAR MEDICINE & THERANOSTICS, DOW UNIVERSITY OF HEALTH SCIENCES, KARACHI PAKISTAN
2. AGA KHAN UNIVERSITY HOSPITAL, KARACHI PAKISTAN

Background:

Conventional one-day stress–rest myocardial perfusion imaging (MPI) with Tc-99m sestamibi employs a 1:3 stress-to-rest dose ratio to overcome residual stress activity. However, the high resting dose substantially increases patient radiation exposure. This study evaluated whether additional prone SPECT imaging after stress supine SPECT could eliminate the need for rest imaging in patients with suspected diaphragmatic attenuation, thereby reducing radiation dose without compromising diagnostic confidence

Objective

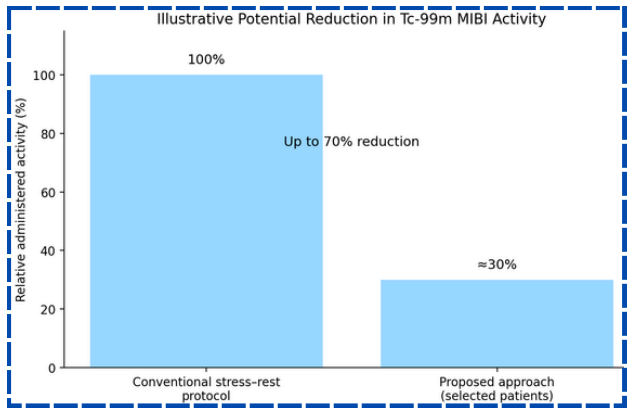
To evaluate whether additional prone SPECT imaging following stress supine SPECT can reduce or eliminate the need for high-dose resting Tc-99m MIBI imaging in selected patients with suspected diaphragmatic attenuation, while maintaining diagnostic confidence and reducing patient radiation exposure

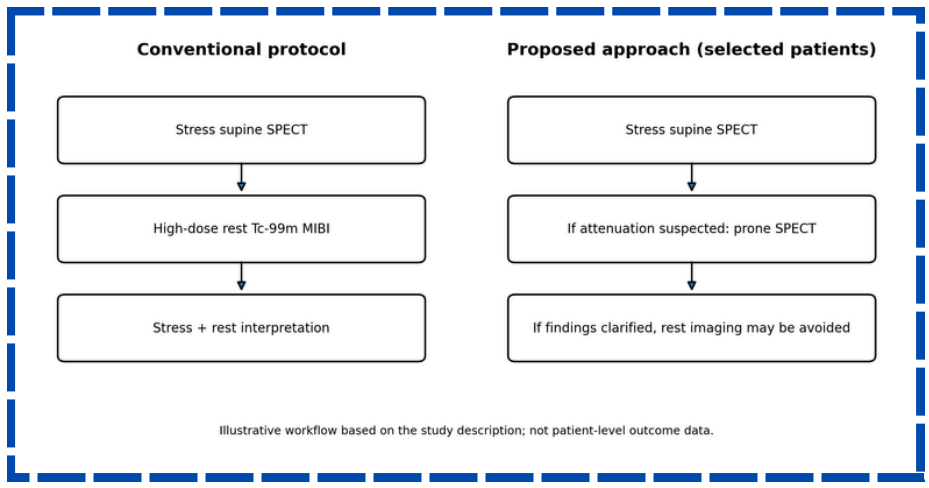
Methods

This prospective observational study was conducted at the Nuclear Medicine and Theranostics Department, Dow University of Health Sciences (DUHS). Eleven male patients (mean age 55 ± 12 years; mean BMI 27.48 ± 5.43 kg/m²) with low-to-moderate pre-test probability and no known CAD underwent gated Tc-99m MIBI myocardial perfusion imaging using a one-day stress–rest protocol with a 1:3 stress-to-rest dose ratio. Nine patients underwent exercise stress testing, while two received pharmacological stress. In patients with suspected diaphragmatic attenuation on stress supine images but preserved regional wall motion on gated imaging, an additional stress prone SPECT acquisition was performed. The impact of prone imaging on diagnostic confidence and avoidance of rest imaging was assessed

Results

Additional stress prone SPECT successfully differentiated diaphragmatic attenuation artifacts from true perfusion defects, allowing confident interpretation without the need for high-dose rest imaging in selected patients. This approach demonstrated the potential to reduce the administered Tc-99m MIBI activity by up to 70%, substantially lowering patient radiation exposure while maintaining high diagnostic confidence





Conclusions

In appropriately selected patients with suspected diaphragmatic attenuation and normal stress-gated wall motion, additional prone SPECT imaging following stress acquisition can safely obviate the need for high-dose rest imaging

Keywords:

Tc-99m sestamibi, Myocardial perfusion imaging, Gated SPECT, Prone imaging, Diaphragmatic attenuation, Radiation dose optimization, coronary artery disease