Enhancing the diagnostic performance of CZT SPECT myocardial perfusion imaging with myocardial blood flow information

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Background: The use of cadmium-zinc-telluride (CZT) single photon emission computed tomography (SPECT) for measuring myocardial blood flow (MBF) has been established as a valuable tool for improving diagnostic accuracy. However, the clinical significance of incorporating MBF into the interpretation of stress SPECT myocardial perfusion imaging (MPI) remains largely unknown.

Purpose: The objective of this study is to determine the effect of MBF information on the interpretation of CZT SPECT MPI.

Methods: A cohort of 411 patients underwent a rest/stress gated perfusion and MBF imaging procedure using full-dose 99mTc-tetrofosmin. MBF and flow reserve were calculated using the Corridor4DM v2018 software (INVIA, Ann Arbor, MI). The SPECT data were analyzed twice, once without and once with MBF results. The criteria for abnormal myocardial flow reserve were set at 2.0, while stress flow was set at 1.8 ml/min/g. The interpretations were categorized into normal, equivocal, or abnormal and interpretive certainty was classified into five groups: definitely normal/abnormal, probably normal/abnormal, or equivocal. The overall results were evaluated, along with differences between men and women. Statistical significance was determined using contingency table analysis and chi-squared testing.

Results: The study cohort had a mean age of 62.5 ± 9.8 years, with 71% of the participants being male. The addition of MBF altered the MPI interpretation in 10.7% of patients (44/411), with a change from abnormal or equivocal to normal in 45.5% (20/44) of cases. The frequency of equivocal MPI interpretations dropped significantly from 4.6% without MBF to 1.5% with MBF (P=0.008). Interpretive certainty improved with a significant decrease in equivocal scans (P=0.006). 89.1% of MPI with MBF were reported as definitely normal or abnormal, compared to 83.0% without MBF (P=0.012) (Figure 1). Further analysis by gender showed similar results for men, while no significant changes were observed in women’s MPI interpretation and certainty (Figure 2).

Conclusion: The inclusion of MBF had a significant impact on the interpretation of CZT SPECT MPI scans, with changes observed in 10.7% of cases. Interpretive certainty improved with fewer equivocal scans and a higher proportion of definitely normal or definitely abnormal interpretations. These findings were evident in men, but not in women (possible due to smaller sample size).
Figure 2