

Prospective Validation of a Quantitative Method for Differentiating Ischemic versus Nonischemic Cardiomyopathy by Technetium-99m Sestamibi Myocardial Perfusion Single-Photon Emission Computed Tomography

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Summary

Background: Myocardial perfusion single-photon emission computed tomography (SPECT) permits assessment of stress perfusion and resting left ventricular (LV) function. Quantitative analysis of perfusion patterns among patients with LV dysfunction offers an opportunity for developing criteria to differentiate ischemic from nonischemic cardiomyopathy.

Hypothesis: Quantitative assessment of SPECT may allow differentiation between ischemic and nonischemic cardiomyopathy.

Methods: We evaluated 144 patients with LV ejection fraction $\leq 40\%$, divided into 63 patients with nonischemic and 81 with ischemic cardiomyopathy. Mean relative myocardial counts were obtained for regions drawn over defect and normal zones on rest and stress polar perfusion maps.

Results: Multivariate logistic regression analysis of significant univariate SPECT predictors of ischemic cardiomyopathy revealed that the stress defect severity ratio (SDSR) was the best predictor of ischemic cardiomyopathy ($p < 0.0001$). By receiver operator characteristic (ROC) curve analysis, an SDSR of $\leq 45\%$ optimized prediction of ischemic cardiomyopathy (sensitivity 81%, specificity 96%). An SDSR of $\leq 45\%$ occurred in 65 of 81 (80%) patients with ischemic cardiomyopathy, but in only 3 of the 63 (4%) patients with nonischemic cardiomyopathy ($p < 0.0001$). Applying the $\leq 45\%$ SDSR threshold to a prospective group of 89 patients yielded a somewhat lower sensitivity (60%), but retained high specificity (91%) for identifying ischemic cardiomyopathy ($p = \text{NS}$ vs. retrospective group).

Conclusions: Presence of a severe and extensive stress perfusion defect is a hallmark of ischemic cardiomyopathy. By contrast, a mild stress perfusion defect (SDSR of $> 45\%$) is commonly present among patients with ischemic and nonischemic cardiomyopathy. An SDSR of $\leq 45\%$ is a reproducible specific marker for identifying the presence of ischemic cardiomyopathy.

Key words: myocardial perfusion single-photon emission computed tomography, cardiomyopathy

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