Anti-Ischemic Therapy and Myocardial Ischemia Shown by Single Photon Emission Computed Tomography Imaging

To the Editor:

O'Rourke and colleagues\(^1\) describe a case of resolution of stress-induced myocardial ischemia during aggressive medical therapy demonstrated by single photon emission computed tomography (SPECT) imaging. They conclude that a 1-year period of aggressive medical treatment led to this favorable result in a patient, who initially had typical angina pectoris and a 80% mid-left anterior descending coronary artery stenosis. We do not agree with their interpretation, and we think that the effect demonstrated on SPECT imaging can be shown within hours after the administration of effective antiischemic therapy with \(\beta\)-blockers, calcium antagonists, or nitrates.\(^3\)

Sensitivity for the detection of stress-induced myocardial ischemia by SPECT imaging depends on several factors, including the administration of anti-ischemic medications, non–flow-limiting coronary stenoses, overlap circulation, “balanced” hyperfusion or hypoperfusion in segments with attenuation, and collateral circulation.\(^4\)

Antiischemic therapy can abolish the effects of pharmacological stress with consecutive “false-negative” SPECT imaging results. Therefore, serial testing using pharmacological stress with dipyridamole or adenosine is not appropriate to assess the adequacy of medical therapy.\(^5\)

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Response

We appreciate the comments by Auer and associates on our article.\(^1\) Although perfusion defects on single photon emission computed tomography (SPECT) imaging can improve within hours of effective anginal therapy, this observation does not diminish the usefulness of sequential vasodilator stress myocardial perfusion SPECT in documenting effective medical therapy. Several prior publications have established this fact. Sharir et al\(^2\) performed dipyridamole SPECT in 21 patients with coronary artery disease before and after the administration of calcium antagonists, nitrates, or \(\beta\)-blockers. A 24% to 33% reduction in perfusion defect size occurred with antiischemic medications. Mostaza et al\(^3\) examined the effects of cholesterol reduction using dipyridamole thallium-201 SPECT. After 16 weeks of therapy, the summed stress score was lower with pravastatin than with placebo (7.2 versus 5.9, \(P=0.012\). Quantitative analysis showed a smaller defect with pravastatin (29.2% versus 33.8%, \(P=0.021\)).

Similar results have been shown by Gould\(^4\) using dipyridamole postion-emission tomography. Thus, reducing cholesterol levels with statins improves myocardial perfusion during SPECT imaging. This improvement likely relates to the normalization of endothelial function rather than anatomic changes. The action of dipyridamole in the coronary vasculature may be related in part to an increase in perfusion related to endothelial dependent arteriolar vasodilation.\(^5\) In another study, Dakik et al\(^6\) reported the results of adenosine SPECT in 44 postinfarction patients to compare medical therapy with coronary angioplasty. After 30 days, a 33% reduction in total perfusion defect size and a 23% reduction in reversible perfusion defect size were noted with antiischemic therapy. The reduction in total ischemic defect size was similar in both treatment groups. Importantly, event-free survival was 96% for patients who had a significant reduction in perfusion defect size and only 65% for those with no major decrease in SPECT defects.

To assess medical therapy, either exercise or pharmacological vasodilator stress is used with SPECT. We and others\(^7\) have demonstrated that exercise SPECT will document a reduction in ischemia with medical therapy. The vasodilator stress is potentially more reproducible because patient effort is not required. Of course, it is essential that the patients be appropriately prepared for the stress SPECT studies. Relative to vasodilator stress, it is important that the patients not be under the influence of caffeine at the time of testing, because caffeine can block the vasodilator effects of adenosine and dipyridamole.

Contrary to the conclusions of Auer and colleagues, extensive evidence suggests that myocardial perfusion SPECT with pharmacological stress is effective in assessing the adequacy of medical therapy.

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2. Sharir T, Rabinowitz B, Livschitz S, et al. Underestimation of extent and severity of coronary artery disease by dipyridamole stress thallium-201 SPECT. After 16 weeks of therapy, the summed stress score was lower with pravastatin than with placebo (7.2 versus 5.9, \(P=0.012\). Quantitative analysis showed a smaller defect with pravastatin (29.2% versus 33.8%, \(P=0.021\)).

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