Dobutamine Stress Testing Revisited

I read with great interest the recently published study by Calnon et al. (1), which analyzed the clinical outcome of patients who underwent dobutamine stress single-photon emission computed tomography (SPECT) Tc-99m-sestamibi imaging. Two aspects of this study are rather intriguing, and deserve further examination.

First, the annual “hard” cardiac event rate in patients with normal dobutamine SPECT studies was 2.3%. This is more than twofold higher than previously published event rates after a normal exercise stress perfusion study (<1%). It is also substantially higher than previously reported in other patients with normal dobutamine SPECT. Previous studies, including a large series by Geleijnse et al. (2), reported an annual event rate of 0.8% for hard events, and 2.5% for all cardiac events in patients with normal dobutamine Tc-99m-sestamibi SPECT studies. As stated by the investigators (1), some “probably normal” studies were grouped into the “normal study” category, and neither attenuation correction nor gated analyses were used in most studies. It is possible that these factors may have affected observed event rates.

Second, the multivariate analysis identified the electrocardiogram (ECG) response and SPECT perfusion results as independent predictors of cardiac events after accounting for clinical variables. As a group, patients with abnormal ST-segment changes and normal myocardial perfusion had a similar intermediate rate of events as did those with perfusion defects but without abnormal ST-segment changes on their ECG. This is a very interesting finding, and has the potential for changing our common clinical practice.

It may be helpful to separate the two groups with intermediate event rates and report the outcome separately for each group. Commonly, patients with SPECT scans revealing no perfusion abnormalities or ancillary findings suggestive of coronary artery disease, but with ischemic ST-segment changes during dobutamine stress, are often classified as “normal.” Thus, it will be particularly useful to know whether the outcome in this group differed significantly from a subgroup of dobutamine stress patients with normal ECG and normal perfusion. If, indeed, patients with abnormal ST-segment changes but normal perfusion during dobutamine stress testing have an intermediate event rate, it would be interesting to know whether any significant clinical variables might explain a relatively high event rate in this subset.

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REFERENCES


REPLY

Our observation of a relatively high cardiac event rate in patients with normal dobutamine Tc-99m-sestamibi single-photon emission computed tomography (SPECT) studies must be considered in the context of the high intrinsic risk of the population referred for dobutamine perfusion imaging at our institution (1). We reserve dobutamine for patients who are unable to perform adequate exercise and have contraindications to adenosine or dipyridamole stress. Geleijnse et al. (2) used dobutamine more liberally (e.g., included patients without contraindications to vasodilator stress), which might have contributed to the lower cardiac event rates observed in patients with normal dobutamine Tc-99m-sestamibi SPECT studies at their institution. Geleijnse et al. (2) assigned patients with “equivocal defects” to the “normal scan” group, and studies were interpreted without the use of electrocardiogram (ECG)-gating or attenuation correction. It is therefore unlikely that these technical factors were responsible for the higher cardiac event rates in patients with normal dobutamine Tc-99m-sestamibi SPECT scans in our study. We believe that the higher cardiac event rates reflect the high intrinsic risk of the population referred for dobutamine perfusion imaging at our institution. This conclusion is supported by the significantly higher cardiac event rate in patients with abnormal dobutamine Tc-99m-sestamibi SPECT studies (1) than in patients with abnormal exercise Tc-99m-sestamibi SPECT studies (2).

We agree that the subgroup of patients (n = 23) with dobutamine-induced ST-depression and normal SPECT results is of particular clinical interest. Absence of a perfusion defect could have resulted from “balanced” myocardial ischemia due to diffuse coronary disease without a normally perfused myocardial region, though this phenomenon is rare and unlikely to have occurred in all 23 patients. Only three total cardiac events were observed in this subgroup (one cardiac death and two nonfatal myocardial infarctions [MIs]), but the annual cardiac event rates were relatively high owing to the small sample size (cardiac death and nonfatal MI rates of 2.6% and 5.2%, respectively). These findings should be confirmed in a larger group of patients before specific recommendations are made regarding management of patients with dobutamine-induced ST depression and normal SPECT images.

The larger subgroup of patients (n = 129) with normal ECG responses but abnormal SPECT images had a high rate of cardiac events (10 cardiac deaths [4.5%/year] and 8 nonfatal MIs [3.6%/year]). This subgroup of patients should be considered at high risk for cardiac events and should be managed accordingly.

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