Noninvasive diagnosis of coronary artery stenosis in women with limited exercise capacity: comparison of dobutamine stress echocardiography and 99mTc sestamibi single-photon emission CT

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Noninvasive Diagnosis of Coronary Artery Stenosis in Women with Limited Exercise Capacity*

Comparison of Dobutamine Stress Echocardiography and ^{99m}Tc Sestamibi Single-Photon Emission CT

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Objectives: **To compare the accuracy of dobutamine stress echocardiography (DSE) and simultaneous ^{99m}Tc sestamibi (MIBI) single-photon emission CT (SPECT) imaging for the diagnosis of coronary artery stenosis in women.**

Patients: **Seventy women with limited exercise capacity referred for evaluation of myocardial ischemia.**

Methods: **DSE (up to 40 μg/kg/min) was performed in conjunction with stress MIBI SPECT. Resting MIBI images were acquired 24 h after the stress test. Ischemia was defined as new or worsened wall motion abnormalities confirmed by DSE and as reversible perfusion defects confirmed by MIBI. Significant coronary artery disease was defined as ≥ 50% luminal diameter stenosis.**

Results: **DSE was positive for ischemia in 35 of 45 patients with coronary artery stenosis and in 2 of 25 patients without coronary artery stenosis (sensitivity = 78% CI, 68 to 88; specificity = 92% CI, 85 to 99; and accuracy = 83% CI, 74 to 92). A positive MIBI study for ischemia occurred in 29 patients with coronary artery stenosis and in 7 patients without coronary artery stenosis (sensitivity = 64% CI, 53 to 76; specificity = 72% CI, 61 to 83; and accuracy = 67% CI, 56 to 78 [$p < 0.05$ vs DSE]). In the 59 vascular regions with coronary artery stenosis, the regional sensitivity of DSE was higher than MIBI (69% CI, 62 to 77 vs 51% CI, 42 to 59, $p < 0.05$), whereas specificity in the 81 vascular regions without significant stenosis was similar (89% CI, 84 to 94 vs 88% CI, 82 to 93, respectively).**

Conclusion: **DSE is a useful noninvasive method for the diagnosis of coronary artery stenosis in women and provides a higher overall and regional diagnostic accuracy than dobutamine MIBI SPECT in this particular population.** ***(CHEST 1998; 114:1097–1104)***

Key words: coronary artery disease; dobutamine; scintigraphy; stress echocardiography; women

Abbreviations: DSE = dobutamine stress echocardiography; LCX = left circumflex coronary artery; MIBI = sestamibi; RCA = right coronary artery; SPECT = single-photon emission CT

Coronary artery disease is the leading cause of death for women.[1] Therefore, the identification of accurate noninvasive methods for the diagnosis of coronary artery disease is important for the management of women with suspected myocardial ischemia before the development of more severe clinical manifestations when therapeutic interventions have higher risks and less favorable outcomes.[2] Exercise electrocardiography has limited accuracy in the diagnosis of coronary artery disease in women.[2,3] Although the accuracy of exercise ^{201}Tl perfusion scintigraphy was reported to be higher than electrocardiography in women,[3] some studies have shown that the accuracy of myocardial perfusion scintigraphy is reduced in women because of certain pitfalls

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in the acquisition and the interpretation of images.[4] In contrast, stress echocardiography was reported as an accurate and cost-effective method for the diagnosis of coronary artery disease in women.[5–8] Because women present with coronary artery disease at older ages,[1] a large proportion of these patients are unable to exercise and, therefore, are unable to be candidates for pharmacological stress testing. Dobutamine stress testing is an increasingly used modality for the diagnosis of coronary artery disease in patients with limited exercise capacity.[9–17] Recent studies have shown similar accuracies for ^{99m}Tc methoxyisobutyl isonitrile (sestamibi [MIBI]) single-photon emission CT (SPECT) imaging and echocardiography in conjunction with dobutamine stress test for the diagnosis and localization of coronary artery disease.[14–17] However, the number of women reported in these studies was small. This study was designed to assess the relative merits of dobutamine stress echocardiography (DSE) and simultaneous dobutamine MIBI SPECT in the overall and regional diagnosis of coronary artery stenosis in women with limited exercise capacity and suspected myocardial ischemia.

Materials and Methods

Patient Selection

The study population comprised 70 women with limited exercise capacity who were referred for evaluation of chest pain. Patients were not included in the study if they had severe heart failure, unstable angina, myocardial infarction < 3 months previously, severe valvular heart disease, or left bundle branch block. Mean age was 58 ± 14 years. Twenty four patients (34%) had a previous Q-wave myocardial infarction. Symptoms before the test included typical chest pain in 25 patients (36%), atypical chest pain in 28 patients (40%), and noncardiac chest pain in 17 patients (24%). Thirty five patients (50%) took beta blockers alone or in combination with other anti-ischemic medications. Thirty six patients (51%) took nitrates, and 35 patients (50%) took calcium channel blockers. Exercise capacity was impaired in 29 patients because of musculoskeletal or joint disease, and there was poor physical fitness in 28 patients, chronic obstructive airway disease in 10 patients, and peripheral vascular disease in 3 patients. Risk factors for coronary artery disease were hypertension in (31 patients, 44%), diabetes mellitus (9 patients, 13%), hypercholesterolemia (23 patients, 33%), and smoking (16 patients, 23%). Mean weight was 67 ± 11 (range 45 to 101) kg, and mean height was 164 ± 6 (range 96 to 199) cm.

Dobutamine Stress Test

Dobutamine was infused through an antecubital vein starting at a dose of 5 μg/kg/min, followed by a dose of 10 μg/kg/min (3-min stages), and increasing by 10 μg/kg/min every 3 min to a maximum of 40 μg/kg/min. Atropine (up to 1 mg) was given to patients not achieving 85% of the age-predicted maximal heart rate, and dobutamine infusion was continued.[18] The ECG was monitored throughout dobutamine infusion and was recorded each minute. Cuff BP was measured at rest, every 3 min during stress, and at maximal stress. The test was interrupted if severe chest pain, ST-segment depression of > 2 mm, significant ventricular or supraventricular arrhythmia, hypertension (BP ≥ 240/120), a fall in systolic BP of > 40 mm Hg, or any intolerable side effect regarded as being the result of dobutamine occurred during the test. Metoprolol (1 to 5 mg) was used intravenously to reverse the effects of dobutamine if the patient did not revert spontaneously and quickly. The finding of ischemia during the ECG was defined as ≥ 0.1 mV of horizontal or downsloping ST-segment depression, 80 μs from the J point, compared with the baseline level, or ≥ 0.1 MV of ST-segment elevation in the ECG leads corresponding to segments without resting wall motion abnormalities.[19]

Stress Echocardiography

Echocardiographic images were acquired using the standard views at rest, during stress, and during recovery. The left ventricular wall was divided into 16 segments and was scored using a four-point scale, where 1 = normal, 2 = hypokinesis, 3 = akinesis, and 4 = dyskinesis. Ischemia was defined as new or worsening wall motion abnormalities. Ischemia was not considered to be present if akinetic segments at rest became dyskinetic during stress.[20,21] The echocardiograms were recorded on videotapes and were digitized on optical disks (Vingmed-CFM 800; Vingmed Sound A/S; Horten, Norway). Images were compared side by side in quad-screen format by two independent observers without knowledge of the patients' clinical, scintigraphic, or angiographic data. In case of disagreement, a majority decision was made by a third investigator. The interobserver and intraobserver agreement for dobutamine stress echocardiographic assessment in our laboratory are 91% and 92%, respectively.[22]

SPECT Imaging

Approximately 1 min before the termination of the stress test, an intravenous dose of 370 MBq of MIBI was administered.[14,15] Stress images were acquired 1 h after termination of the test. For resting studies, 370 MBq of MIBI were injected at least 24 h after the stress study. For each study, six oblique (short axis) slices, from the apex to the base, and three sagittal (vertical long axis) slices, from the septum to the lateral wall, were defined. Each of the six short-axis slices was divided into eight equal segments. A total of 47 segments per patient were analyzed (after the exclusion of the septal part of the two basal slices). The interpretation of the scan was semiquantitatively performed by visual analysis assisted by circumferential profiles analysis. Stress and rest tomographic views were reviewed side by side by an experienced observer who was unaware of the patients' clinical, echocardiographic, or angiographic data. A reversible perfusion defect was defined as a perfusion defect on stress images that partially or completely resolved at rest in ≥ 2 contiguous segments or slices. This was considered diagnostic of ischemia. A fixed perfusion defect was defined as a perfusion defect on stress images in ≥ 2 contiguous segments or slices that persisted on images from resting studies. Echocardiographic and scintigraphic images were matched in six segments: anterior, inferior, septal anterior, septal posterior, posterolateral, and apical.

Coronary Angiography

Coronary angiography was performed within 3 months of the dobutamine stress test. Lesions were quantified as previously described.[23] Significant coronary artery disease was defined as a stenosis diameter of ≥ 50% in ≥ 1 major epicardial artery.

Coronary arteries were assigned to myocardial segments as previously described.[17] Because of the frequent vascular overlap in the posterior and inferior walls,[24] these two regions were assigned to both the left circumflex and the right coronary arteries.

Statistical Analysis

Unless specified, data are presented as mean values (± SD). The χ^2 test was used to compare differences between proportions. The Student's *t* test was used for the analysis of continuous data. A p value of < 0.05 was considered statistically significant. Agreement between echocardiography and MIBI SPECT on the diagnosis of myocardial ischemia was expressed by the κ value. Values between 0.75 and 1 were considered indicative of strong agreement, between 0.40 and 0.75 of fair to good agreement, and between 0 and 0.40 of poor agreement. Sensitivity, specificity, and accuracy were derived according to the standard definitions and were represented with 95% CI.

Results

Dobutamine Stress Test

Dobutamine-atropine induced a significant increase in mean (± SD) heart rate (71 ± 15 beats/min at rest to 134±15 beats/min at peak stress; $p < 0.0001$), systolic BP (129 ± 23 to 138 ± 28 mm Hg; $p < 0.001$), and rate pressure product (9,315 ± 3050 to 18,460 ± 4,174; $p < 0.00001$). Atropine was administered to 30 (43%) patients. Symptoms during the test were angina (27 patients, 38%), atypical chest pain (9 patients, 13%), and dyspnea (7 patients, 10%). Fifty nine (84%) patients reached the target heart rate (≥ 85% of the maximal exercise heart rate predicted for age). The test was interrupted before reaching the target heart rate because of angina in five patients and hypotension in three patients, whereas three patients failed to reach the target heart rate despite using the maximal dobutamine and atropine dose.

Coronary Angiography

Significant coronary artery stenosis was detected in 45 (64%) patients. Twenty seven (39%) patients had single-vessel disease, 13 (18%) had two-vessel disease, and 5 (7%) had three-vessel disease. Normal coronary arteries or < 50% lesions were present in 25 (36%) patients. Significant stenosis of the left anterior descending coronary artery was present in 30 (43%) patients, of the left circumflex coronary artery (LCX) in 15 (21%) patients, and of the right coronary artery (RCA) in 23 (33%) patients. Twenty nine (41%) patients had significant stenosis of the RCA, or the LCX, or both. Significant coronary artery stenosis was present in 18 of 24 (75%) patients with previous Q-wave myocardial infarction and in 27 of 46 (59%) patients without previous Q-wave myocardial infarction.

Prediction of Coronary Artery Stenosis by Electrocardiography

Ischemic ECG changes occurred in 11 of the 45 patients with coronary artery disease and in 3 of the 25 patients without coronary artery disease (sensitivity = 24% CI, 14 to 35; specificity = 88% CI, 80 to 96; and accuracy = 47% CI, 35 to 59).

Stress Echocardiography

Ischemia was detected in 35 of 45 (78%) patients with significant coronary artery stenosis and in 2 of the 25 (8%) patients without significant coronary artery stenosis. The accuracy of DSE was higher than electrocardiography ($p < 0.00005$). The sensitivity was 67% in patients with single-vessel disease (18/27), 92% in patients with two-vessel disease (12/13), and 100% in patients with three-vessel disease (5/5). The sensitivity was significantly higher in patients with multivessel disease than in those with single-vessel disease (94% [17/18] vs 67% [18/27]; $p < 0.05$). An ischemic pattern in two different vascular territories, suggestive of multivessel disease, occurred in 7 of 18 patients with multivessel disease and in 3 of 52 patients without multivessel disease (sensitivity = 39% CI, 27 to 50; specificity = 94% CI, 88 to 100; accuracy = 80% CI, 71 to 89). No significant differences in the diagnostic accuracy of DSE was detected between patients with typical and those with atypical or noncardiac chest pain (84% CI, 70 to 98 vs 82% CI, 71 to 93, respectively). The accuracy of both techniques for the overall and regional detection of significant coronary artery stenosis is shown in Table 1. The introduction of resting wall motion abnormalities for the diagnosis of coronary artery stenosis in patients without previous myocardial infarction resulted in an additional one true-positive and three false-positive studies. In the 19 patients without significant coronary artery stenosis or previous infarction, 7 false-positive results were identified using the 6-segment model: 2 fixed abnormalities in the apex, 1 fixed abnormality in the anterior septum, 3 inches in the posterior septum (2 fixed and 1 reversible), and 1 reversible abnormality in the inferior wall.

MIBI SPECT

Ischemia (partially or completely reversible perfusion defects) was detected in 29 of 45 (64%) patients with significant coronary artery disease and in 7 of the 25 (28%) patients without significant coronary artery disease (Table 1). Accuracy was higher than with electrocardiography ($p < 0.05$). The sensitivity was 56% in patients with single-vessel disease (15/27), 69% in patients

Table 1—*Accuracy of Dobutamine Stress Echocardiography and Dobutamine MIBI SPECT for the Diagnosis of Significant Coronary Artery Stenosis in Women***

	Echocardiography	No. Patients	MIBI SPECT	No. Patients
Overall diagnosis				
Sensitivity	78 (68–88)	35/45	64 (53–76)	29/45
Specificity	92 (85–99)	23/25	72 (61–83)	18/25
Positive PV	95 (89–100)	35/37	81 (71–90)	29/36
Negative PV	70 (59–80)	23/33	53 (41–65)	18/34
Accuracy	83 (74–92)	58/70	67 (56–78)†	47/70
LAD stenosis				
Sensitivity	67 (56–78)	20/30	53 (42–65)	16/30
Specificity	90 (83–97)	36/40	90 (83–97)	36/40
Positive PV	83 (75–92)	20/24	80 (71–89)	16/20
Negative PV	78 (69–88)	36/46	72 (61–83)	36/50
Accuracy	80 (71–89)	56/70	74 (64–85)	52/70
LCX and/or RCA stenosis				
Sensitivity	72 (62–83)	21/29	48 (37–60)	14/29
Specificity	88 (80–96)	36/41	85 (77–94)	35/41
Positive PV	81 (71–90)	21/26	70 (59–81)	14/20
Negative PV	82 (73–91)	36/44	70 (59–81)	35/50
Accuracy	81 (72–91)	57/70	70 (59–81)	49/70
All arteries				
Sensitivity	69 (62–77)	41/59	51 (42–59)†	30/59
Specificity	89 (84–94)	72/81	88 (82–93)	71/81
Positive PV	82 (75–89)	41/50	75 (68–82)	30/40
Negative PV	80 (73–87)	72/90	71 (63–79)	71/100
Accuracy	81 (74–87)	111/140	72 (65–80)	101/140

* Values are presented as percentage and (95% confidence interval). LAD = left anterior descending coronary artery; PV = predictive value.
† $p < 0.05$.

with two-vessel disease (9/13), and 100% in patients with three-vessel disease (5/5). There was a trend to a higher sensitivity in patients with multivessel disease than in those with single-vessel disease (78% [14/18] vs 56% [15/27]; $p = 0.1$). An ischemic pattern in two different vascular territories, suggestive of multivessel disease, occurred in 6 of 18 patients with multivessel disease and in 4 of 52 patients without multivessel disease (sensitivity = 33% CI, 22 to 44; specificity = 92% CI, 86 to 99; accuracy = 77% CI, 67 to 87). No significant difference in the diagnostic accuracy of MIBI SPECT was detected between patients with typical chest pain and those with atypical or noncardiac chest pain (64% CI, 45 to 83 vs 69% CI, 55 to 82, respectively). The introduction of fixed perfusion abnormalities for the diagnosis of coronary artery disease in patients without previous myocardial infarction resulted in an additional one true and three false-positive studies. In the 19 patients without significant coronary artery stenosis or previous infarction, 14 false-positive defects were identified using the 6-segment model: 7 inches from the anterior wall (4 fixed and 3 reversible), 1 reversible defect in the apex, and 2 defects (1 reversible and 1 fixed) in each of the anterior septum, the posterior septum, and the inferior wall.

Comparison of DSE and MIBI SPECT

The accuracy of DSE was significantly higher than MIBI SPECT for the overall diagnosis of coronary artery disease ($p < 0.05$; Figure 1; Table 1). Echocardiography was more sensitive than MIBI SPECT for identifying individual coronary stenoses (69% vs 51%; $p < 0.05$; Figure 1). This analysis was done by adding the left anterior descending region to a combined arterial region of RCA and LCX. There was fair agreement (70%) between both methods on the diagnosis of myocardial ischemia (51/70; $\kappa = 0.40$; Fig 2). All the false-positive MIBI defects in the anterior wall were associated with normal wall motion at rest and at peak DSE.

In the 24 patients with previous Q-wave infarction, 14 (58%) patients had infarct-related artery stenosis and 9 (38%) patients had remote coronary artery stenosis. The sensitivity, specificity, and accuracy of DSE for the diagnosis of infarct-related artery stenosis were 57% CI, 37 to 77, 90% CI, 78 to 102, and 71% CI, 53 to 89, respectively. The sensitivity, specificity, and accuracy for MIBI were 43% CI, 23 to 63, 80% CI, 64 to 96, and 58% CI, 39 to 78, respectively. For the diagnosis of remote coronary artery stenosis, the sensitivity, specificity, and accuracy of DSE were 67% CI, 48 to 86, 93% CI, 83 to 103, and 83% CI, 68 to 98, respectively. The sensi-

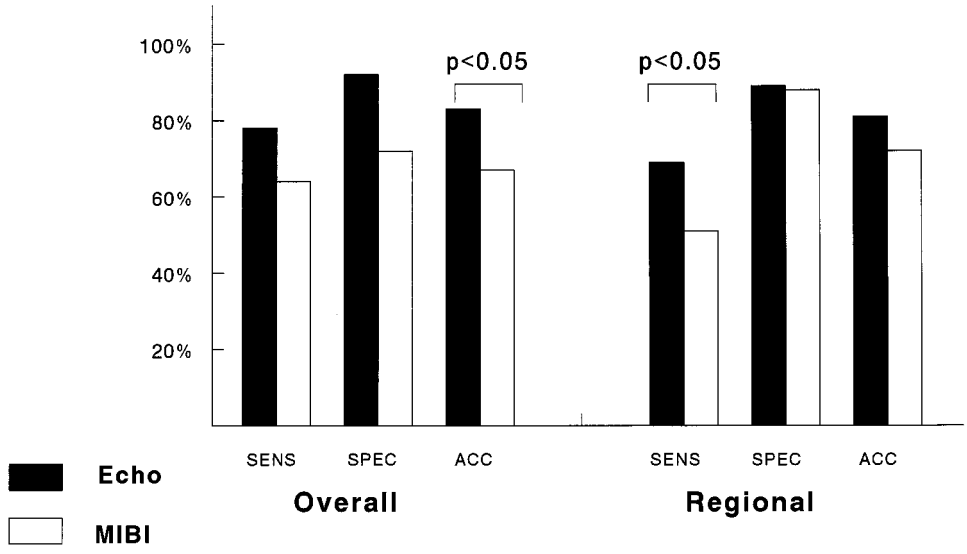

FIGURE 1. Sensitivity (SENS), specificity (SPEC), and accuracy (ACC) of dobutamine stress echocardiography (Echo) and ^{99m}Tc MIBI SPECT for the overall and regional diagnoses of coronary artery disease in women.

tivity, specificity, and accuracy for MIBI were 44% CI, 25 to 64, 87% CI, 73 to 100, and 71% CI, 53 to 89, respectively.

DISCUSSION

Our data show that for women with limited exercise capacity and suspected myocardial ischemia, DSE is an accurate method for the diagnosis of coronary artery disease and provides higher overall accuracy than dobutamine MIBI SPECT. There was a trend for both higher sensitivity and specificity with DSE than MIBI SPECT, and overall accuracy was, statistically, significantly higher for DSE than MIBI. For the identification of individual coronary artery stenoses, the sensitivity of DSE was higher than MIBI SPECT in the anterior and posterior circulation, whereas regional specificity was similar for both techniques. The addition of fixed wall motion abnormalities and resting myocardial perfusion defects as criteria for the diagnosis of coronary artery disease in patients without previous myocardial infarction did not improve the accuracy; it resulted in three false-positive and one true-positive studies by each technique. There was a fair agreement between both techniques (70%) on the diagnosis of myocardial ischemia. Both techniques had higher accuracy than electrocardiography. The relatively high specificity of the ECG in this study (88%) may be explained by the very low sensitivity (24%) that tends to passively enhance specificity.[25]

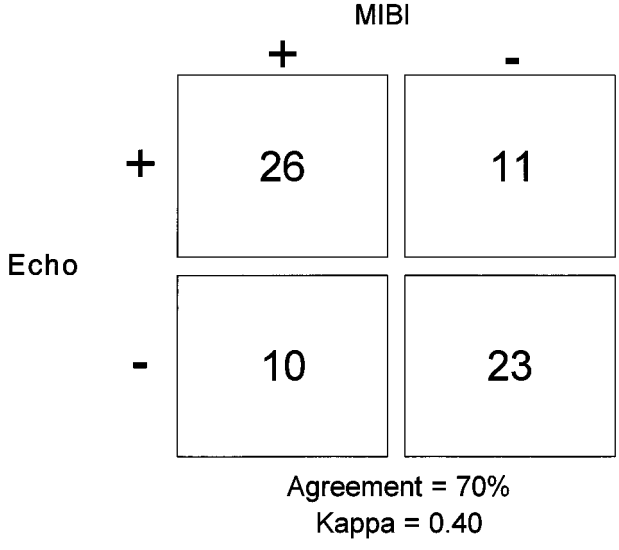

FIGURE 2. The agreement between dobutamine stress echocardiography (Echo) and ^{99m}Tc MIBI SPECT on the overall diagnosis of myocardial ischemia in women

Comparison with Previous Studies

Some authors have reported that myocardial perfusion scintigraphy for the diagnosis of coronary artery disease is less accurate in women than in men.[4] The reason for this difference is not clearly understood. Breast attenuation is considered one of the major limiting factors of myocardial perfusion scintigraphic imaging in women[26] because of the creation of false-positive defects, particularly in the anterior wall, or false-negative results when a perfusion defect is misclassified as a breast attenuation

artifact. In our study, the specificity of dobutamine MIBI SPECT was lower than DSE despite the use of reversible, rather than fixed, abnormalities to predict coronary artery stenosis. Nevertheless, breast attenuation may cause a false-reversible defect if the position of the breast is changed during rest imaging, compared with the position during stress imaging. In this study, 7 of 19 patients (37%) without either significant coronary artery stenosis or a previous myocardial infarction had perfusion defects in the anterior wall, and 3 of these 7 defects were reversible. Interestingly, all these defects were associated with normal function at rest and at peak DSE. Another possible mechanism of reduced accuracy is smaller heart size in women than in men. A coronary lesion in a small chamber is more likely to produce a perfusion defect that is too small to be identified by the imaging system than is a proportional lesion in a patient with a larger chamber size.[4] The small myocardial mass in women also may exaggerate the normal apical thinning, leading to a false-positive apical defect. Studies of the diagnostic accuracy of exercise ^{201}Tl scintigraphy in women reported fairly low overall sensitivity (71% to 79%) with particularly low sensitivity in patients with single-vessel disease (52% to 57%).[27–29]

The Influence of Stress Modality

The higher accuracy of DSE compared with MIBI SPECT in our study may be explained by the stress modality itself. Previous studies from our center,[14,15] and from others,[16,17] have shown similar accuracies for DSE and MIBI SPECT in the diagnosis of coronary artery disease. A recent study even has shown that dobutamine MIBI SPECT is more sensitive than DSE.[30] However, Calnon et al[31] recently demonstrated that dobutamine reduces myocardial uptake of MIBI in experimental animals, presumably through an increase in mitochondrial calcium influx. The implications of that experimental study are that flow disparity may be underestimated by MIBI SPECT when dobutamine is used as a stressor. Although it may be premature to extrapolate these experimental results to patients studies, it may be predicted that any clinical effects of these findings would be most apparent in mild disease and single-vessel disease. Therefore, patients with single-vessel disease may be more likely to have a false-negative test. The high prevalence of single-vessel disease in this relatively young group of female patients included in our study may explain the reduced sensitivity of MIBI. Therefore, the lower accuracy of dobutamine MIBI than of DSE for women in our study may be the result of a particular limitation of myocardial perfusion scintigraphic imaging in women, a gender difference in the relative frequency and severity of dobutamine-induced wall motion and myocardial perfusion abnormalities, or a particular limitation of the use of MIBI in conjunction with dobutamine because of the inhibition of MIBI uptake by the latter. A study comparing dobutamine echocardiography with vasodilator perfusion scintigraphy in women will be important to clarify the significance of our findings.

We have demonstrated previously that in patients with coronary artery disease who are diagnosed with ischemia by dobutamine perfusion scintigraphy, a simultaneous negative echocardiographic study for ischemia occurred more frequently in women.[32] However, patients in that study were selected on the basis of having coronary artery disease and ischemic response by MIBI SPECT, and, therefore, the difference between the techniques in sensitivity in women was not evaluated. It is possible that female gender is associated with a higher discrepancy in the diagnosis of myocardial ischemia by MIBI SPECT imaging and echocardiography.

In contrast with the studies in which the accuracy of stress myocardial perfusion scintigraphy was low in women, several authors reported a good accuracy of myocardial perfusion scintigraphy in women in conjunction with exercise,[3] dipyridamole,[33] and adenosine.[34] We have reported previously that a normal dobutamine MIBI study in women with chest pain implies an excellent prognosis at a mean follow-up period of 23 months.[35] The apparent discrepancy between this study and the prognostic study can be explained by the fact that a normal study does not assess the specificity of the test. Additionally, the sensitivity of MIBI in this study was relatively higher for patients with multivessel disease (78%) than for those with single-vessel disease (56%), which means that most of patients with multivessel disease who are known to have a worse prognosis will have an abnormal MIBI study.

Limitations of the Study

MIBI studies were not gated. It has been shown that the addition of gated MIBI images to the reading of stress and rest perfusion images improves the interpretation of the test and enhances the accuracy for the diagnosis of coronary artery disease.[36] Therefore, the conclusion of our study applies only to nongated MIBI SPECT imaging. Most of the patients were receiving anti-ischemic medications, including beta-blockers in 50% of the patients. This may have contributed to a reduced sensitivity of both techniques. Although atropine administration increases sensitivity in patients taking beta-blockers,[18] a low peak-stress heart rate theoretically will

reduce the sensitivity of echocardiography more than MIBI SPECT because of the earlier occurrence of flow malperfusion relative to wall motion abnormalities in the ischemic cascade.[37] Therefore, it is unlikely that beta-blockers are the reason for the higher accuracy of echocardiography, compared with MIBI SPECT, in our study. Another limitation is the inclusion of some patients with previous myocardial infarction. However, in this study the ischemic patterns of both techniques were correlated with angiography to assess the accuracy of the diagnosis of coronary artery disease as well as the identification of individual coronary artery stenoses.

Summary and Conclusions

In women with limited exercise capacity undergoing dobutamine stress testing for the evaluation of myocardial ischemia, DSE has a higher accuracy than dobutamine MIBI SPECT for the diagnosis of coronary artery disease and for the identification of regional coronary artery stenoses. If the results of this study are confirmed by other studies, echocardiography should be the imaging modality of choice in women with limited exercise capacity undergoing dobutamine stress testing for the evaluation of myocardial ischemia.

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