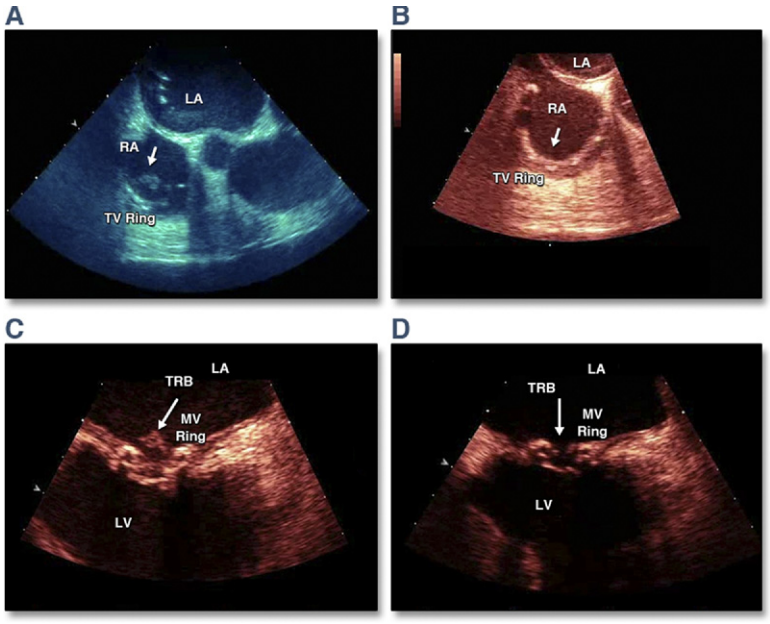

Figure 2. HVR Thrombosis Images by TEE

(A) A 40-year-old asymptomatic woman with hyperechogenic, mobile masses **(arrow)** (1.5 × 0.8 cm and 0.78 × 0.5 cm in size) over the tricuspid annuloplasty ring in TEE examination. **(B)** A complete resolution was revealed after the thrombolytic therapy with tissue-type plasminogen activator **(arrow)**. **(C)** TEE images of a 68-year-old man with a 1.16 × 0.7 cm, hyperechogenic, mobile mass **(arrow)** over the prosthetic mitral valve ring with a transmitral mean gradient of 11.8 mm Hg. **(D)** Despite regression of the thrombus size **(arrow)**, the transmitral gradient was found to be still high (8.9 mm Hg) in control TEE examination. See Online Video 2. MV Ring = mitral valve ring; RA = right atrium; other abbreviations as in Figure 1.

ing. We think that more attention should be paid to prosthetic heart valve rings because of their potential for the increased risk of thrombosis.

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APPENDIX

For supplemental videos, please see the online version of this paper.

Does Low Pre-Test Probability of Coronary Artery Disease Reflect Overuse of Stress Testing?

Chen et al. (1) describe few differences in downstream use of cardiovascular procedures between office- and hospital-based cardiovascular stress testing. Despite the similarities between the 2 groups, we are struck by low post-test rates of cardiac catheterization: >7 of 8 patients who underwent myocardial perfusion imaging and >13 of 14 patients who underwent stress echocardiography did not undergo cardiac catheterization (or revascularization) within the next 6 months. We argue that these low rates reflect overuse of stress testing in both groups, due at least in part to inappropriate testing of lower pre-test probability patients, even with a 26% prevalence of coronary artery disease.

We performed estimates of pre-test probabilities with: 1) rates of cardiac catheterization reported by Chen et al. (1) as a ceiling of post-test probability; and 2) likelihood ratios (LRs) based on published sensitivity/specificity estimates of myocardial perfusion imaging (LR = 3.2 to 3.6) (2) and stress echocardiography (LR = 2.7 to 7.1) (3). We estimate that the mean pre-test probability of having ischemic heart disease in this cohort averages only 1.5% to 3.9%.

American College of Cardiology/American Heart Association guidelines recommend exercise stress testing individuals with intermediate pre-test probabilities of ischemic heart disease, as defined by age, sex, and symptoms (4). For comparison of expected cardiac catheterization rates, we estimated post-test probabilities of a hypothetical intermediate risk cohort of 50- to 59-year-old subjects with chest pain with an adjusted Diamond-Forrester model (5) and conservative LR = 3.4. We estimate a post-test probability of coronary artery disease (as cardiac catheterization estimate/ceiling) of 63% to 76% in men and 31% to 75% in women, compared with rates of 5% to 12% in Chen et al. (1).

Despite minimal differences in downstream use between office- and hospital-based stress testing, the data of Chen et al. (1) suggest that there is substantial overuse. Other possible reasons, such as financial incentives, misinterpretation of abnormal tests, patient expectations, or defensive medical practice, might also contribute to this discrepancy and warrant further investigation.

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REPLY

Drs. Huffman and van Geertruyden raise a timely concern regarding overutilization of stress testing. Their Bayesian approach suggests that many patients in our study (1) appear to be at low pre-test probability for coronary artery disease. Although the appropriateness of stress testing is beyond the scope of our study, as clinical data is required to confirm the level of risk, other studies have demonstrated that 14% to 18% of stress tests with imaging were inappropriate, with nearly one-half performed in asymptomatic, low-risk individuals (2). Clearly, patient selection for stress testing can be improved, and we agree with Drs. Huffman and van Geertruyden that additional research is needed to evaluate what prompts low-risk patients to be referred for stress testing.

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