

FIGURE 4-12 Echocardiogram enhanced with intravenous ultrasound contrast agent: apical four-chamber view (A) and apical long-axis view (B). Highly echo-reflectant microbubbles make the left ventricular cavity appear white, whereas the myocardium appears dark. Video 4-3 shows a dynamic image of echocardiographic contrast. (Image courtesy Sheldon E. Litwin, MD, Division of Cardiology, University of Utah, Salt Lake City, Utah.)

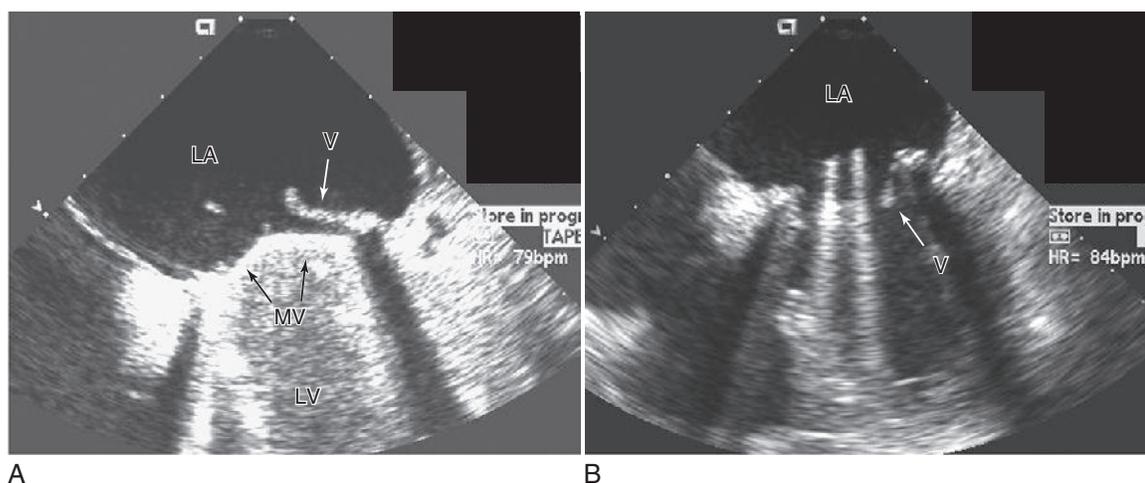


FIGURE 4-13 Transesophageal echocardiogram demonstrates a vegetation (*arrow*) adherent to the ring of a bileaflet, tilting-disk mitral valve prostheses. **A**, In systole, the leaflets are closed with the vegetation seen in the left atrium. **B**, In diastole, the leaflets are open, with the vegetation prolapsing into the left ventricle. Transesophageal echocardiography is the diagnostic test of choice for assessing prosthetic mitral valves because the esophageal window allows unimpeded views of the atrial surface of the valve. Video 4-4 shows a dynamic transesophageal echocardiographic image. LA, Left atrium; LV, left ventricle; MV, prosthetic mitral valve disks; V, vegetation. (Courtesy Sheldon E. Litwin, MD, Division of Cardiology, University of Utah, Salt Lake City, Utah.)

ventricular ejection fraction (LVEF) can then be calculated as follows:

$$\text{LVEF} = (\text{EDC} - \text{ESC}) / \text{EDC}$$

If scintigraphic information is collected throughout the cardiac cycle, a computer-generated image of the heart can be displayed in a cinematic fashion. This allows assessment of wall motion.

Myocardial perfusion imaging is usually performed in conjunction with exercise or pharmacologic (vasodilator) stress testing. Dipyridamole (Persantine), or more commonly adenosine, is used as the coronary vasodilator. Each agent can increase myocardial blood flow by fourfold to fivefold. Adenosine is more expensive, but it has the advantage over dipyridamole of a very short half-life. Newer adenosine-like agents with reduced side effect profiles are starting to be used clinically.

Technetium-99m sestamibi is the most frequently used radio-nuclide, and it is usually injected just before completion of the stress test. Single-photon emission computed tomography (SPECT) images of the heart are obtained for qualitative and quantitative analyses at rest and after stress. In the normal heart, the radioisotope is relatively equally distributed throughout the myocardium. In patients with ischemia, a localized area of decreased uptake occurs after exercise but partially or completely fills in at rest (i.e., redistribution). A persistent defect at peak exercise and rest (i.e., fixed defect) is consistent with MI or scarring. However, in some patients with apparently fixed defects, repeat rest imaging at 24 hours or after reinjection of a smaller quantity of isotope demonstrates improved uptake, indicating viable, but severely ischemic myocardium.

The use of new approaches such as combined low-level exercise and vasodilators, prone imaging, attenuation correction, and