

**TABLE 7-3** MEASURES OF AORTIC STENOSIS SEVERITY

INDICATOR	NORMAL	MILD	MODERATE	SEVERE
Aortic valve area (cm <sup>2</sup> )	>2.0	1.5-2.0	1.0-1.5	<1.0
Mean gradient (mm Hg)		<25	25-40	>40
Peak jet velocity (m/sec)	<2.0	2-3	3-4	>4

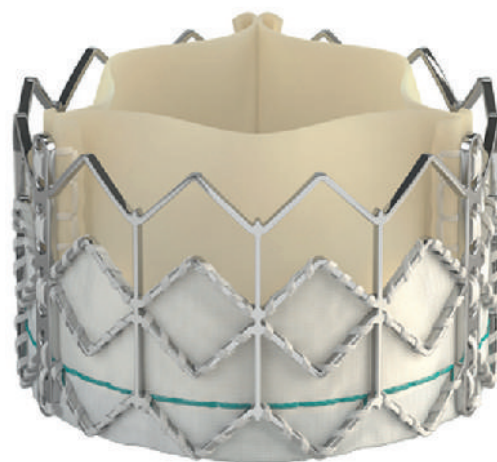
Data from Baumgartner H, Hung J, Bermego J, et al: Echocardiographic assessment of valve stenosis: EAE/ASE recommendations for clinical practice, *J Am Soc Echocardiogr* 22:1-22, 2009.

**FIGURE 7-2** Medtronic bileaflet mechanical prosthetic valve. (Courtesy of Medtronic, Inc.)**FIGURE 7-3** Medtronic Hancock II bioprosthetic valve. (Courtesy of Medtronic, Inc.)

## Diagnosis

### Acute Severe Regurgitation

The sudden development of severe regurgitation is poorly tolerated by the normal left ventricle. Left heart filling pressures rise rapidly, and respiratory failure from pulmonary edema develops.

**FIGURE 7-4** Edwards SAPIEN transcatheter heart valve. (Courtesy of Edwards Lifesciences LLC, Irvine, Calif.)

The decreased effective cardiac output results in a resting tachycardia and hypotension. The patient's tachypnea and rapid heart rate impede recognition of the typical diastolic decrescendo murmur because of marked shortening of diastole and early termination of the murmur. The diagnosis can be easily missed, particularly with hasty and errant performance of a cursory examination of an unstable patient in a noisy emergency room. A chest radiograph showing a normal-size heart with pulmonary edema should raise suspicions. Timely TTE or transesophageal echocardiography (TEE) is key to establishing the diagnosis early in the disease course.

### Chronic Severe Regurgitation

When time permits compensatory mechanisms such as LV dilation to gradually evolve, even a very large regurgitant volume can be tolerated well for many years. The resulting large stroke volume, along with the regurgitation, is responsible for many of the findings on physical examination.

The enlarged heart caused by ventricular volume overload results in a laterally displaced and diffuse point of maximal impulse (PMI), as well as cardiomegaly by chest radiography. A low diastolic blood pressure is present and results in a large pulse pressure. The increased diastolic filling results in a soft  $S_1$  heart sound, and an  $S_3$  gallop may be present even in the absence of clinical heart failure. Auscultation of the typical diastolic decrescendo murmur, heard at either the left or the right sternal border, can be improved by examining the patient as he or she is leaning forward at end-expiration. A diastolic flow rumble at the left sternal border may be confused with mitral stenosis; this is known as an Austin-Flint murmur. A soft systolic murmur may be present because of the large stroke volume ejected in systole (see Table 7-2). The large stroke volume also results in a number of peripheral physical examination findings such as Quincke's pulse (systolic plethora and diastolic nail bed blanching with pressure), Musset's sign (head bobbing) and Corrigan's pulse (a bounding full carotid pulse with rapid downstroke). These findings, including the increased pulse pressure, are present only after compensatory cardiac changes have evolved and are not present with acute severe regurgitation.