KEY CONCEPTS

Valvular Heart Disease

- Valve pathology can lead to occlusion (*stenosis*) and/or to regurgitation (*insufficiency*); acquired aortic and mitral valves stenoses account for approximately two thirds of all valve disease.
- Valve calcification is a degenerative process that typically results in stenosis; abnormal matrix synthesis and turnover result in myxomatous degeneration and insufficiency.
- Inflammatory valve diseases lead to post-inflammatory neovascularization and scarring. Rheumatic heart disease results from anti-streptococcal antibodies that cross-react with cardiac tissues; it most commonly affects the mitral valve and is responsible for 99% of acquired mitral stenoses.
- Infective endocarditis can be aggressive and rapidly destroy normal valves (acute IE), or can be indolent and minimally destructive of previously abnormal valves (subacute IE). Systemic embolization can produce septic infarcts.
- Nonbacterial thrombotic endocarditis occurs on previously normal valves due to hypercoagulable states; embolization is an important complication.
- Mechanical prosthetic valves have thrombotic or hemorrhagic complications related to the nonlaminar flow of blood and the need for chronic anti-coagulation. Bioprosthetic valves are nonviable and are therefore susceptible to long-term calcification and/or degeneration with tearing. Both types of valves have an increased risk of developing endocarditis relative to native valves.

Cardiomyopathies

Although the term *cardiomyopathy* (literally, heart muscle disease) has been historically applied to any cardiac dysfunction resulting from a myocardial abnormality, a more nuanced definition is probably appropriate. Thus—stimulated by the recognition of new phenotypes and the advent of more sophisticated molecular characterization—an expert panel has suggested: *"[C]ardiomyopathies are a heterogeneous group of diseases of the myocardium associated with mechanical and/or electrical dysfunction that usually (but not invariably) exhibit inappropriate ventricular hypertrophy or dilatation and are due to a variety of causes that frequently are genetic. Cardiomyopathies either are confined to the heart or are part of generalized systemic disorders, often leading to cardiovascular death or progressive heart failure-related disability."*

Thus, cardiomyopathies manifest as failure of myocardial performance; this can be mechanical (e.g., diastolic or systolic dysfunction) leading to CHF, or can culminate in life-threatening arrhythmias. *Primary* cardiomyopathies can be genetic or acquired diseases of myocardium, whereas *secondary* cardiomyopathies have myocardial involvement as a component of a systemic or multiorgan disorder. A major advance in our understanding of cardiomyopathies stems from the frequent identification of underlying genetic causes, including mutations in myocardial proteins involved in contraction, cell-cell contacts, and the cytoskeleton. These, in turn, lead to abnormal contraction or relaxation, or to dysregulated ion transport across cell membranes. Although chronic myocardial dysfunction secondary to ischemia, valvular abnormalities, or hypertension can cause significant ventricular dysfunction (as described previously), these conditions should not be denoted as cardiomyopathies.

Cardiomyopathies can be classified according to a variety of criteria, including the underlying genetic basis of dysfunction; indeed, we have already discussed a number of the arrhythmia-inducing channelopathies, which may be included in cardiomyopathies. However, we will confine our list of cardiomyopathies to disorders that produce anatomic abnormalities in the heart. These fall into three pathologic patterns (Fig. 12-29 and Table 12-11):

- Dilated cardiomyopathy (including arrhythmogenic right ventricular cardiomyopathy)
- Hypertrophic cardiomyopathy
- Restrictive cardiomyopathy

Among the three major patterns, dilated cardiomyopathy is most common (90% of cases), and restrictive cardiomyopathy is the least frequent. Within each pattern, there is a spectrum of clinical severity, and in some cases clinical features overlap among the groups. In addition, each of these patterns can be caused by a specific identifiable cause, or can be idiopathic (Tables 12-11 and 12-12).

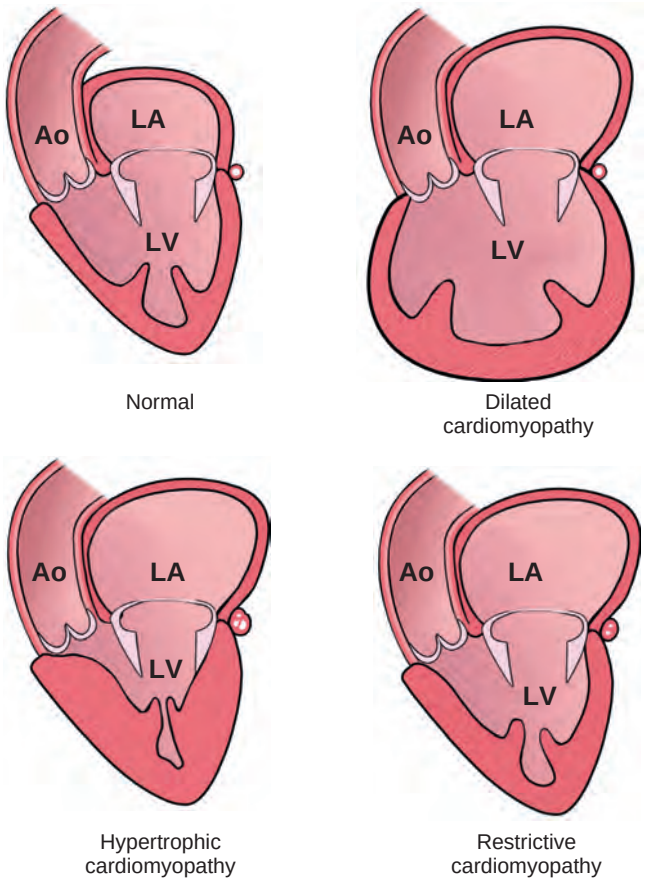

Figure 12-29 The three major morphologic patterns of cardiomyopathy. Dilated cardiomyopathy leads primarily to systolic dysfunction, whereas restrictive and hypertrophic cardiomyopathies result in diastolic dysfunction. Note the changes in atrial and/or ventricular wall thickness. Ao, Aorta; LA, left atrium; LV, left ventricle.