

290e Cardiac Manifestations of Systemic Disease

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The common systemic disorders that have associated cardiac manifestations are summarized in [Table 290e-1](#).

DIABETES MELLITUS

(See also [Chap. 417](#)) Diabetes mellitus, both insulin- and non-insulin-dependent, is an independent risk factor for coronary artery disease (CAD; [Chap. 291e](#)) and accounts for 14–50% of new cases of cardiovascular disease. Furthermore, CAD is the most common cause of death in adults with diabetes mellitus. In the diabetic population, the incidence of CAD relates to the duration of diabetes and the level of glycemic control, and its pathogenesis involves endothelial dysfunction, increased lipoprotein peroxidation, increased inflammation, a prothrombotic state, and associated metabolic abnormalities.

Compared to their nondiabetic counterparts, diabetic patients are more likely to have a myocardial infarction, have a greater burden of CAD, have larger infarct size, and have more postinfarct complications, including heart failure, shock, and death. Importantly, diabetic patients are more likely to have atypical ischemic symptoms; nausea, dyspnea, pulmonary edema, arrhythmias, heart block, or syncope may be their anginal equivalent. Additionally, “silent ischemia,” resulting from autonomic nervous system dysfunction, is more common in diabetic patients, accounting for up to 90% of their ischemic episodes. Thus, one must have a low threshold for suspecting CAD in diabetic patients. The treatment of diabetic patients with CAD must include aggressive risk factor management ([Chap. 418](#)). Considerations regarding pharmacologic therapy and revascularization strategies are similar in diabetic and nondiabetic patients except that diabetic patients have higher morbidity and mortality rates associated with revascularization, have an increased risk of restenosis after percutaneous coronary intervention (PCI), and have improved survival when treated with surgical bypass compared with PCI for multivessel CAD.

Patients with diabetes mellitus also may have abnormal left ventricular systolic and diastolic function, reflecting concomitant epicardial CAD and/or hypertension, coronary microvascular disease, endothelial dysfunction, ventricular hypertrophy, and autonomic dysfunction. Furthermore, the increase in intramyocardial lipid deposition (predominantly nonesterified fatty acids) that is characteristic of diabetic states may contribute to both systolic and diastolic dysfunction by impairing insulin signaling, reducing trans-sarcolemma calcium flux, and inducing myocyte apoptosis. A restrictive cardiomyopathy may be present with abnormal myocardial relaxation and elevated ventricular filling pressures. Histologically, interstitial fibrosis is seen, and intramural arteries may demonstrate intimal thickening, hyaline deposition, and inflammatory changes. Diabetic patients have an increased risk of developing clinical heart failure, which probably contributes to their excessive cardiovascular morbidity and mortality rates. There is some evidence that insulin therapy may ameliorate diabetes-related myocardial dysfunction.

MALNUTRITION AND VITAMIN DEFICIENCY

Malnutrition (See also [Chap. 97](#)) In patients whose intake of protein, calories, or both is severely deficient, the heart may become thin, pale, and hypokinetic with myofibrillar atrophy and interstitial edema. The systolic pressure and cardiac output fall, and the pulse pressure narrows. Generalized edema is common and relates to a variety of factors, including reduced serum oncotic pressure and myocardial dysfunction. Such profound states of protein and calorie malnutrition, termed *kwashiorkor* and *marasmus*, respectively, are most common in underdeveloped countries. However, significant nutritional heart disease also may occur in developed nations, particularly in patients with chronic diseases such as AIDS, patients with anorexia nervosa, and patients with severe cardiac failure in whom gastrointestinal hypoperfusion and venous congestion may lead to anorexia and malabsorption. Open-heart surgery poses increased risk in malnourished patients; such patients may benefit from preoperative hyperalimentation.

Thiamine Deficiency (Beriberi) (See also [Chap. 96e](#)) Generalized malnutrition often is accompanied by thiamine deficiency; however, this hypovitaminosis also may occur in the presence of an adequate protein and caloric intake, particularly in East Asia, where polished rice

TABLE 290e-1 COMMON SYSTEMIC DISORDERS AND THEIR ASSOCIATED CARDIAC MANIFESTATIONS

Systemic Disorder	Common Cardiac Manifestations	Chapter
Diabetes mellitus	CAD, atypical angina, CMP, systolic or diastolic CHF	417
Protein-calorie malnutrition	Dilated CMP, CHF	97
Thiamine deficiency	High-output failure, dilated CMP	96e
Hyperhomocysteinemia	Premature atherosclerosis	96e
Obesity	CMP, systolic or diastolic CHF	415e
Hyperthyroidism	Palpitations, SVT, atrial fibrillation, hypertension	405
Hypothyroidism	Hypotension, bradycardia, dilated CMP, CHF, pericardial effusion	405
Malignant carcinoid	Tricuspid and pulmonary valve disease, right heart failure	113
Pheochromocytoma	Hypertension, palpitations, CHF	407
Acromegaly	Systolic or diastolic heart failure	401e
Rheumatoid arthritis	Pericarditis, pericardial effusions, coronary arteritis, myocarditis, valvulitis	380
Seronegative arthropathies	Aortitis, aortic and mitral insufficiency, conduction abnormalities	384
Systemic lupus erythematosus	Pericarditis, Libman-Sacks endocarditis, myocarditis, arterial and venous thrombosis	378
HIV	Myocarditis, dilated CMP, pericardial effusion	226
Amyloidosis	CHF, restrictive CMP, valvular regurgitation, pericardial effusion	137
Sarcoidosis	CHF, dilated or restrictive CMP, ventricular arrhythmias, heart block	390
Hemochromatosis	CHF, arrhythmias, heart block	428
Marfan syndrome	Aortic aneurysm and dissection, aortic insufficiency, mitral valve prolapse	427
Ehlers-Danlos syndrome	Aortic and coronary aneurysms, mitral and tricuspid valve prolapse	427
Systemic sclerosis	Pericardial effusion, CHF (systolic and diastolic), myocarditis, coronary microvascular vasospasm, tachyarrhythmias	382

Abbreviations: CAD, coronary artery disease; CHF, congestive heart failure; CMP, cardiomyopathy; SVT, supraventricular tachycardia.