CONGENITAL CORONARY ARTERY DISEASE

Anomalous origin of the left coronary artery from the pulmonary trunk usually presents in early infancy with congestive cardiac failure due to ischemic myocardial dysfunction. The diagnosis can usually be made by parasternal short-axis sections of the great arteries. The most characteristic finding is reversed flow in the left coronary artery demonstrated by color flow Doppler. Usually, the anomalous coronary artery connects to the pulmonary trunk at one of the sinuses, but in some cases the connection may be to the more distal pulmonary arteries. A less common presentation of this condition is in late childhood or early adult life, usually with left ventricular dysfunction and mitral regurgitation. There is almost always reversed blood flow in the left coronary artery, representing a left-to-right shunt from the right coronary artery into the pulmonary trunk.

Congenital anomalies of the coronary arteries are also found in various types of congenital heart disease. The most important of these is complete transposition of the great arteries. Abnormalities such as an intramural course, single coronary artery, or abnormal origin add an incremental risk factor for the arterial switch operation performed in early life.

Fistula communications from the coronaries may connect to the left or right ventricle, the right atrium, or the pulmonary trunk. They are almost always associated with marked dilatation of the proximal coronary arteries. Color flow Doppler is extremely helpful in the diagnosis showing at the site of the fistulous communication the characteristic continuous-flow profile demonstrated with pulse or continuous-wave Doppler.

ACQUIRED CORONARY ARTERY DISEASE

Kawasaki’s disease is the most common cause of acquired coronary artery anomalies in infants and children. Coronary artery aneurysms are characteristic, often leading to coronary artery stenosis and features of ischemic heart disease. Coronary artery aneurysms usually occur in the proximal left and right coronary arteries and are readily demonstrated from parasternal sections of the aortic valve. Aneurysms may be more difficult to define by echocardiography when they persist into adult life. It is important to be aware, however, that Kawasaki’s disease in childhood can present with evidence of ischemic heart disease in young adults.\(^1\)

CORONARY ARTERY ANATOMY

Two main coronary arteries arise from two of the three sinuses of Valsalva, the right coronary and left coronary sinuses, respectively. The two coronary arteries have major differences in their branching patterns once they have emerged from their sinuses.

After arising from its sinus, the right coronary artery runs around the orifice of the tricuspid valve in the interventricular groove. In this initial course it usually gives off the sinus nodal artery into the atrial musculature and the infundibular (or conal) artery into the right ventricular muscle mass. The conal/infundibular branch commonly anastomoses with a small branch of the left coronary artery to form the anastomotic ring (of Vieussens). These branches and the ring are sometimes considerably enlarged when there is distal atherosclerotic disease in the right coronary artery. The artery then runs...
to the acute margin of the heart, where it gives rise to the acute marginal artery of the right ventricle and usually a lateral atrial artery. Continuing around the tricuspid orifice, the right coronary artery gives off various smaller ventricular branches before, in the majority of hearts, it merges into the posterior interventricular artery. The area of the junction of the posterior interventricular and the atrioventricular grooves is generally called the *crux of the heart*. Before it forms the posterior descending branch, the right coronary artery itself makes a U turn into the area of atrioventricular muscular septum and gives off the artery to the atrioventricular node from the apex of the U angle. The foregoing describes the anatomy of the majority of people (i.e. that the artery supplying the posterior descending branch is the right coronary artery). This arrangement is called *right coronary dominance*. Although the left coronary artery always supplies a greater mass of muscle than the right coronary artery, echocardiography only visualizes the left main stem and the proximal left anterior descending artery. Although its sensitivity in detecting significant lesions is debatable, it can detect proximal lumen calcification.\textsuperscript{1-3} Transesophageal echo with color flow Doppler provides an ideal noninvasive tool for studying the proximal seg-

FIGURE 8.1. Parasternal short-axis view from a patient with anomalous left coronary artery origin, arising from the pulmonary artery. Notice the continuous retrograde flow in the coronary artery shown on the color M-mode picture.