large or unusual PDAs may require surgery.

Prognosis: Both surgical procedures can be done at low risk with zero percent mortality. PDA closure in very preterm infants has a higher mortality rate because of the additional significant medical problems. Complications are rare, but can include injury to the laryngeal nerve, paralysis of the left hemidiaphragm, or injury to the thoracic duct (Park, 2014).

ASD, Atrial septal defect; *AV,* atrioventricular; *BE,* bacterial endocarditis; *COA,* coarctation of the aorta; *CPB,* cardiopulmonary bypass; *HF,* heart failure; *PDA,* patent ductus arteriosus; *VSD,* ventricular septal defect.

The outcomes of surgical treatment for patients with moderate to severe disease are variable. Patient risk factors for increased morbidity and mortality include prematurity or low birth weight, a genetic syndrome, multiple cardiac defects, a noncardiac congenital anomaly, and age at time of surgery (neonates are a higher risk group). For example, aortic stenosis or coarctation manifesting in the first week of life is more severe and carries a higher mortality than if it becomes apparent at 1 year of age. Outcomes for surgical repair of similar congenital heart defects also vary among treatment centers. In general, the outcomes of surgical procedures have steadily improved in the past decade, with mortality rates for many severe defects below 10% and a decrease in the incidence of complications and length of hospital stay.

Defects with Increased Pulmonary Blood Flow

In this group of cardiac defects, intracardiac communications along the septum or an abnormal connection between the great arteries allows blood to flow from the higher pressure left side of the heart to the lower pressure right side of the heart (Fig. 23-4). Increased blood volume on the right side of the heart increases pulmonary blood flow at the expense of systemic blood flow. Clinically, patients demonstrate signs and symptoms of HF. ASD, VSD, and patent ductus arteriosus are typical anomalies in this group (see Box 23-1).