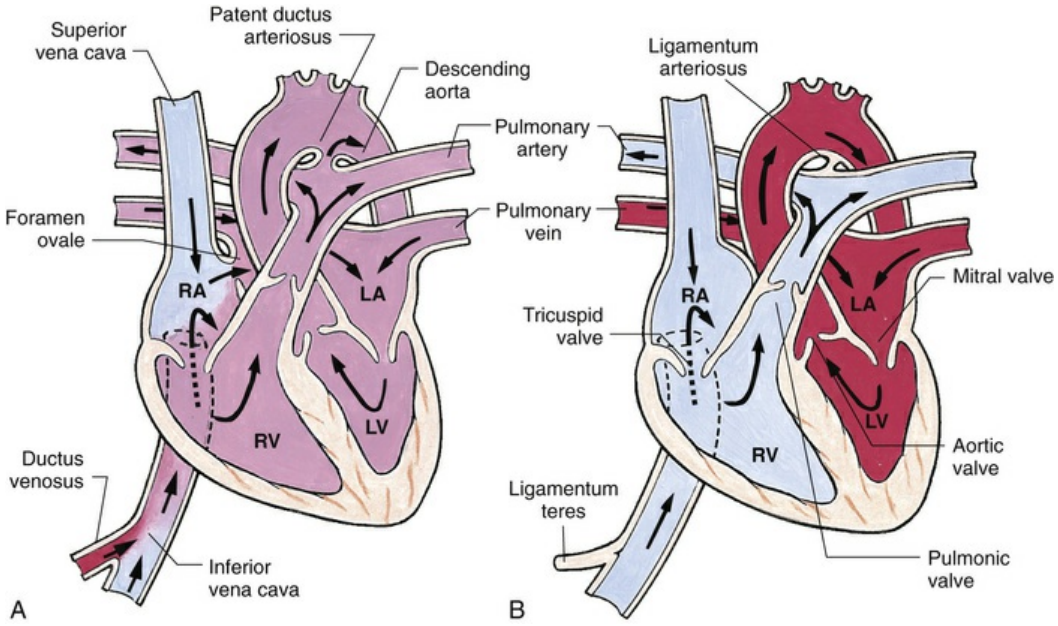

FIG 23-2 Changes in circulation at birth. **A,** Prenatal circulation. **B,** Postnatal circulation. *Arrows* indicate direction of blood flow. Although four pulmonary veins enter the left atrium *(LA),* for simplicity, this diagram shows only two. *LV,* Left ventricle; *RA,* right atrium; *RV,* right ventricle.

Before birth, the high pulmonary vascular resistance created by the collapsed fetal lung causes greater pressures in the right side of the heart and the pulmonary arteries. At the same time, the free-flowing placental circulation and the ductus arteriosus produce a low vascular resistance in the remainder of the fetal vascular system. With the cessation of placental blood flow from clamping of the umbilical cord and the expansion of the lungs at birth, the hemodynamics of the fetal vascular system undergo pronounced and abrupt changes (see Fig. 23-2, *B*).

With the first breath, the lungs are expanded, and increased oxygen causes pulmonary vasodilation. Pulmonary pressures start to fall as systemic pressures, given the removal of the placenta, start to rise. Normally, the foramen ovale closes as the pressure in the left atrium exceeds the pressure in the right atrium. The ductus arteriosus starts to close in the presence of increased oxygen concentration in the blood and other factors.

Altered Hemodynamics