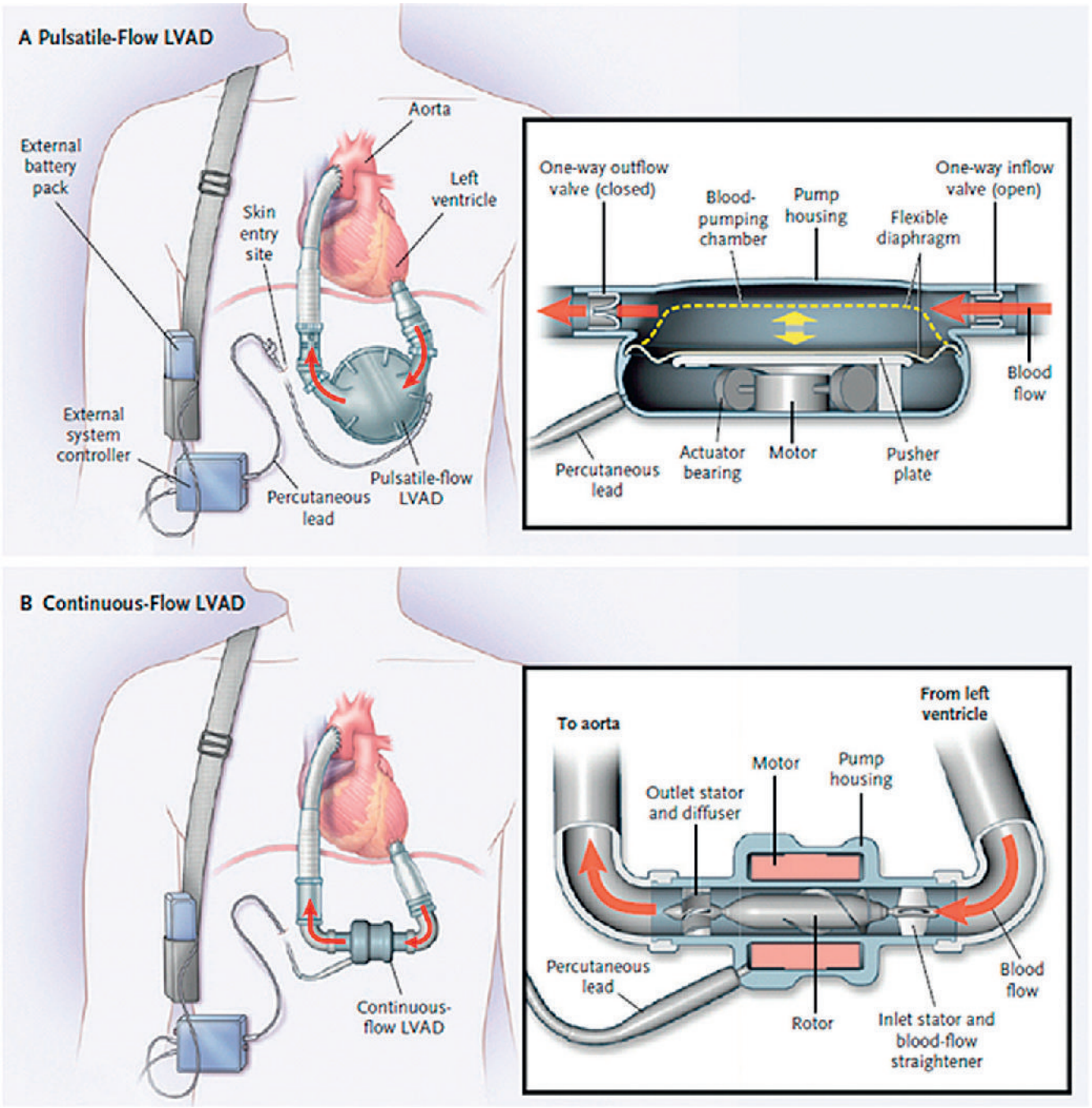

FIGURE 11-3 **A,** HeartMate XVE left ventricular assist device (LVAD) with pneumatically driven pulsatitle pump system. **B,** HeartMate II LVAD with axial flow pump system. See text for details. (Slaughter MS, Rogers JG, Milano CA, et al: Advanced heart failure treated with continuous-flow left ventricular assist device, N Engl J Med 361:2241–2251, 2009.)

transplantation was achieved. The TAH seeks to entirely restore cardiac function, and it is indicated in patients who are at risk of death from irreversible biventricular failure not amenable to medical or surgical therapy.

In the United States, the pneumatically driven SynCardia CardioWest TAH-t (temporary) (SynCardia, Inc., Tucson, Ariz.) and the hydraulically driven AbioCor TAH (Abiomed, Danvers, Mass.) are presently approved by the FDA. These pulsatile pumps are placed in the orthotropic position by excising the right and left ventricles for total replacement of bilateral valvular and ventricular function (Fig. 11-5). The CardioWest TAH-t is approved as a bridge to transplantation and has a survival rate similar to LVAD implantation for that indication. To date, the longest survival time with the CardioWest is 1374 days. The AbioCor is currently approved for humanitarian device use. Such instances involve the compassionate use of the device, without prior evidence of effectiveness, to potentially benefit patients with a rare disease. The AbioCor TAH is entirely implantable and is intended for permanent cardiac replacement in patients younger than 75 years of age who have severe heart failure and are not candidates for transplantation but meet the criteria for humanitarian device use. Initial clinical trials in 14 patients demonstrated adequate support; the longest survival time with the AbioCor was 512 days.