Mechanical circulatory assist devices have been used in clinical practice as a bridge to transplantation since the late 1960s. In 1982, the first totally artificial heart designated as permanent therapy was implanted, but relatively few totally artificial hearts are implanted today. In the last several years, there has been a shift toward the use of left ventricular assist devices as a bridge to cardiac transplantation. Likewise, there is increasing interest in the use of ventricular assist devices as a bridge to recovery for patients with myocarditis, dilated cardiomyopathy, and following myocardial infarction or cardiotomy. This review presents basic information on the present use of these very devices as they relate to transplantation and recovery, and as permanent therapy. Individual devices will briefly be described, as will indications for, and timing of, implantation. Other related issues, such as right heart failure, pulmonary hypertension, arrhythmias, anticoagulation, and infections, will be addressed. In closing, the future of mechanical circulatory devices will be discussed.