Ventricular assist devices

Ventricular assist devices

V ADs have had a significant impact. They may be used as a bridge to transplantation, a bridge to recovery (where the device is explanted if the patient’s cardiac function improves) or as long-term durable destination therapy . The first total artificial heart implant was performed by Cooley in Houston, Texas, USA, in 1969 with the patient sub - sequently undergoing heart transplantation 48 hours later. In 1966, DeBake y utilised a left V AD in a patient unable to wean from cardiopulmonary bypass after valve surgery . Current generation de vices use continuous non-pulsatile flow technology , which permits small device size, has the rotor as the only moving part and uses electrical rather than the more bulky pneumatic power delivery (Figure 92.1). Patients can now remain on device support for years if nec - essary , although complications from anticoagulation (stroke, device thrombosis, gastrointestinal bleeding), right ventricular failure, aortic valve regurgitation and driveline infection are common; hospital readmission is fr equent. Early mortality is akin to heart transplantation but long-term survival is inferior with 50% survival at 5 years. Given the shortage of suitable donor organs, V AD implan - tation is an increasingly common approach for those deterio - rating on the waiting list to gain time for a suitable donor heart to be become available. Future technology improvements are focused on increased biocompatibility , artificially generated pulsatility and avoidance of drivelines. Among patients admitted in cardiogenic shock, venoarte rial extracorporeal membrane oxygenation (ECMO) can be used to restore perfusion rapidly via the peripheral femoral artery and vein cannulation and permit urgent heart trans planta tion to be carried out within days, although the results are inferior (Figure 92.2). Summary box 92.3 Complications associated with VADs /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF /uni25CF

Ventilator Oxygenator Arterial return line (into body) Venous drainage cannula (out of body) ECMO ECMO pump pump controller Figure 92.2 Extracorporeal membrane oxygenation (ECMO), which can be used for cardiorespiratory support before or after heart and lung transplantation. Blood is drained from the right atrium via the femoral vein, oxygenated and pumped back to the arterial circulation. In a variation where respiratory and not circulatory support is needed (venovenous ECMO) oxygenated blood is returned to the right atrium via the other femoral vein or jugular vein. Anticoagulation Bleeding – gastrointestinal tract, intracerebral, subarachnoid, extradural Thrombosis Pump obstruction Device failure Infection Driveline, systemic sepsis Structural Aortic regurgitation, tricuspid regurgitation Right ventricular failure Higher risks at transplantation Adhesions, infection, vasoplegia

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