Anaesthetic management of patient with cardiac devices

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As the need for mechanical circulatory assistance : increasing,advances and development in its structure, function, and COl rol continueto influence the outcome and the patient benefit. Howeve the devicesavailable today are the result of long and hard we k by manyinvestigators, researchers, and clinicians.Despite substantial improvement in myocardial p otection andother technical advances, postoperative ventricular dysfunct on persists asa complication in 2-6% of all patients undergoing cardii : or thoracicaortic sugary. Despite maximal inotropic therapy, 0.5- % of thesepatients can not be weaned readily from CPB and would require someform of mechanical cardiac assistance to achieve adeq ate systemicpressure and perfusion.The currently available circulatory assist devices ar the artificialcardiac pacemaker, the intraaortic balloon pump, the vel ricular assistdevices, and the implantable cardioverter defibrilla Ir. Differenthaemodynamic and physiopathologic changes occur with tl ~use of thesemechanical circulatory assist devices and understanding of hese changesis very important to help the surgeon, anesthetist, and p rfusionists todecrease the morbidity of these changes on the patient.A) Artificial cardiac pacemaker:Electronic cardiac pacemakers are temporary Ir permanent(implanted) devices that electrically stimulate the heart.SlI1tIIIUlryPacemakers consist of a power source (battery) 1 tat suppliesenergy for stimulation and other pacemaker functions, circuii ,for sensingand regulation of stimulation, and leads that connect the I rwer sourceand electronic circuitry to electrodes.Artificial pacing is indicated for treatment of pen stent bradycardiaof any origin if it compromises hemodyramics or p edisposes toventricular irritability manifested by premature beats (ventriculartachycardia (VT). The two major indications for permane t pacing arefailure of impulse formation and failure of cardiac conductii 1. Clinically,sick sinus syndrome and complete heart block are the r ost commonindications for pacemakers.Complications following pacemaker or pcn imph ntation:Earlv Late EaJ or latePneumo (hemo)-thorax Thromboembolism, pulse Lead disksubcutaneous emphysema generator erosion, lead pacemakemyocardial perforation defects t pacing thresholds pacemakearterial lead placement battery depletion pacemakebrachial plexus injury generatorextracard1gementarrhythmiasinfectionsyndromenalfunction.c stimulationB) The intraaortic ballon pump:The IABP is a catheter mounted intravascular devic s designed toimprove the balance between myocardial oxygen suppf and demandwhile increasing systemic perfusion to a modest I egree,

Othercomponents of IABP include a pump, a gas source, and a r icroprocessorconsole.The primary indications for IABP in cardiac surgi al patient areinability to separate from CPB, poor haemodynamic Unction, andongoing ischaemia following CPB despite increasing lrug support.-117-SlI1IUIUIryMyocardial function often improves with the use of thl IABP, andsystemic perfusion and vital organ function are preserved. I is crucial tocontrol heart rate and suppress atrial and ventricular dys hythmias toensure proper balloon timing. As cardiac function returns, tl ~assist ratiois gradually weaned from every beat to every other bel and so onassuming no further cardiac deterioration, then removed.Complications associated with the lAP are pnmar y related toischaemia distal to the site of balloon insertion. Direct 1 auma to thevessel, arterial obstruction, and thrombosis are the II ,st commoncomplications, although aortic perforation and balloon I ipture occurrarely. Platelet destruction and thrombocytopenia may also I ccur,C) Automatic implantableCardioverter defibrillatorRecurrent ventricular tachycardia or ventricular fibril uion that canresult in sudden death in the survivor of cardiac arrest may I : treated withan automatic implantable cardioverter defibrillator (AICD)· iat senses theonset of these ventricular dysrhythmias and delivers a syr hronized 25-joule electrical discharge.Table (11) Potential complications of len surger: :I) Complications resulting II) Surgical complications III) Surgifrom the subclavian stick related to the pulse generator related 1teehniquePneumothorax Pocket erosion Lead dislodiHemothorax Pocket hematoma Lead perofnSubclavian artery puncture Pocket seroma Loose set scAir embolism Pocket infection Failure to isBleeding MicrodislocHemoptysis MalpositionBrachial plexus injury DiaphragmsSubclavian artriovenous fistula Exit blockConductor!Insulation bVenous thrcPulmonary.1 complicationsthe ICD leadsmentIon,wate the set screwionc stimulationIClurealeibosisnbolismSumtlUlryContraindications:Implantation of an ICD is contraindicated in any pati at who has aremedial cause of ventricul arrhythmias such as acut myocardialinfarction, myocardial ische ia, electrolyte imbalance, I ug toxicity,hypoxia, or sepsis.D) The ventricular assisThe VAD is a blood p p that is designed to assist r replace thefunction of either the right or left ventricle. In the absence I f right or leftventricular ejection, the RV supports the pulmonary eire ilation, whilea LVAD provides systemic p rfusion respectively. Implant: lleVADs arepositioned intracorporeally i the anterior abdominal wa or within abody cavity other than the pe icardium.Extraeorporeal VADs ay be located in a paracorp real position,along the patient’s anterior a dominal wall, or externally, 1 the patient’sbedside.Infrequently,demands despite maximal pis unable to meet syster IC metabolicarmacologic therapy and in ertion of theces, devices that actually pu np blood andbypass either the left or ri t ventricle are required. The e devices areeffective because the inj producing myocardial dysi motion takesplace intraoperatively and, ore important, is often revers ile, A secondgroup of patients who have hown benefit from assist de’ ces are thosewith chronic heart failure. These devices allow for I iemodynamicsupport as a temporary meas re prior to heart transplantatic 1.Complications of V s are inadequate LVAI flow, rightventricular failure, haemorrh ge, thromboembolism, infectic t, multisystemorgan failure, device malfunc ion, and pump dependency.