SUMMARY

Cardiac arrhythmia is defined as any rhythm other than normal sinus rhythm that may result from abnormalities of impulse formation, impulse conduction or combination of both.

Several mechanisms are responsible for cardiac arrhythmias, however, reentry is the commonest cause of many supraventricular and ventricular tachyarrhythmias.

Some cardiac arrhythmias are benign and clinically insignificant, whereas others are extremely serious and unresponsive to medical therapy. New modalities of medical therapy such as specific pacemakers and catheter ablation are of limited value in the management of such cases.

Supraventricular tachycardias such as Wolff-Parkinson-white syndrome, atrioventricular nodal reentrant tachycardia, ectopic automatic atrial tachycardia, atrial flutter-fibrillation as well as ischemic ventricular tachycardia and specific forms of non-ischemic ventricular tachycardias are often refractory to all forms of medical therapy, thus, forming the scope of surgery of cardiac arrhythmias.

On the other hand, bradyarrhythmias are treated almost exclusively by electrical stimulation of the heart and no drug or other therapy approaches the cardiac pacemaker in success of their management.

Routine cardiac investigations such as electrocardiography and echocardiography are of limited value in detection of the precise site of origin and underlying mechanism for tachyarrhythmias, whereas, invasive investigations as cardiac catheterization and electrophysiologic studies are helpful for such diagnosis as well as the diagnosis of any associated cardiac pathology.

Proper patient selection and meticulous intraoperative mapping, whether epicardial or endocardial, for detection of atrial and ventricular activation patterns are of prime importance for success of cardiac arrhythmia surgery.

Wolff-Parkinson- White syndrome, the Columbus of cardiac arrhythmias, was also the first arrhythmia to be treated surgically initiating the classic endocardial (open heart) school of Sealy that advocates atriotomy and dissection of the ventricular end of the accessory pathways with aortic cross clamping and cardioplegia. This approach is suitable for ablation of left free wall, right free wall, anteroseptal and posteroseptal accessory pathways.

On the other hand, the epicardial (closed heart) school of Guiraudon that obviates the need for aortic cross clamping and minimizes cardiopulmonary bypass was designed to divide the atrial end of all varieties of accessory pathways from outside, except the anteroseptal variety that require open heart approach to the septum.

Regardless of the technique chosen, the results approach a one hundred percentage initial operation success rate with an operative mortality in elective uncomplicated cases about zero percentage.

Instead of catheter ablation of His bundle with subsequent permanent pacemaker implantation, cryoablation within and around borders of the triangle of Koch or sharp dissection of the intermediate atrioventricular node are now available alternatives to treat patients with atrioventricular nodal reentrant tachycardias with a success rate approaching 95%.

Automatic atrial tachycardias are generally suppressed by general anaesthesia and as a result intraoperative mapping may not be possible, a fact that led many cardiac surgeons to treat such patients by the electrical isolation of the offended atrium, however, right atrial isolation is considerably more difficult than the left one because of the complexities of the pacemaker tissues on right side.

Many options including, cryoablation of the site of origin of the tachycardia or the combined sinoatrial node, atrioventricular node insulation are used to treat patients with atrial flutter-fibrillation.

Ventricular tachyarrhythmias represent a more formidable problem to the surgeon than supraventricular tachyarrhythmias

because of progressive underlying heart disease, limited cardiovascular reserve as well as the difficulty to understand the underlying substrate responsible for such arrythmias that are often unstable during surgery, rendering intraoperative mapping so difficult specially following performing a ventriculotomy.

Ischemic ventricular tachycardias that develop as a sequelae of myocardial infarction, constitute the majority of ventricular tachycardias treated surgically. Encircling endocardial ventriculotomy was the first operation directed to isolate the arrhythmogenic area, at the border between healthy and infarcted or aneurysmal part of the ventricle, from the remainder of the heart, however, left ventricular dysfunction aggrevation was a major limitation. Endocardial resection procedure, either localized or extended was an alternative to preserve left ventricular function, however, intraoperative assessment of the adequacy of resection is not available since resection is performed during cold cardioplegia with the aorta cross clamped.

Sequential map guided subendocardial resection and/or cryoablation of arrhythmogenic areas under normothermic cardiopulmonary bypass permit the intraoperative assessment of adequacy of resection and/or cryoablation and minimize postoperative recurrence of arrhythmia, however, prolonged periods of cardiopulmonary bypass remain a limiting factor.

Recently, Balloon electric shock ablation is used for precise detection and subsequent ablation of the arrhythmogenic site precluding the need for ventriculotomy and minimizing the period of cardiopulmonary bypass, however, certain simple and localised forms of ventricular tachycardias can be treated by such technique.

Postoperative recurrence of ventricular tachyarrhythmias reported in many series led many surgical teams to consider the automatic implantable cardioverter defibrillator as a complementary, not competitive, procedure to surgical control of ventricular tachyarrhythmias and by leaving the device patches intraoperatively, control of such patients is possible should the arrhythmia recure postoperatively without the need for another thoracotomy for the device placement.

Cardiac transplantation has been reported as the last resort for patient with refractory, life threatening arrhythmias, but has been limited to those with end-stage left ventricular dysfunction.