

## SUMMARY

The electrophysiological properties of the heart include cardiac impulse formation and conduction, namely, rhythmicity, excitability and conductivity. Cardiac dysrhythmias may result from alteration in two or three electrophysiological properties.

The incidence of intra-operative dysrhythmias vary greatly from 16 to 62 percent. They are most commonly encountered at the times of endotracheal intubation and extubation. Patients with preexisting cardiac disease had a higher incidence of ventricular dysrhythmias than did patient without heart disease.

Patients with preexisting disease such as ischaemic heart disease, hypertension, rheumatic and congenital heart disease are most likely to have disturbance of rhythm during anaesthesia. Also, patients with endocrine disorders such as thyrotoxicosis and phaeochromocytoma will cause cardiovascular irregularities.

In anaesthetic practice cardiac dysrhythmias are most frequently associated with adverse changes of ventilation, notably hypoxia hypercarbia and hypocapnia. Also disturbances of acid-base balance, both metabolic acidosis and alkalosis are associated with abnormalities in the cardiac rhythm.

Variation in the intracellular and extracellular concentration of certain electrolytes such as potassium, sodium, calcium and magnesium may result in cardiac irregularities.

Extremes of temperature, both hypothermia and malignant hyperpyrexia are associated with an increased frequency of cardiac arrhythmias.

Almost all anaesthetic agents depress the myocardium and the resulting hypotension may lead to rhythm changes. Halothane anaesthesia is associated with high incidence of nodal bradycardia, it is also associated with ventricular premature beats especially during spontaneous respiration. Halothane sensitizes the myocardium to the arrhythmogenic effect of adrenaline. Arrhythmias can be prevented if the dose of adrenaline does not exceed 10 ml. of 1 : 100000 to 1 : 200000 concentration in 10 minutes or 30 ml. of the same concentration in 1 hour. Ventricular arrhythmias are less during enflurane during halothane anaesthesia whether adrenaline is infiltrated or not.

Isoflurane increases the threshold of adrenaline induced arrhythmia three times than that in patients anaesthetized with halothane.

Suxamethonium especially on repeated administration causes bradycardia and cardiac arrhythmias. The rapid increase in serum potassium associated with the use of suxamethonium in patients with burns, trauma, uraemia and neuromuscular disorder is associated with cardiovascular hazards.

Cardiac dysrhythmias may occur during some surgical procedures such as ocular surgery, oral and dental surgery, intracranial neurosurgical manipulation especially in the posterior fossa, traction on intra-abdominal and pelvic viscera, handling and stimulation of the pericardium, heart and aorta. Instrumentation and manipulation of larynx and trachea may result in cardiac arrhythmias which are of major interest to the anaesthetist.

The electrocardiogram is now used as a routine monitor during anaesthesia and operation. The ECG should be used to identify myocardial ischaemia, recognize dysrhythmias and enables the physician to evaluate the function of the pacemaker during the surgical procedure. The per operative uses of ECG determine rate and rhythm disturbances, ischaemic heart disease, myocardial hypertrophy, heart block, electrolyte and drug effects and pericardial disease, pacemaker function and infarction that may occur in the postoperative period.

The prophylactic prevention of cardiac dysrhythmias in the operating room and intensive care unit lies in the proper anaesthetic management. Thorough pre-operative evaluation and correction of the cardiovascular status to optimum plays an important role in the prevention of intra-operative dysrhythmias.

The first stage in the treatment of cardiac dysrhythmias is the elimination of the predisposing factors before proceeding to further therapy. There are many factors which may be encountered during surgery and predispose to the development of arrhythmias such as noxious stimulation during light planes of anaesthesia which evoke a strong sympathetic response leading to dysrhythmias and it is treated by deepening the level of anaesthesia or temporary stoppage of stimulation. Also, inadequate ventilation to a point of hypoxia and acidosis may result in arrhythmias. Hypocapnia which result from hyperventilation will cause respiratory alkalosis and compensatory serum electrolytic shifts which may predispose the patient to arrhythmias, and correcting the respiratory defect is the solution. Administration of drugs that alter automaticity as epinephrine, atropine or potassium concurrently with agents that sensitize the myocardium as halothane or cyclopropane may produce cardiac arrhythmias. Such combination must be avoided.

Cardiac dysrhythmias require treatment when they :

- 1 - Interfere significantly with normal tissue perfusion;
- 2 - Adversely affect the normal balance between myocardial oxygen supply and demand; or
- 3 - Predispose the patient to ventricular tachycardia or fibrillation.

Drug therapy, cardioversion and electrical pacing are indicated when correcting the underlying cause or causes fails to control dysrhythmias.