DGAFMS MEDICAL MEMORANDUM NO

CARDIAC ARREST

Introduction

1. Cardiac arrest is a medical emergency where immediate recognition and treatment are of paramount importance as delay of even a few minutes results in irreversible brain damage. Suddenness of the catastrophe tends to cause confusion & hence one person should effectively coordinate the resuscitative efforts.

2. All medical officers & Nursing officers must know how to deal with cardiac arrest. The paramedical staff must be conversant with basic life support measures. All new staff must have introductory training. The efficiency & effectiveness of the existing Staff in handling this emergency must be periodically assessed.

Definition

3. Cardiac arrest is defined as an abrupt cessation of cardiac pump function which may be reversible by a prompt intervention but will lead to death in its absence.

Etiology

4. The most common underlying cause is coronary atherosclerotic heart disease. The remainder are due to Cardionyopathies (dilated & hypertrophic), myocardial hypertrophy, myocarditis, Valvular heart disease (aortic stenosis), WPW syndrome & Congenital long QT Syndrome. Certain precipitating factors have also been identified viz transient ischaemia, low cardiac output states, fluid & electrolyte imbalance, drugs (digitalis, Proarrhythmic effects) & toxins (cocaine).

Mechanisms

5. The most common electrical mechanism is Venticular fibrillation (65-80%). Severe brady arrhythmia, asystole & Pulseless electrical activity account for another 20-30% cases. Sustained VT is a less common cause.

Cardio-Pulmonary resuscitation & Emergency Cardiac care

6. The individual who collapses suddenly is managed in four stages

[a] Initial response & basic life support (CPR)

[b] Advanced life support

[c] Post resuscitation care

[d] Long term management

Initial response & Basic life Support [CPR]

7. The following measures will be taken immediately and successively:-

[a] In the initial response, one should confirm whether sudden collapse is due to cardiac arrest. Complete loss of consciousness & absence of major arterial (carotid/femoral) pulses indicate cardiac arrest. Agonal respiratory movements may persist for a short time after the onset of cardiac arrest. As soon as Cardiac arrest is suspected or confirmed sound the alarm, call for help & note the time. For patients who develop cardiac arrest in wards(other than ICU/CCU) there should be a cardiac alarm system for calling a specialist team. Resuscitation sets should be strategically placed throughout the hospital.

[b] A precordial thump delivered by the clenched fist to the junction of middle & lower third of the sternum may occasionally revert VT or VF.

[c] The next step is to clear the airway by tilting the head back, lifting the chin & removing any dentures or foreign bodies.

[d] Basic life support [CPR] is then begun till a defibrillator is available.

[i] Mouth to mouth respirations may be used if no specific rescue equipment is available (airway/masked ambu bag). Lungs are to be inflated 10-12 times per minute i.e. once every fifth chest compression when two persons are available & twice in succession for every 15 chest compressions when only one person is carrying out both ventilation & chest compression.

[ii] Chest Compressions: The palm of one hand is placed over the lower sternum with the heel of the other resting on the dorsum of the lower hand. The sternum is depressed 3 to 5 cm, with the arms remaining straight, at a rate of approximately 80 to 100 per minute.

Advanced life Support [ALS]

8. Defibrillation, definitive airway control [usually with endotracheal intubations], intravenous access & pharmacologic therapy constitute advanced life support. As VF/Pulseless VT is the commonest underlying cause, whenever possible immediate defibrillation should precede intubation and insertions of an intravenous line (table 1). Management of Pulseless electrical activity & asystole is shown in Table 2. These have extremely low survival rates (zero to 4 percent). Finding & treating an underlying cause assumes importance in this setting. These include acidosis, Hypoxia, Hypovolaemia, dyselectrolaemia, Hypothermia, Myocardial Infarction, Poisoning, Cardiac tamponade, pneumothorax & Pulmonary embolism.

Table 1 : Management of VF/ Pulseless VT

- Perform CPR until defibrillator arrives
- Shock using 200 J, 200-300J & then 360J
- Intubate trachea & confirm correct tube placement: IV access
- Administer IV epinephrine (1mg push & repeated every 3-5 min)
- Shock using 360 J (upto three times)
- Administer antiarrhythmic drugs
  - IV Lidocaine or amiadarone
  - IV Magnesium Sulfate (Hypomagnesemia/Polymorphic VT)
  - IV Procainamide (recurrent VF/VT)
- Shock using 360J (upto three times)
- Identify & treat potential cause

Table 2 : Management of Pulseless Electrical Activity/asystole

- Perform CPR
- Endotracheal intubtion; IV access
- Confirm asystole by maximizing gain & in more than one rhythm lead [immediate transcutaneous pacing if available]
- Administer IV epinephrine [1mg push every 3-5 mins]
- Administer IV atropine [1 mg push every 3-5 mins to a total of 3 mg]
- Identify & treat potential causes

Medications during ALS

9. All medications used during cardiac arrest (table 3) when given through a peripheral venous site in arm or leg should be followed by a 20 ml IV bolus of saline & elevation of arm or leg for 10-20 seconds. Certain medications can also be given endotracheally diluted with normal saline to a total volume of 10 ml. Doses are as below:-

[a] Epinephrine 2 - 2.5 mg
[b] Atropine 2 – 3 mg
[c] Lidocaine 2 – 4 mg/kg

Table 3 : Drugs useful in Cardiac resuscitation

Drug	Indication	**Dosage**
Lidocaine	VF/ Pulseless VT	Initial dose 1-1.5 mg/kg IV Infusion 2-4 mg/min
	Stable VT	
Amiadarone	VF/Pulseless VT	300 mg diluted in 20-30 ml 5% dextrose repeat 150 mg SoS. Infusion 1mg/Min for 6 hrs and then 0.5 mg/min
	Stable VT	
	Supraventricular	
	Tachyarrhythmias	
Atropine	Symptomatic bradycardia/asystole	1mg IV every 3-5min [total 3 mg] 1 mg IV push repeat every 3-5 min
Epinephrine	VF/Pulseless VT	
	Asystole/Pulseless electrical activity	
	Anaphylaxis	
Bicarbonate	Metabolic acidosis	1 mmol/kg body wt slow IV
	Hyperkalaemia	
Magnesium sulfate	Hypomagnesemia	IV 1-2 G in 100 ml 5% dextrose over 1-2 min
	Polymorphic VT	
Procainamide	Recurrent VF/VT	12-17 mg/kg at rate of 20-30 mg/min IV
	Monomorphic VT	
Dopamine	Shock	IV initial 2-5 g/kg/min dose range 2-20 g/kg/min, titrate to systolic BP of 95-100 mmHg
	Post resuscitation	
	Hypotension	

When to stop

10. Prolonging resuscitation efforts beyond 30 minutes without a return of spontaneous circulation is usually futile. Unless the cardiac arrest is compounded by hypothermia, submersion in cold water, or drug over dose. For asystole it is reasonable to stop resuscitation after 10 minutes of resuscitation if there are no identified & reversible causes.

Post resuscitation Care

11. Hypotension should be treated by the administration of fluids, unless the patient has pulmonary oedema, in which case dopamine should be started. Appropriate analgesia & sedation should be given for intubated patients. If the arrest was due to VF/VT parenteral administration of antiarrhythmic drug (initially used lidocaine or amiadarone) is continued. Finally a meticulous search for the precipitating cause should be performed.

Long term management

12. Survivor of out of hospital cardiac arrest should undergo extensive diagnostic workup to prevent further recurrences. These include echo, stress test, coronary angiography & programmed electrical stimulation. Depending on the underlying cause (ischaemic or arrhythmic), anti ischaemic therapy (angioplasty/CABG plus betablockers) or antiarrhythmic therapy (amiadarone, AICD, CABG, aneurysmectony, cryoablation) is chosen. Survivors of cardiac arrest within the hospital due to acute MI undergo evaluation & long term management on the established lines.