Cardiac Arrest in Special Situations

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I. Cardiac arrest associated with internal physiological or metabolic conditions, such as

Asthma
Anaphylaxis
Pregnancy
Pulmonary embolism (PE)
Electrolyte imbalance
II. Cardiac arrest associated with external or environmentally related circumstances, such as

- Ingestion of toxic substance,
- Accidental hypothermia,
- Trauma,
- Choking,
- Drowning,
- Electric shock,
- lightning strikes

Cardiac Arrest in Bronchial Asthma

**BLS Modifications**

BLS treatment of cardiac arrest in asthmatic patients is unchanged.

**ALS Modifications**

- Possible “lateral chest compressions”.
- Ventilation strategy of low RR and TV is reasonable (Class Ila, LOE C). During arrest a brief disconnection from the bag mask or ventilator may be considered *(Auto PEEP)*
- Compression of the chest wall to relieve air-trapping can be effective (Class Ila, LOE C).
- Tension pneumothorax should be R/O (Class I).
Cardiac Arrest in Anaphylaxis

BLS Modifications

Epinephrine should be administered early by IM injection to all patients with signs of a systemic allergic reaction, especially hypotension, airway swelling, or difficulty breathing (Class I, LOE C).

Cardiac Arrest in Anaphylaxis

ALS Modifications

- Early and rapid advanced airway management is critical.

- Vasogenic shock from anaphylaxis may require aggressive fluid resuscitation (Class IIa, LOE C).

- The IV route as an alternative to IM administration of epinephrine in anaphylactic shock (Class IIa, LOE C).
Cardiac Arrest in Anaphylaxis (cont.)

ALS Modifications

- Alternative vasoactive drugs (vasopressin, norepinephrine, methoxamine, and metaraminol) (Class IIb, LOE C).

- Use of antihistamines, inhaled B2 agonists, and IV corticosteroids (Class IIb, LOE C).

Cardiac Arrest in Pregnancy

BLS Modifications

To relieve aortocaval compression during chest compressions:

- It is reasonable to perform manual left uterine displacement in the supine position first (Class IIa, LOE C).

- Left lateral tilt not recommended.
Left uterine displacement using 2-handed technique.

Left uterine displacement using 1-handed technique.
Cardiac Arrest in Pregnancy (cont.)

**ALS Modifications**

- Airway management may be difficult.

- Bag-mask ventilation with 100% oxygen before intubation is especially important in pregnancy (Class IIa, LOE B)
Cardiac Arrest in Pregnancy (cont.)

- During cardiac arrest, if the pregnant woman with a fundus height at or above the umbilicus has not achieved ROSC with usual resuscitation measures plus manual LUD, it is advisable to prepare to evacuate the uterus while resuscitation continues. (Class I)

- Perimortem Caesarean Delivery (PMCD) should be considered at 4 minutes after onset of maternal cardiac arrest or resuscitative efforts (for the unwitnessed arrest) if there is no maternal ROSC.

Cardiac Arrest in Pulmonary Embolism

Pulseless electrical activity is the presenting rhythm in 36% to 53% of PE-related cardiac arrests.

**ALS Modifications**

In suspected but unconfirmed PE:

- No evidence is available to support or refute the effectiveness of empiric thrombolysis (Class IIa, LOE B).

- Thrombolysis may be considered (Class IIb, LOE C).
Cardiac Arrest in Pulmonary Embolism (cont.)

In patients with confirmed PE as the precipitant of cardiac arrest:

- Thrombolysis, surgical embolectomy, and mechanical embolectomy are reasonable emergency treatment options. (Class IIa, LOE B).

- Standard contraindications to thrombolysis may be superseded by the need for potentially lifesaving intervention.

Cardiac Arrest in Trauma

BLS Modifications

- If involves the head and neck, the cervical spine must be stabilized.
- Jaw thrust should be used instead of a head tilt–chin lift to establish a patent airway.

ALS Modifications

- If bag-mask ventilation is inadequate, an advanced airway should be inserted while maintaining cervical spine stabilization.
- Consider tension pneumothorax, hypovolemia & cardiac tamponade.
- Rapid Defibrillation for commotio Cordis.
Cardiac Arrest in Drowning

BLS Modifications

- The most important and detrimental consequence of submersion is hypoxia; therefore, oxygenation, ventilation, and perfusion should be restored as rapidly as possible.

- Use the traditional A-B-C instead of C-A-B approach in view of the hypoxic nature of the arrest.

Cardiac Arrest in Drowning (cont.)

- Prompt initiation of rescue breathing increases the victim’s chance of survival.

- Some victims aspirate no water because they develop laryngospasm or breath-holding. Even if water is aspirated, there is no need to clear the airway of aspirated water.
Cardiac Arrest due to Electrocution

- The frequency of alternating current increases the likelihood of current flow through the heart during the relative refractory period, which is the “vulnerable period” of the cardiac cycle (VF).

- Lightning can produce a wide spectrum of peripheral and central neurological injuries.

Cardiac Arrest due to Electrocution (cont.)

**BLS Modifications**
- Maintain spinal stabilization during extrication and treatment if there is a likelihood of head or neck trauma.
- Victims with respiratory arrest may require only ventilation and oxygenation to avoid secondary hypoxic cardiac arrest.

**ACLS Modifications**
- Early intubation should be performed for patients with evidence of extensive burns.
Cardiac Arrest due to Hypothermia

- For patients with mild hypothermia (temperature $\geq 34^\circ C$) Passive rewarming is generally adequate.

- For patients with moderate ($30^\circ C$ to $34^\circ C$) hypothermia with a perfusing rhythm, external warming techniques are appropriate.

- For patients with severe hypothermia ($\leq 30^\circ C$) with a perfusing rhythm, core rewarming is often used.

- Patients with severe hypothermia and cardiac arrest can be rewarmed most rapidly with cardiopulmonary bypass.

Cardiac Arrest due choking

- Assess severity
- Encourage cough if effective
- Backblows or abdominal thrusts
Choking:
Back Blows
Cardiac Arrest due to Electrolyte Disturbance

Hypokalemia

- Normal K level (3.5-4.5 mEq/L)
- Hypokalemia can produce ECG changes such as U waves, T-wave flattening, and arrhythmias (especially if the patient is taking digoxin), particularly ventricular arrhythmias

ACLS Modifications
- Correction of hypokalemia by slow IV KCL during ACLS.
- Hypomagnesemia should be checked and treated.
- The effect of bolus administration of potassium for cardiac arrest suspected to be secondary to hypokalemia is unknown and ill advised (Class III, LOE C).
Cardiac Arrest due to Electrolyte Disturbance (cont.)

Hyperkalemia

 Severe hyperkalemia (more than 6.5 mmol/L) can cause cardiac arrhythmias and cardiac arrest.

 The first indicator of hyperkalemia may be the presence of peaked T waves (tenting) on the electrocardiogram (ECG) then prolonged PR, widened QRS.

 If hyperkalemia is left untreated, a sine-wave pattern, idioventricular rhythms, and asystolic cardiac arrest may develop.

Cardiac Arrest due to Electrolyte Disturbance (cont.)

ACLS Modifications

in addition to standard ACLS (Class IIb, LOE C) the following can be given:

 Stabilize myocardial cell membrane: Ca chloride (10%) or Ca gluconate.

 Shift potassium into cells: IV insulin+glucose, nebulized B2 agonist.

 Promote potassium excretion: Diuresis, Kayexalate, Dialysis.
ECG Changes in Hyperkalemia

Cardiac Arrest due to Electrolyte Disturbance (cont.)

Hypomagnesemia:
- Hypomagnesemia, is defined as a serum magnesium concentration below 1.3 mEq/L.
- Hypomagnesemia can be associated with polymorphic ventricular tachycardia, including torsades de pointes.

ACLS Modifications
- IV magnesium 1 to 2 g of MgSO4 bolus IV push is recommended (Class I, LOE C).
Cardiac Arrest due to Toxin Ingestion

Careful history taking from relatives.

Administration of single-dose activated charcoal to adsorb ingested toxins can be administered within 1 hour of poisoning.

Cardiac Arrest due to Toxin Ingestion

ACLS Modifications

- **Opioid overdose**: IV naloxone (Class I, LOE A).
- **Benzodiazepine overdose**: IV Flumazenil (Class IIb, LOE C).
- **Beta blockers**: IV glucagon, high-dose insulin with IV dextrose supplementation, or IV calcium salts (Class IIb, LOE C).
- **Ca Channel Blockers overdose**: high-dose insulin with IV dextrose supplementation or calcium in patients with refractory shock (Class IIb, LOE C).
- **Digoxin overdose**: Fab (One vial of antidigoxin Fab / 0.5 mg of digoxin) or serum digoxin concentration (ng/mL)×weight (kg)/100.
- **Tricyclic antidepressant**: Na bicarbonate (Class IIb, LOE C).
Conclusion

- Cardiac arrest is not always due to primary cardiac cause.

- Different clinical & environmental situations can lead to cardiac arrest.

- Health care providers should understand these situations together with their knowledge of basic and advanced life support.

Thank You Very Much