

Cardiac Arrest in Special Situations

Dr. Yasser Yazeed M.D.

Lecturer of cardiovascular medicine
Cairo University

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 IIa, 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 IIa, 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

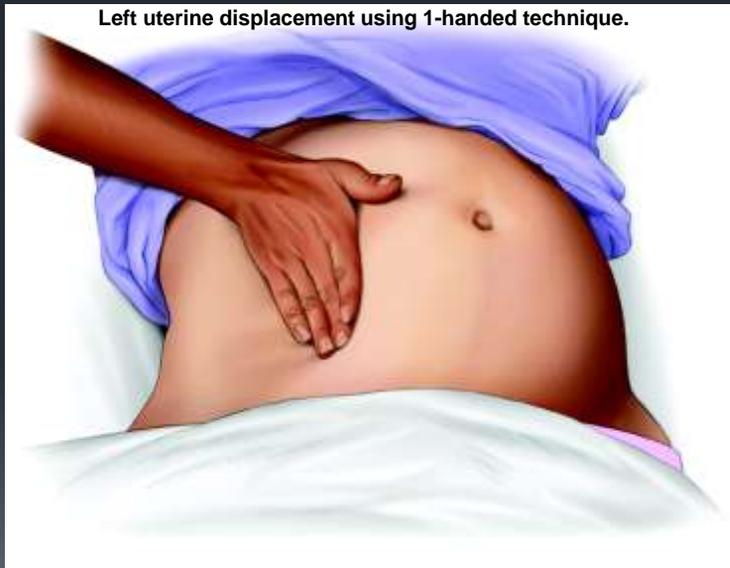
To relieve aortocaval compression during chest compressions:

- 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.



Patient in a 30° left-lateral tilt using a firm wedge to support pelvis and thorax.



Vanden Hoek T et al. Circulation 2010;122:S829-S861



Copyright © American Heart Association, Inc. All rights reserved.

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 Electrocutation

- 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 Electrocutation (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

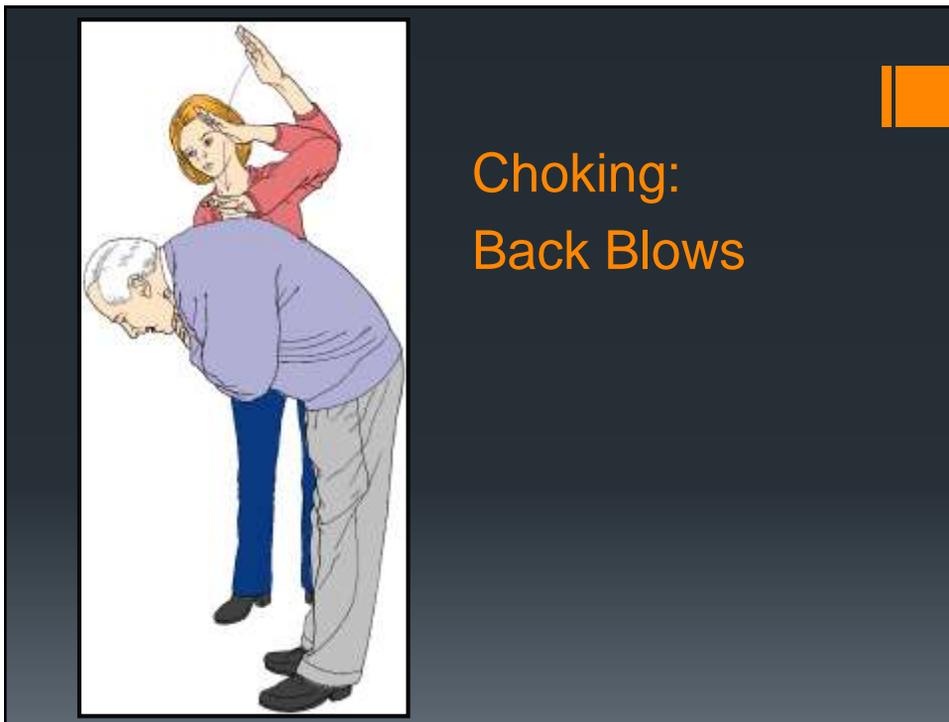
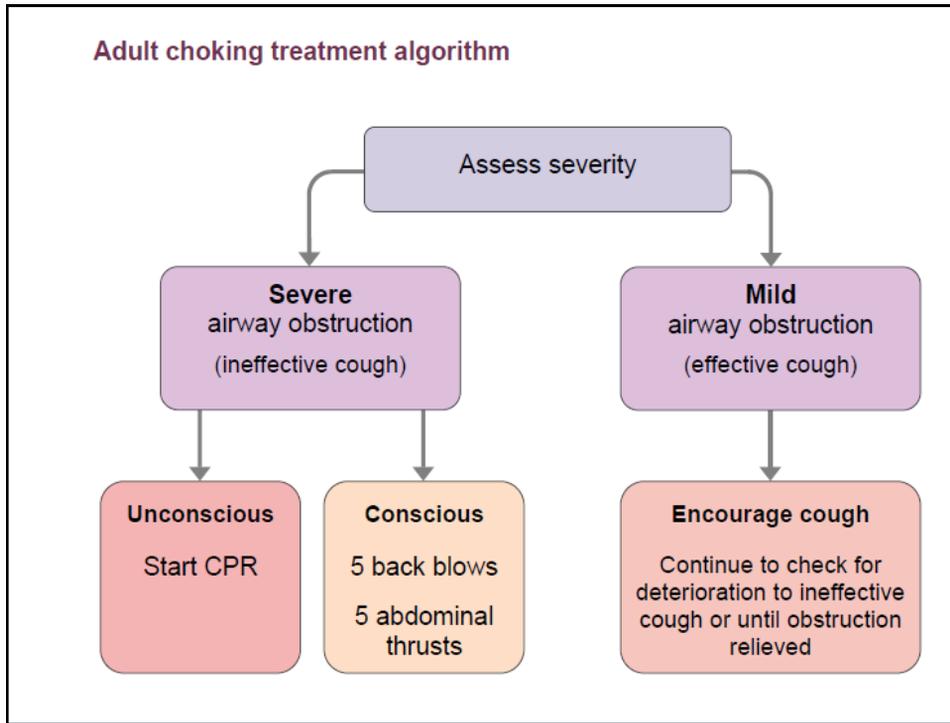
- early intubation should be performed for patients with evidence of extensive burns.

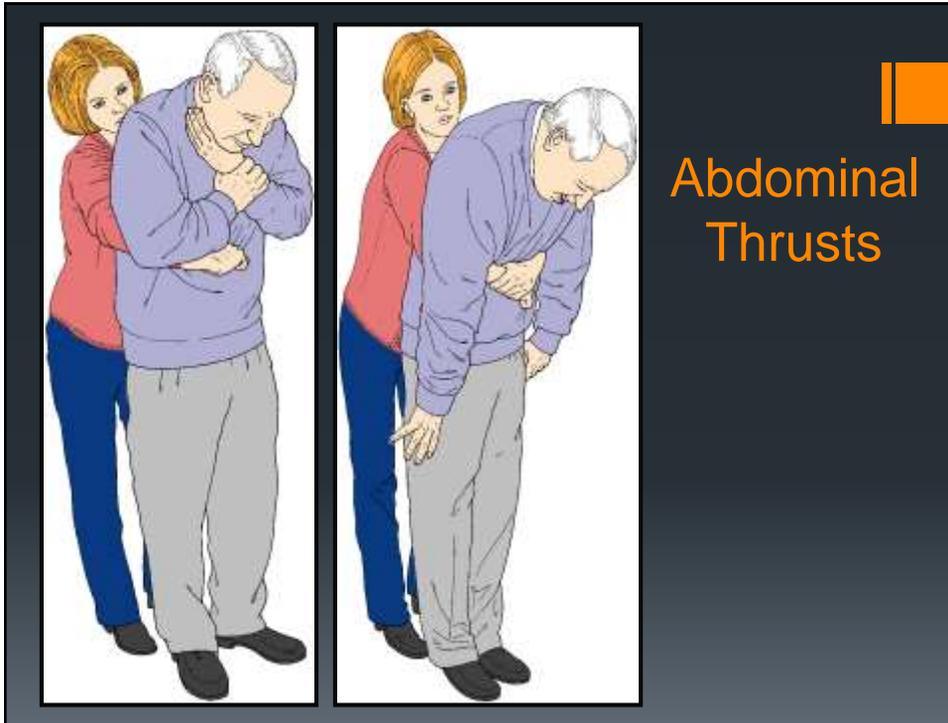
Cardiac Arrest due to Hypothermia

- For patients with **mild hypothermia** (temperature $\geq 34^{\circ}\text{C}$) Passive rewarming is generally adequate.
- For patients with **moderate** (30°C to 34°C) hypothermia with a perfusing rhythm, external warming techniques are appropriate.
- For patients with **severe hypothermia** ($\leq 30^{\circ}\text{C}$) 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





Abdominal Thrusts

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.)

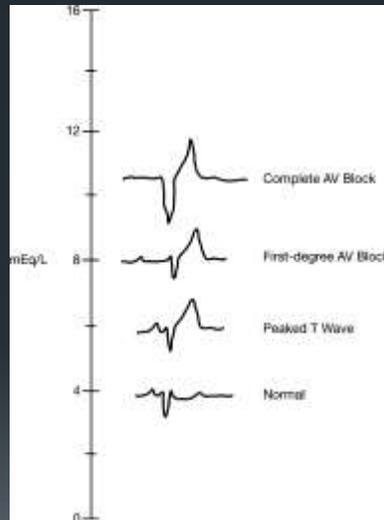
Hyperkalemia

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



Vanden Hoek T et al. Circulation 2010;122:S829-S861

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