Acute Coronary Syndromes and Special Circumstances of Resuscitation

2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

胡為雄

Key issues with major changes in the 2015 Guidelines Update recommendations for ACS

- Prehospital ECG acquisition and interpretation
- Troponin to identify patients who can be safely discharged from the emergency department
- Choosing a reperfusion strategy when prehospital fibrinolysis is available
- Choosing a reperfusion strategy at a non–PCI-capable hospital
- Interventions that may or may not be of benefit if given before hospital arrival
- Hospital reperfusion dicisions after ROSC

Prehospital ECG Acquisition and Interpretation

- **2015 (New):** Prehospital 12-lead ECG should be acquired early for patients with possible ACS. (Class I, LOE B-NR).
- **2015 (New):** Because of high false-negative rates, we recommend that computer-assisted ECG interpretation not be used as a sole means to diagnose STEMI (Class III: Harm, LOE B-NR).

Prehospital ECG Acquisition and Interpretation

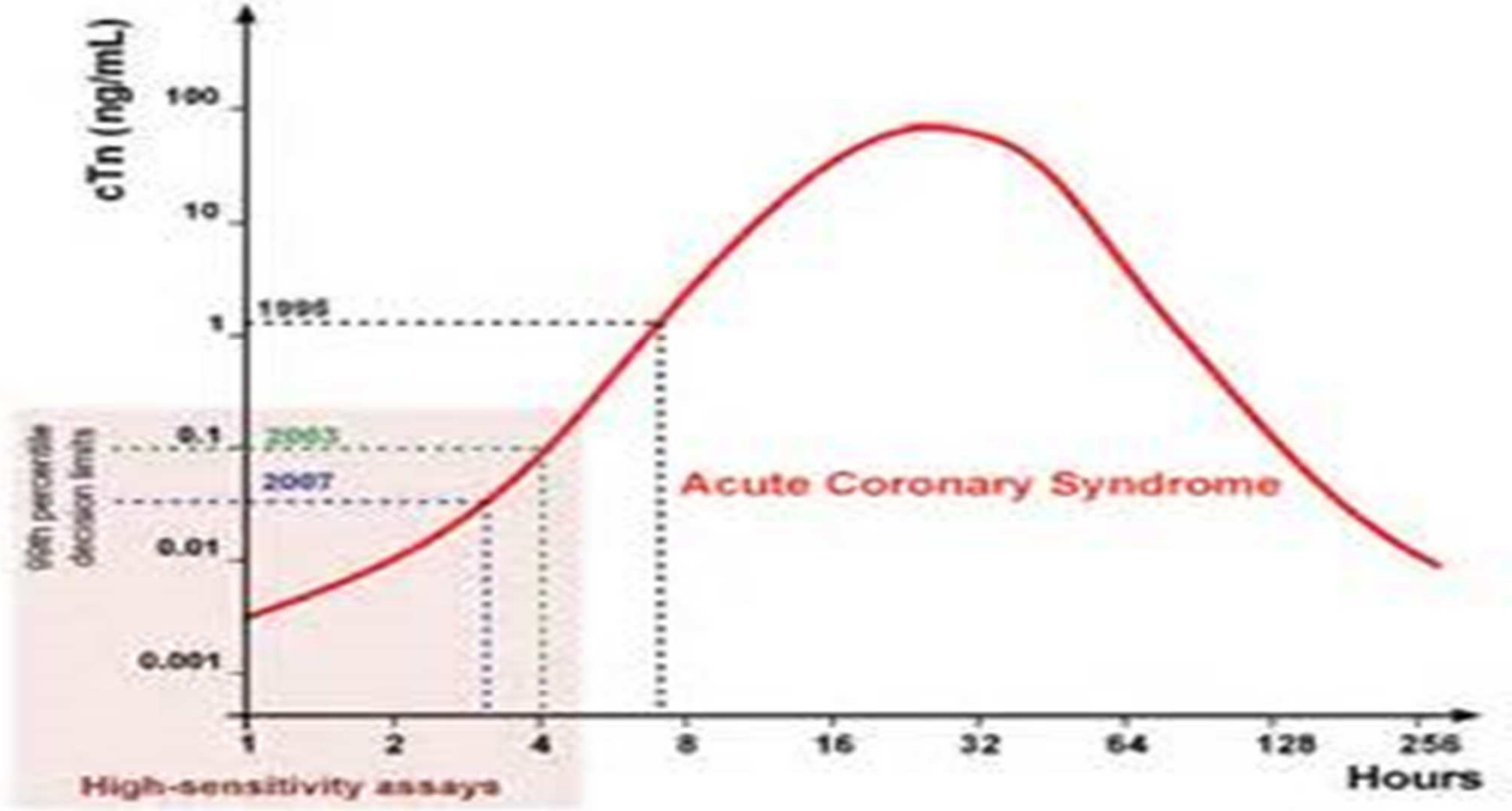
- **2015 (Updated):** Computer-assisted ECG interpretation may be used in conjunction with interpretation by a physician or trained provider to recognize STEMI. (Class IIb, LOE C-LD).

- **2015 (Updated):** Prehospital notification of the receiving hospital and/or prehospital activation of the catheterization laboratory should occur for all patients with a STEMI identified on prehospital ECG. (Class I, LOE B-NR).

Prehospital ECG Acquisition and Interpretation

- **2015 (New):** While transmission of the prehospital ECG to the ED physician may improve positive predictive value and therapeutic decision-making regarding adult patients with suspected STEMI, if transmission is not performed, it may be reasonable for trained non-physician ECG interpretation to be used as the basis for decision-making, including activation of the catheterization laboratory, administration of fibrinolysis, and selection of destination hospital (Class IIa, LOE B-NR).

High- sensitivity Troponon



cTn Assay	Diagnostic cutoff	Implementation
TnI	≥ 1.5 ng/mL	1995
cTnI	> 0.10 ng/mL	2063
TnI-Ultra	> 0.04 ng/mL	2007

Troponin to Identify Patients Who Can Be Safely Discharged From the ED

- **2015 (New):** High-sensitivity troponin T and troponin I alone measured at 0 and 2 hours should not be used to exclude the diagnosis of ACS, (Class III: Harm, LOE B-NR).
- High-sensitivity troponin I measurements that are less than the 99th percentile, measured at 0 and 2 hours, may be used together with low risk stratification (TIMI score 0 or 1) to predict a less than 1% chance of 30-day major adverse cardiac event (MACE). (Class IIa, LOE B-NR).

Troponin to Identify Patients Who Can Be Safely Discharged From the ED

- The clinician should bear in mind that unstable angina can present without any objective data of myocardial ischemic injury (ie, with normal ECG and normal troponin), in which case the initial diagnosis depends solely on the patient's clinical history and the clinician's interpretation and judgment.

Reperfusion

- **2015 (New):** Where prehospital fibrinolysis is available as part of the STEMI system of care and direct transport to a PCI center is available, prehospital triage and transport directly to a PCI center may be preferred because it results in a small relative decrease in the incidence of intracranial hemorrhage. without evidence of mortality benefit to either therapy (Class IIb, LOE B-R).

Reperfusion

- **2015 (New):** In adult patients presenting with STEMI in the emergency department of a non–PCI-capable hospital, we recommend immediate transfer without fibrinolysis from the initial facility to a PCI center, instead of immediate fibrinolysis at the initial hospital with transfer only for ischemia-driven PCI. (Class I, LOE B-R).

Reperfusion

- **2015(new):** In the treatment of patients with suspected STEMI, the combined application of fibrinolytic therapy followed by immediate PCI (as contrasted with immediate PCI alone) is not recommended. (Class III: Harm, LOE B-R).

Reperfusion

- **2015 (New):** When STEMI patients cannot be transferred to a PCI-capable hospital in a timely manner, fibrinolytic therapy with routine transfer for angiography may be an acceptable alternative to immediate transfer to primary PCI. (Class IIb, LOE C-LD).

Reperfusion

- **2015 (New):** Regardless of whether time of symptom onset is known, the interval between first medical contact and reperfusion should not exceed 120 minutes (Class I, LOE C-EO).

Reperfusion

- **2015 (Updated):** In STEMI patients presenting within 2 hours of symptom onset, immediate fibrinolysis rather than PPCI may be considered when the expected delay to PPCI is more than 60 minutes (Class IIb, LOE C-LD).

Reperfusion

- **2015 (Updated):** In STEMI patients presenting within 2 to 3 hours after symptom onset, either immediate fibrinolysis or PPCI involving a possible delay of 60 to 120 minutes might be reasonable (Class IIb, LOE C-LD).

Reperfusion

- **2015 (Updated):** In STEMI patients presenting within 3 to 12 hours after symptom onset, performance of PPCI involving a possible delay of up to 120 minutes may be considered rather than initial fibrinolysis (Class IIb, LOE C-LD).

Reperfusion

- **2015 (Updated):** In STEMI patients when long delays to PPCI are anticipated (more than 120 minutes), a strategy of immediate fibrinolysis followed by routine early (within 3 to 24 hours) angiography and PCI if indicated, is reasonable (Class IIb, LOE B-R).

Reperfusion

- **2015 (New):** When fibrinolytic therapy is administered to a STEMI patient in a non–PCI-capable hospital, it may be reasonable to transport all postfibrinolysis patients for early routine angiography in the first 3 to 6 hours and up to 24 hours rather than transport postfibrinolysis patients only when they require ischemia-guided angiography. (Class IIb, LOE B-R).

Other Interventions

- In patients with suspected STEMI intending to undergo PPCI, initiation of ADP inhibition may be reasonable in either the prehospital or in-hospital setting (Class IIb, LOE C-LD).
- We recommend that EMS systems that do not currently administer heparin to suspected STEMI patients do not add this treatment, whereas those that do administer it may continue their current practice (Class IIb, LOE B-NR)

Other Interventions

- In suspected STEMI patients for whom there is a planned PPCI reperfusion strategy, administration of unfractionated heparin (UFH) can occur either in the prehospital or in-hospital setting (Class IIb, LOE B-NR).

Other Interventions

- In systems in which UFH is currently administered in the prehospital setting for patients with suspected STEMI who are being transferred for PPCI, it is reasonable to consider prehospital administration of enoxaparin as an alternative to UFH (Class IIa, LOE B-R).

Other Interventions

- The usefulness of supplementary oxygen therapy has not been established in normoxic patients. In the prehospital, ED, and hospital settings, the withholding of supplementary oxygen therapy in normoxic patients with suspected or confirmed acute coronary syndrome may be considered (Class IIb, LOE C-LD).

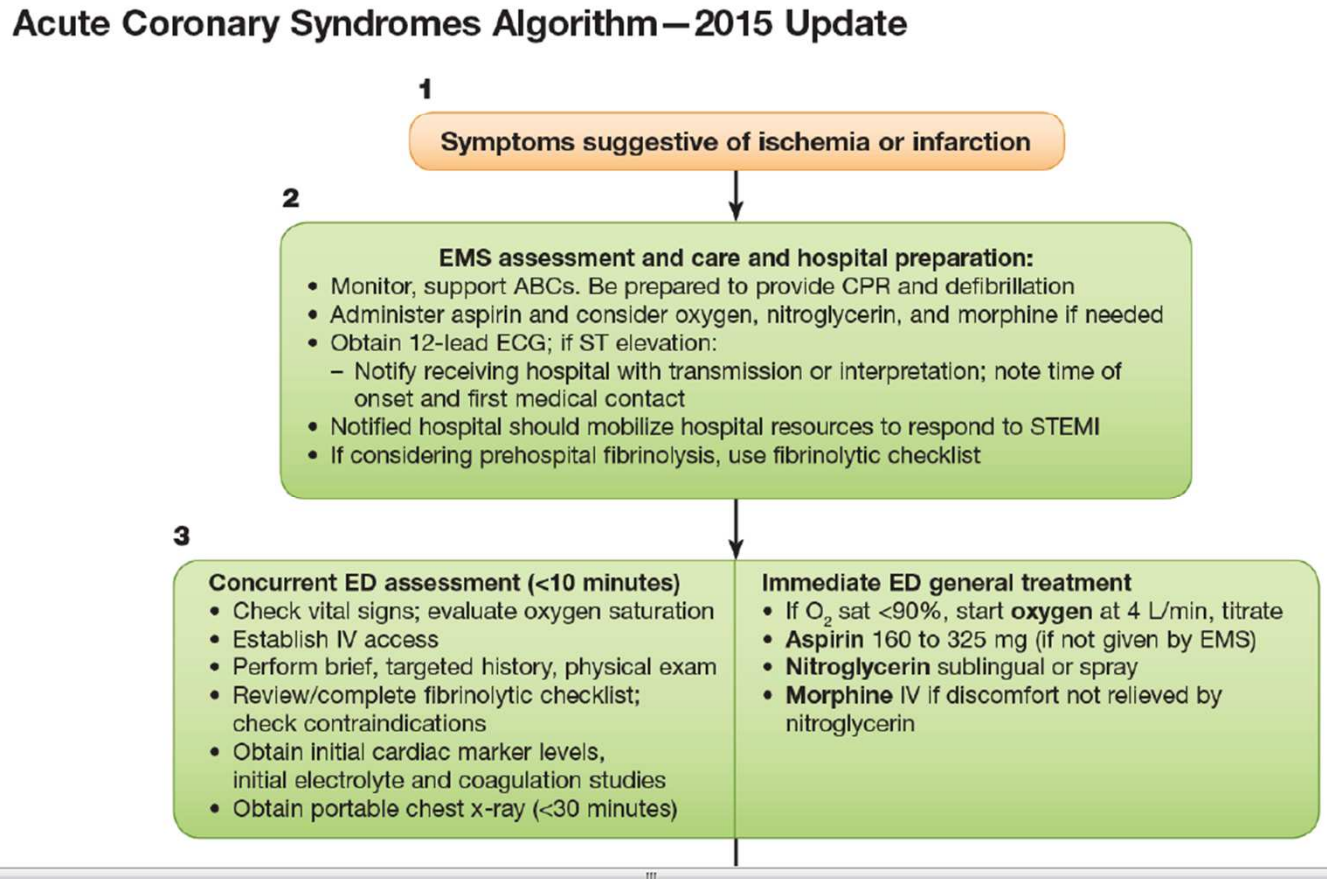
Hospital Reperfusion Decisions After ROSC

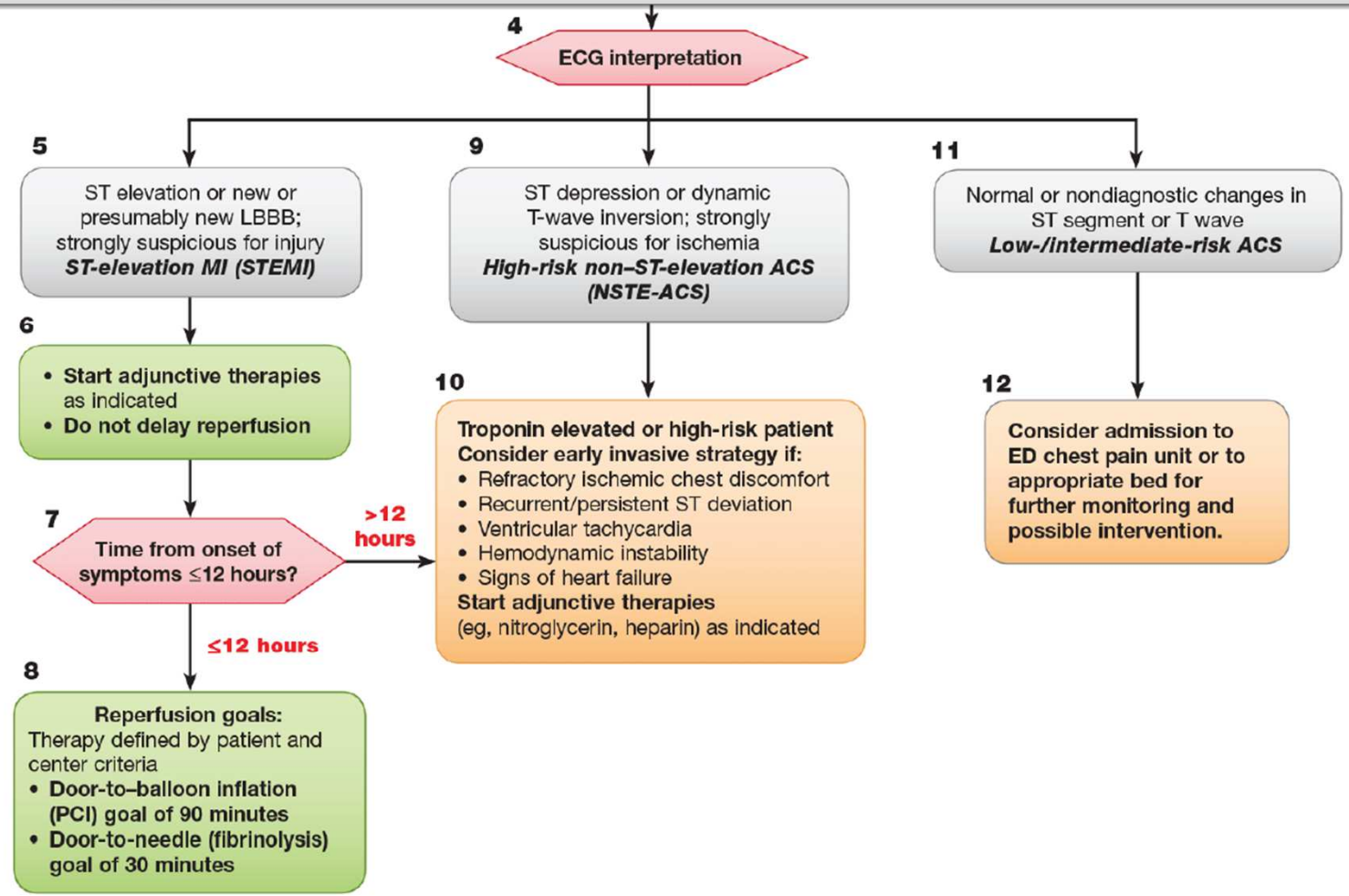
- Coronary angiography should be performed emergently (rather than later in the hospital stay or not at all) for OHCA patients with suspected cardiac etiology of arrest and ST elevation on ECG (Class I, LOE B-NR).
- Emergency coronary angiography is reasonable for select (eg, electrically or hemodynamically unstable) adult patients who are comatose after OHCA of suspected cardiac origin but without ST elevation on ECG (Class IIa, LOE B-NR).

Hospital Reperfusion Decisions After ROSC

- Coronary angiography is reasonable in post–cardiac arrest patients where coronary angiography is indicated regardless of whether the patient is comatose or awake (Class IIa, LOE C-LD).

Figure 2: Acute Coronary Syndromes Algorithm - 2015 Update





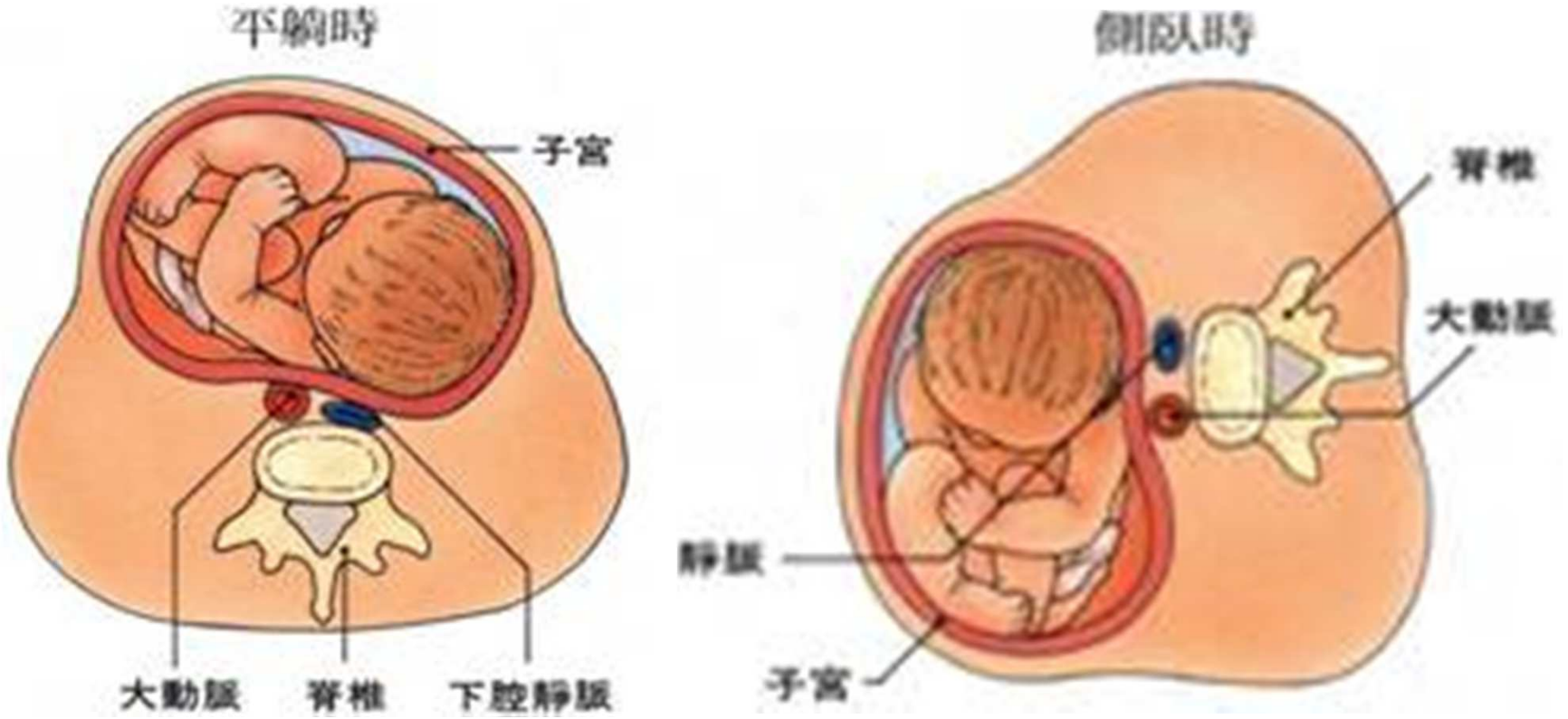
Special Circumstances of Resuscitation *2015*

- *Cardiac arrest associated with pregnancy*
- Cardiac arrest associated with pulmonary embolism
- Opioid-associated resuscitative emergencies, with or without cardiac arrest
- Recommendations on intravenous lipid emulsion therapy for cardiac arrest due to drug intoxication
- Management of cardiac arrest during percutaneous coronary intervention

Cardiac Arrest Associated With Pregnancy

- Maternal cardiac arrest occurs in approximately 1:12 000 admissions for delivery in the USA.
- The most common causes of maternal cardiac arrest are hemorrhage, cardiovascular diseases (including myocardial infarction, aortic dissection, and myocarditis), amniotic fluid embolism, sepsis, aspiration pneumonitis, pulmonary embolism, and eclampsia.
- Iatrogenic causes of maternal cardiac arrest include hypermagnesemia from magnesium sulfate administration and anesthetic complications.

孕婦平躺與左側躺對靜脈回流之影響



孕婦左側躺接受胸外按摩姿勢

Cardiac Arrest Associated With Pregnancy

- Aortocaval compression can occur at approximately 20 weeks of gestational age, at about the time when the fundus is at or above the umbilicus.
- Chest compressions in the left lateral tilt position result in decreased CPR quality (less forceful chest compressions) than is possible in the supine position.

Cardiac Arrest Associated With Pregnancy

2015 Recommendations-New and Updated

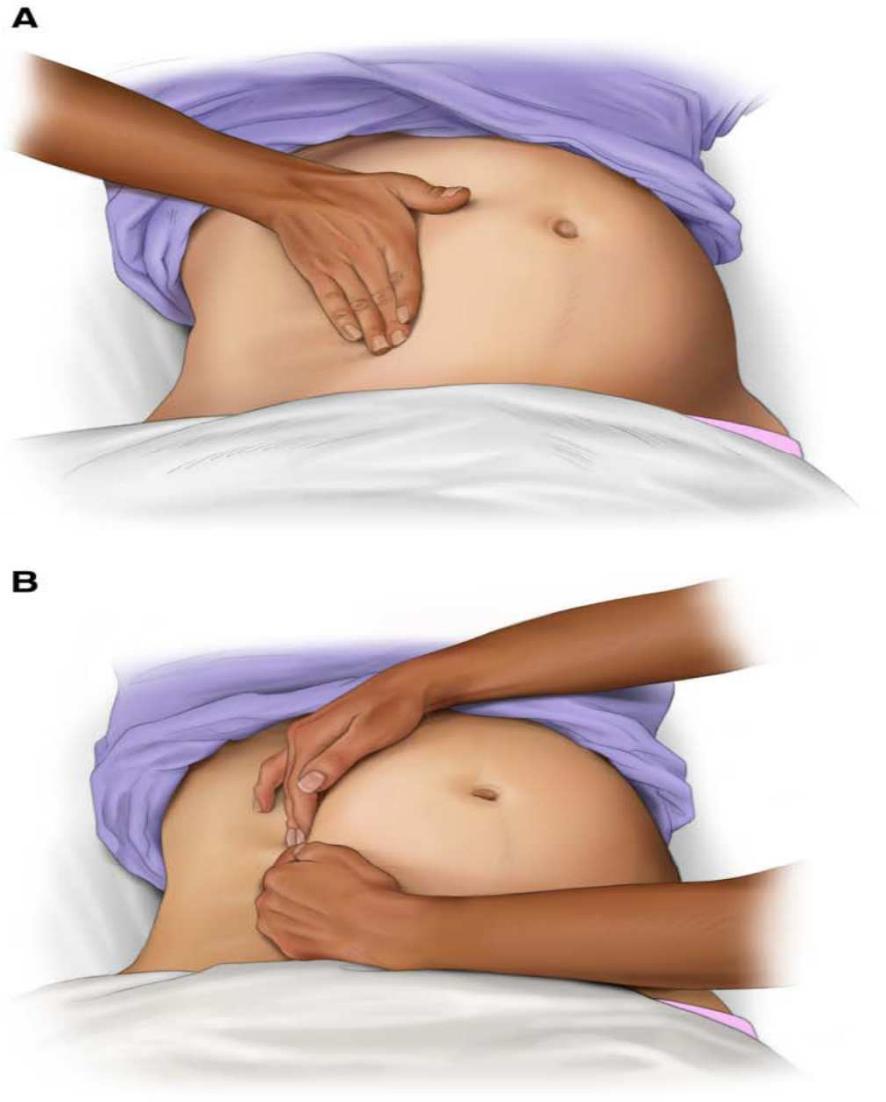
- *BLS Modification: Relief of Aortocaval Compression*
- *ALS Modification: Emergency Cesarean Delivery in Cardiac Arrest*

Cardiac Arrest Associated With Pregnancy

BLS Modification: Relief of Aortocaval Compression

- Priorities for the pregnant woman in cardiac arrest are provision of high-quality CPR and relief of aortocaval compression(Class I, LOE C-LD).
- If the fundus height is at or above the level of the umbilicus, manual LUD can be beneficial in relieving aortocaval compression during chest compressions (Class IIa, LOE C-LD).

Manual Left Lateral Uterine Displacement (LUD)



Cardiac Arrest Associated With Pregnancy

- 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, LOE C-LD).

Cardiac Arrest Associated With Pregnancy

ALS Modification: Emergency Cesarean Delivery in Cardiac Arrest

- In situations such as nonsurvivable maternal trauma or prolonged pulselessness, in which maternal resuscitative efforts are obviously futile, there is no reason to delay performing PMCD (Class I, LOE C-LD).
- PMCD:PeriMortem Cesarean Dilivery

Cardiac Arrest Associated With Pregnancy

ALS Modification: Emergency Cesarean Delivery in Cardiac Arrest

- PMCD should be considered at 4 minutes after onset of maternal cardiac arrest or resuscitative efforts (for the unwitnessed arrest) if there is no ROSC (Class IIa, LOE C-EO).

Cardiac Arrest Associated With Pregnancy

- The clinical decision to perform a PMCD—and its timing with respect to maternal cardiac arrest—is complex because of the variability in level of practitioner and team training, patient factors (eg, etiology of arrest, gestational age), and system resources.
- Survival of the mother has been reported up to 15 minutes after the onset of maternal cardiac arrest, Neonatal survival has been documented with PMCD performed up to 30 minutes after the onset of maternal cardiac arrest.

Special Circumstances of Resuscitation *2015*

- Cardiac arrest associated with pregnancy
- Cardiac arrest associated with pulmonary embolism
- Opioid-associated resuscitative emergencies, with or without cardiac arrest
- *Recommendations on intravenous lipid emulsion therapy for cardiac arrest due to drug intoxication*
- Management of cardiac arrest during percutaneous coronary intervention

Role of Intravenous Lipid Emulsion Therapy in Management of Cardiac Arrest Due to Poisoning

- Local anesthetics inhibit voltage at the cell membrane sodium channels, limiting action potential and the conduction of nerve signals.
- Local anesthetic systemic toxicity (LAST) can present with fulminant cardiovascular collapse that is refractory to standard resuscitative measures.
- A CNS toxicity phase (agitation evolving to frank seizures or CNS depression) may precede cardiovascular collapse.

Role of Intravenous Lipid Emulsion Therapy in Management of Cardiac Arrest Due to Poisoning

- The inciidence of LAST equal to 0.87/1000 patients.
- Aministration of ILE creates a lipid compartment in the serum, reducing by sequestration the concentration of lipophilic medications in the tissues. Administration of ILE also increases cardiac inotropy by other mechanisms.

Role of Intravenous Lipid Emulsion Therapy in Management of Cardiac Arrest Due to Poisoning

- The most commonly reported strategy is to use a 20% emulsion of long-chain triglycerides, giving an initial bolus of 1.5 mL/kg lean body mass over 1 minute followed by an infusion of 0.25 mL/kg per minute for 30 to 60 minutes. The bolus can be repeated once or twice as needed for persistent cardiovascular collapse; the suggested maximum total dose is 10 mL/kg over the first hour. The safety of prolonged infusions (beyond 1 hour) has not been established.

Role of Intravenous Lipid Emulsion Therapy in Management of Cardiac Arrest Due to Poisoning

2015 ACLS Modifications

- It may be reasonable to administer ILE, concomitant with standard resuscitative care, to patients with local anesthetic systemic toxicity and particularly to patients who have premonitory neurotoxicity or cardiac arrest due to bupivacaine toxicity (Class IIb, LOE C-EO).

Role of Intravenous Lipid Emulsion Therapy in Management of Cardiac Arrest Due to Poisoning

2015 ACLS modifications

- It may be reasonable to administer ILE to patients with other forms of drug toxicity who are failing standard resuscitative measures (Class IIb, LOE C-EO).

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Questions?

Thank you for your attention!