

Managing Cardiac Arrest in Pregnancy



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Cardiac Arrest in Pregnancy

Focus: 3rd Trimester/Potential Viable Fetus

- Rare, catastrophic, BUT SURVIVABLE
- Maternal mortality rates in US are INCREASING
 - Older moms, concomitant medical conditions
- Most CAs are in-hospital on the OB service
- 2 patients, top priority for care is Mom
- Altered anatomy and physiology
 - Some special techniques needed
- LIMITED RESEARCH/EVIDENCE !

AHA Scientific Statement

Cardiac Arrest in Pregnancy

A Scientific Statement From the American Heart Association

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Abstract—This is the first scientific statement from the American Heart Association on maternal resuscitation. This document will provide readers with up-to-date and comprehensive information, guidelines, and recommendations for all aspects of maternal resuscitation. Maternal resuscitation is an acute event that involves many subspecialties and allied health providers; this document will be relevant to all healthcare providers who are involved in resuscitation and specifically maternal resuscitation. (*Circulation*. 2015;132:00-00. DOI: 10.1161/CIR.0000000000000300.)

Key Words: AHA Scientific Statements ■ cardiopulmonary resuscitation ■ heart arrest ■ pregnancy

- In-hospital and EMS recommendations
- Class I, II a, II b recommendations but LOE C

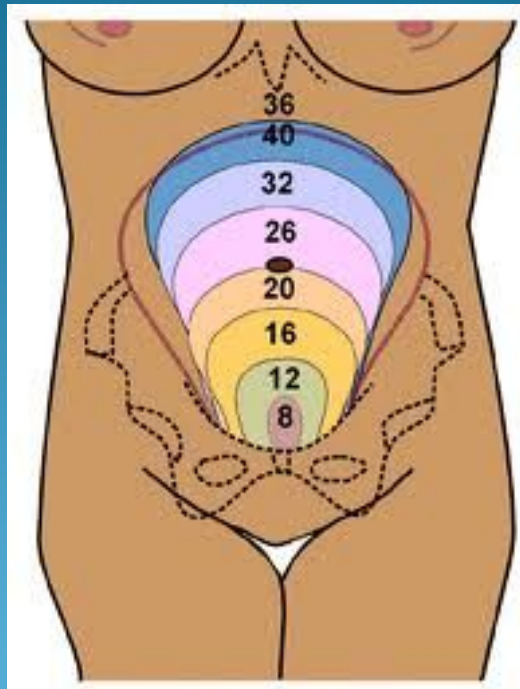
Cardiopulmonary Changes = limited reserve

- ↑ cardiac output (30-50%)
 - ↑ stroke volume
 - ↑ heart rate (15-20 bpm)
 - 20% goes to uterus at term
- ↑ O₂ consumption
- ↑ vascular volume
- ↓ SVR
- ↓ BP
- ↑ tidal volume & ventilation
- ↓ ETCO₂
- Large uterus compresses aorta/IVC when supine
 - ↓ Venous return if >12 wks
 - Low uterine vascular resistance
- Major fluid shifts with contractions & delivery



Aorto-Caval Compression

- Aortic compression: \uparrow afterload
- Inferior vena cava: \downarrow venous return
- Supine hypotensive syndrome is common
- Position on L side increased C.O. by 24% at 32 wks



Relief of aorto-caval compression

- Non-arrest:
 - Full left lateral decubitus position (L side down)
 - For c-spine trauma, tilt or wedge BB
- Arrest:
 - Tilting on a BB or wedge likely NOT good enough!
 - Manual Left Uterine Displacement (AHA Class I)
 - Maintain throughout BLS/ACLS and after ROSC



BLS: CAB-U



- Immediate chest compressions, minimal pauses
- Continuous Manual Left Uterine Displacement
 - Tilt of BB (or wedge) not good enough
 - Chest compressions less effective
 - Doesn't displace uterus enough to relieve IVC
 - Hard to do airway, etc.
- Same CAB as per AHA with 30:2 (Class IIa, LOE C)
- AHA (no rank): “No literature examining the use of mechanical chest compression in pregnancy, and this is not advised at this time.”

AHA Cardiac Arrest Care in Pregnancy

- Airway
 - Do BMV with high flow O₂, 30:2
 - Difficult airway likely
 - ETT smaller size (edema), max 2 tries
 - SGAs OK
 - Higher risk of aspiration
- Defibs
 - Same as usual plus escalate joules
- IV Access
 - Above the diaphragm
- Drugs
 - Same, except avoid vasopressin
- Personnel
 - Minimum of 4 EMS personnel
- Field termination is not addressed

CA in Pregnancy: In Hospital

- Multidisciplinary Response Team
 - OB; Anesthesia; Neonatal; IM/EM/CCM &/or Surgeon; RT; Pharmacy
 - Team “leadership is complicated...”
- **Peri Mortem C Section for Delivery (Class I)**
 - Should be strongly considered for every mother in whom ROSC has not been achieved after ~ 4 minutes of resuscitative efforts (Class IIa) to effect delivery at 5 minutes
 - Start immediately if maternal viability not possible... e.g., fatal injury or prolonged pulselessness (Class I)
 - Do at bedside, do not waste time moving to OR (CI I)
 - Minimum equipment: #10 scalpel

Peri Mortem Cesarean Delivery

For patient with uterus at or above umbilicus:

- Clear maternal survival benefit by emptying uterus
 - High ROSC rate – often immediate
 - The earlier the better but survivors even at 15 min into arrest
 - Consider for mother regardless of fetal viability
- No known harm to mother
- Early delivery of baby with decreased risk of neuro damage from anoxia

AHA Guidelines: PMCD & EMS

- EMS providers should **not** be expected to do PMCD
- Immediate transport should be initiated to center where PMCD can be performed--ALERT THE ED!
- EMS Med Director should identify appropriate receiving hospitals
- Transport should not be prolonged by > 10 minutes to reach a center with more capability
- Bypassing ED or trauma bay to go to OR not advisable
- *AHA does not comment on how to do BLS in moving truck*

Although EMS wants to move all ACLS into the field....what about C-Section by EMS???

- Eagles Poll: NO, NO, & NO
- Placental delivery
- Uterine washout/packing
- Closing the wound
- Skill Set: Can you field dress a deer?
- Treatment is “diesel” (haul a--)
- But then there are scenarios...



AHA Post Arrest Care (Class I)

- If still pregnant, full left lateral decubitus position or continue MLUD

At the hospital:

- Transfer to ICU unless in need of OR
- Multidisciplinary care
- Consider and treat cause
- TTM should be considered...with same protocol as nonpregnant (Cl IIb), with fetal monitoring (Cl I)

Neonatal Resuscitation

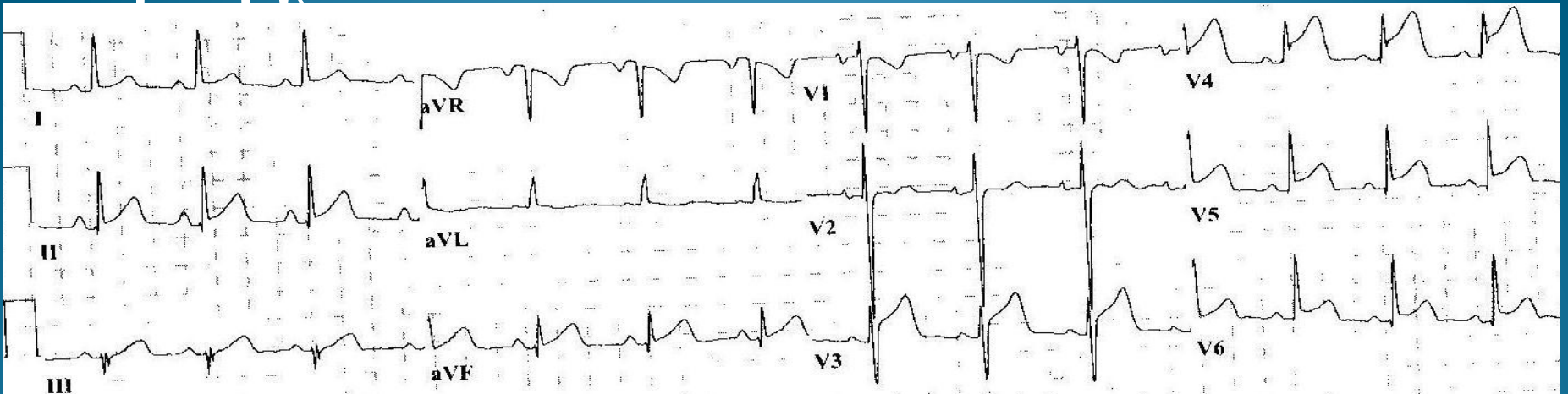
- Neonatal depression highly likely
- Potential survival up to 30 min after onset of maternal arrest with PMCD
- Resuscitation as per neonatal guidelines

Causes of CA in Pregnancy:

- A Anesthetic
Accident/Trauma/Suicide
- B **Bleeding**
- C Cardiovascular
- D Drugs (including anaphylaxis)
- E Embolic (**Amniotic Fluid, Blood Clot, Air**)
- F Fever/sepsis
- G General = **Hs and Ts = especially Hypovolemia**
- H Hypertension (eclampsia, preeclampsia, HELLP)

Cardiovascular disease in pregnancy

- Acute MI/ischemia
- Coronary artery dissection
- Aortic Dissection
- Cardiomyopathy
- Arrhythmic disease (long QT, short QT, Brugada)
- Valvular (including valve replacements)
- Congenital (Eisenmengers = 30% maternal



The Unstable Pregnant Patient

AHA Class I:

- Full left lateral decubitus position
- 100% oxygen by face mask to treat or prevent hypoxia
- IV access above the diaphragm
- Consider and treat precipitating factors



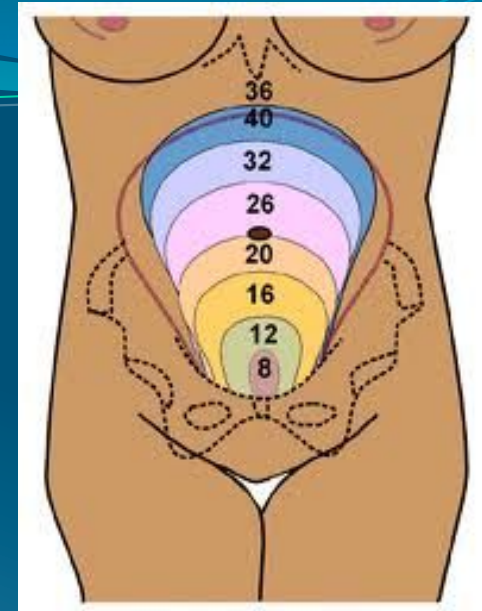
The “Stable” Pregnant Patient

(My 2 cents worth)

- Do not downplay sx/sx!
- CP, SOB, abd pain or palpitations are not just “anxiety” or “worried well”
- Persistent tachycardia is your friend—something is wrong
- Transport even when exam/eval is normal
- Don’t forget: POST PARTUM women are still at risk for several diseases of pregnancy!

Bottom lines:

- Top quality BLS/ACLS for mother
- CAB - U
- Early transport for c-section



References

- Jeejeebhoy F et al (AHA ECC Committee et al): Cardiac arrest in pregnancy, a scientific statement from the AHA. Circ 132 (2015) 1747-1773; plus Appendix: Etiology of maternal cardiac arrest and mortality
- Sommerkamp S, Gibson A: Cardiovascular Disasters in Pregnancy. Emerg Med Clin N Am 30 (2012) 949–959
- Lavonas E et al: Part 10: Special circumstances of resuscitation. Circ 132 [suppl 2]: S501-518 (2015 AHA Guidelines for CPR & ECC)

