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!
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: ↑ afterload
- Inferior vena cava: ↓ 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 (Cl 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:

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<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Anesthetic Accident/Trauma/Suicide</td>
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<tr>
<td>B</td>
<td>Bleeding</td>
</tr>
<tr>
<td>C</td>
<td>Cardiovascular</td>
</tr>
<tr>
<td>D</td>
<td>Drugs (including anaphylaxis)</td>
</tr>
<tr>
<td>E</td>
<td>Embolic (Amniotic Fluid, Blood Clot, Air)</td>
</tr>
<tr>
<td>F</td>
<td>Fever/sepsis</td>
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<tr>
<td>G</td>
<td>General = Hs and Ts = especially Hypovolemia</td>
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<tr>
<td>H</td>
<td>Hypertension (eclampsia, preeclampsia, HELLP)</td>
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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 death)
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
