



Code Blue in the Pregnant Patient, and other Peripartum Emergencies

25th Annual Update in Emergency Medicine

Shirley Lee MD

Declaration of Disclosure

- I have no actual or potential conflict of interest in relation to this program.

Objectives:

1. Review the management of peripartum cardiac arrest
2. Review the management of postpartum hemorrhage
3. Review thromboembolic disease in the pregnant patient

CODE BLUE IN THE PREGNANT PATIENT

Case 1



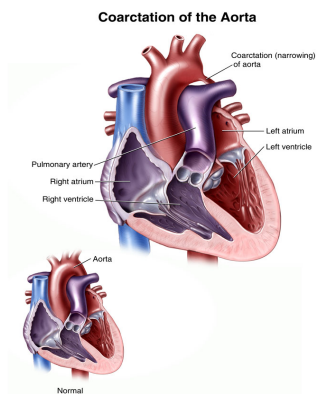
- 45 yo G2P0
- 38 wks pregnant
- From "Up North"

PMHx

•Coarctation of aorta –
stented in 2008

•Bicuspid aortic valve
with moderate
stenosis

•Severe aortic
regurgitation – did not
f/u for surgical repair



Patient History

- Embolic stroke 2007 – on lovenox
- Hypertension
- Quit smoking with pregnancy

Case overview

- Enroute with husband and her parents for admission for induction
- Ambulating from nearby hotel to hospital when c/o of dyspnea to family
- Brought by taxi to Outpatient Obstetrics Clinic located outside of hospital

Pre-hospital care

- 15:37 - 911 call
- 15:40 - Toronto EMS on scene
- 15:42 - Patient agitated & cyanotic
- 15:43 - Unresponsive when loading into ambulance with agonal respirations
 - Cardiac arrested 1 block from hospital
 - Ventilated (BVM) with CPR
- 15:49 - Arrival in ER without prior notification

Emergency dept

- Direct to Resuscitation room
- Initial rhythm: ?PEA arrest – no pulse
- 15:52 - Intubated & IV initiation
- 15:53 - Epinephrine 1st dose
- 15:55 - Code 77 initiated
 - Bedside ultrasound: ?no fetal heart activity seen

Anaesthesia & Obstetric team arrive

- CPR continued with patient wedged in left lateral tilt
- 15:57 - US repeated by Obstetrical team - confirmation of fetal bradycardia
 - Peri-mortem C- section initiated
- 15:58 Male infant delivered
- 15:59 2nd Epinephrine
- 16:00 Return of maternal pulse BP 158/45

NICU - Infant resuscitation

- 15:58 - HR < 60 , cyanotic
- 15:59 - Intubated & 1 min CPR
- 16:03 - HR > 100, pink, floppy
- 16:04 - First spontaneous respiration

Infant Apgar scores

Time from delivery	Apgar score
1 minute	1
5 minutes	3
10 minutes	6

Maternal Post Arrest Care

- Anesthesia – maternal resuscitation
- Obstetrics – C-section closure
- NICU – infant resuscitation
- Cardiology – bedside echo to r/o aortic dissection
- Emergency – facilitating organization of multiple teams, equipment, and transfer to ICU

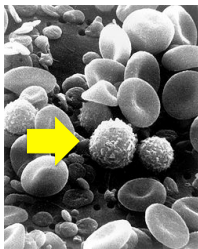
Peripartum cardiac arrest

- Emergency C-section (EC) within 5 min of maternal arrest if fetus >24 wks
- Consider early and complete WITHIN 5 minutes of arrest “4-minute rule”
- 4 minutes maximum to start C-section

PRIMARY GOAL OF EMERGENCY C-SECTION:

TO SAVE THE MOTHER BY DECREASING PHYSIOLOGIC DEMAND

Physiology



Increased:

- WBC
- Coagulation factors
- Cardiac output (40%)
- GFR

EC Procedure

- CPR ongoing
- Vertical incision through abdominal wall layers from epigastrium to pubic symphysis
- Perforate uterus at fundus

EC Procedure

- Extend incision vertically down with scissors by inserting 2 fingers in uterine cavity to separate fetus
- Deliver fetus
- Hold baby below mother, clamp cord and cut cord

ACLS Changes in Pregnancy

- Defibrillation safe for fetus
- Use in witnessed arrest
- Good CPR essential for optimal fetal flow
- Epinephrine can be used (NB: decreases uteroplacental circulation, so use judiciously)

ACLS Update

- Position: No longer left lateral decubitus, as not practical in resuscitation
- Place towels under patient's right side to tilt patient 20-30 degrees towards left
- Dedicated healthcare worker to manually displace uterus to left side and superior

Case 2

- 32 year old G5P4 presents with vaginal bleeding x 1 day
- She is 10 days post vaginal delivery at 39 weeks
- What else would you like to know?

History

- Increased VB over the past 24 hrs with ++ clots in the past 4 hrs
- 24 maxi-pads used in the past 4 hrs
- Tonight, there was a large gush of blood + clots when she went to the bathroom, which soaked through all her clothes

PMHx

- She has a history of 2 previous C-sections due to fetal bradycardia
- She had a difficult delivery due to prolonged labour, resulting in a significant episiotomy repair
- Her Hgb on discharge 10 days ago was 80
- She is a Jehovah's witness

Postpartum Hemorrhage (PPH)

- Most common complication of labor and delivery
- Definition: > 500 ml hemorrhage
- Affects 5-10% deliveries
- 25% of obstetrical deaths

PPH

- Primary
 - Blood loss in first 24 hrs
- Secondary
 - Blood loss 24 hrs – 6 weeks after delivery

Patient may show no signs of shock until 1500 ml lost, due to maternal circulation changes during pregnancy

DDx – Primary PPH

- Uterine atony
 - Genital tract trauma
 - Retained placental tissue
 - Coagulopathy
- Four T's:
- Tone
 - Trauma
 - Tissue
 - Thrombus

Case 2

- Pale NAD
- Vitals: BP 100/58 (lying) P 110 T 37°
- Patient placed in monitored area
- Labs: CBC, type and cross (Rh status), PTT, INR, creatinine, lytes
- Patient agrees to IV NS bolus – 2 litres given

What would you *most likely* do next?

1. Call gyne
2. Order an U/S (is after hours, so will take a while)
3. Do a bedside U/S
4. Do a vaginal exam to remove clots from os

PPH Mx

- Consider: Uterine packing with vag pack
- 4 inch sterile gauze packed in vault with ring forceps in layering technique
- Trendelenberg patient
- Reassess vitals q 1 hr, do postural vitals

Uretonic agents

- Eg. oxytocin, ergot alkaloids, prostaglandin
- Action: induce myometrial contraction
- 1st line: Oxytocin IM /IV
- Dose: Oxytocin 20 IU in 1 L NS infuse up to 500 ml in 10 minutes
- Ergot alkaloids: methergine, ergotamine (avoid in hypertensive patients)

Special issues

- Jehovah's witness
- Need to have discussion regarding which blood products and procedures are acceptable
- Blood components may be OK (Conscience items) eg. albumin, cryoprecipitate, clotting factors
- Allogeneic blood alternatives acceptable
- Document well!

Thromboembolic disease

Pregnancy & VTE

- PE main cause of maternal death (20%)
- Hyper-coagulable state
- More likely to occur post rather than prepartum
- 6X increased risk of VTE compared to non-pregnant women

Risk factors

- Prior superficial venous thrombosis
- Hypercoagulable history
- Women who deliver prematurely
- Women with PPH
- Smoke
- Overweight
- >35 y.o.
- Varicose veins

Clinical features

- Difficult diagnosis to make for both DVT and PE
- Nonspecific symptoms: tachypnea, tachycardia, dyspnea, and pleuritic pain
- D-Dimer often false positive

DVT

- Doppler US – good for femoral or popliteal thrombosis detection
- Not as effective for iliac vein, which is common site of DVT in pregnancy
- MRI alternative, or serial indirect Dopplers or CT may be indicated

PE

- VQ is very low level of radiation <50 mrad fetus exposure
- If non-diagnostic VQ result – withhold anticoagulation
- Helical CT – less radiation than VQ
- Pioped 2 studies

Pregnancy & VTE

Radiologic investigations:

1. Leg doppler U/S first - R/O DVT (seen in 15% suspected PE cases, 30% of patients with proven PE)
If leg U/S +ve, treat - no need for CT or VQ
2. If above negative, but still suspicious fo PE, then order either V/Q (often indeterminate) or CT

Pioped II Recommendations

- Pioped II investigators :
- 70% recommend VQ
- 30% recommend CT angiography
- Radiation dose to fetus from 16 section CT angiography is same magnitude as VQ scan at 0 (0.2 mGy) and 3 months (0.3 to 0.6 mGy)

Stein PD et al, NEJM 2006

Radiation-induced teratogenesis risk

- 8th-17th week highest risk of growth retardation, microcephaly, intellectual deficits due to cumulative pregnancy doses exceeding 50 mGy (5 rad)
- Childhood malignancies (leukemia) risk throughout pregnancy with dose of at least 10 mGy. Above this does is 3.5x greater risk.

Fetal radiation exposure from DI

- Chest Xray – 1-3 mrad
- CT head – 2 mrad
- CT chest with abdomen shielding 300 mrad
- CT abdo/ pelvis 3000-9000 mrad
- VQ scan <55 mrad
- MRI and US – no ionizing radiation

Treatment

- LWMH anticoagulant of choice:
- Decreased bleeding risk
- Decreased HIT
- Reliable pharmacokinetics
- Fixed dosages & less frequent dosing
- Decreased risk of osteoporosis & thrombocytopenia

Take Home Points

- Continuous CPR is essential in the pregnant patient with cardiac arrest for both best fetal and maternal outcome
- “4 minute rule”
- Consider early Emergency C-section to save the mother by and enhance chance of survival for fetus

Take Home Points

- Patient with PPH may not present in typical signs of hemorrhagic shock, so keep a high level of suspicion
- Recheck vitals often and fluid resuscitate early
- Oxytocin is the drug of choice in PPH

Take Home Points

- DVT and PE are challenging diagnoses to make in the pregnant patient
- Doppler US is first imaging of choice, followed by either CT or VQ
- LWMH is drug of choice for treatment



Website resources

- RHTP (Reproductive Health Technologies Project) website
- www.rhtp.org
- Association of Reproductive Health Professionals
- www.arhp.org

References

- Anderson JM et al. Prevention and Management of Postpartum Hemorrhage. AFP 2007 Mar 14;75(6): 875-882.
- Roe EJ et al. Perimortem Cesarean Delivery. Emedicine 2011
- Stein PD et al. Diagnostic Pathways in Acute Pulmonary Embolism: Recommendations of the PIOPED II Investigators. Radiology 2007. Vol 242:1:1-21.