CRITICAL CARE EMERGENCIES 101: HIGH STAKES HIGH ANXIETY

Objectives
- To examine common complications of pregnancy that may require critical care admission
- To review a critical case
- To describe collaborative possibilities with outreach

Critical Care in Obstetrics
- Maternal transfer and morbidity related to:
  - Hypertension
  - Postpartum hemorrhage

Admissions
- 2.7/1000 births
  - Postpartum (majority)
  - Hypertension (30%)
  - Hemorrhage (25%)
  - Sepsis
  - Cardiac disease
  - Other pre-existing conditions

Critical Care Outreach
- History: UK (1999)
- Multidisciplinary team
- Unstable physiology prior to cardiac arrest
- Respiratory cause
Incidence of Hypertension in Pregnancy

- Chronic hypertension: 3%
- Hypertension in pregnancy: 10%
- Preeclampsia: 5%
- Increasing rates based on:
  - Increased BMI
  - Increased maternal age
  - Nutrition and lifestyle factors

Classification

- Pre-existing hypertension
  - With co-morbid conditions
  - With preeclampsia (after 20 weeks gestation) defined as resistant hypertension or new or worsening proteinuria or one or more adverse conditions
- Gestational hypertension
  - With co-morbid conditions
  - With preeclampsia (after 20 weeks) defined as new proteinuria or one/more co-morbid conditions

Risk factors

- First pregnancy
- Extremes of maternal age (<18 and > 35)
- Obesity
- Personal or family history of preeclampsia
- Diabetes, renal disease, vascular disease
- Paternal antigen exposure

Prevention

- Calcium supplementation
- Aspirin
- Rest
- Regular exercise
- Vitamin C & E
- Diuretics
- Garlic

Etiology

- Abnormal placental implantation
- Angiogenic factors
- Cardiovascular maladaptation and vasoconstriction
- Genetic predisposition
- Immunologic intolerance
- Platelet activation
- Vascular endothelial damage/dysfunction
Tests/Investigations
- CBC, group and reserve
- INR, PT, PTT
- AST, ALT, LDH
- Urinalysis, Proteinuria (dip or 24 hour collection), creatinine ratio
- Albumin, Bilirubin

Investigations to Classify HDP
Fetal investigations:
- FMC
- NST
- BPP
- Deepest amniotic fluid pocket
- US assessment of fetal growth
- Umbilical artery Doppler

Pharmacological Intervention
- Goal of treatment is to lower the BP to less than 160 mmHg systolic and less than 110 mmHg diastolic
- Initial treatment is recommended: labetolol, or hydralazine
- Magnesium sulfate is not a antihypertensive agent

Labetolol
- A non-selective beta-blocker with vascular-receptor blocking capabilities
- Associated with fetal growth restriction over time and in higher doses with neonatal hypoglycemia
- Side effects include fatigue, lethargy, peripheral vasoconstriction, sleep disturbance
- Oral dose (as ordered) can be from 200 – 1200 mg/d in 2-3 divided does or up to 10-20 mg IV (with appropriate monitoring guidelines)

Hydralazine
- Selectively relaxes arteriolar smooth muscle causing vasodilation
- Urgent control of severe hypertension
- Side effects include headache, nausea, flushing, palpitations, hypotension/fetal bradycardia (IV doses)
- 50 – 300 mg/d in 2 – 4 doses (as ordered)
- IV doses 5 mg IV (with appropriate guidelines)

Magnesium Sulfate
- Initial dose is 4 grams in 20 minutes with an ongoing dose of 2 grams/hour (IV)
- “High risk medication”
- Prevents eclampsia as well as recurrent seizures
- Priority agent for perinatal seizures (pre or up to 6 weeks post partum); benzos not first line agent in pregnancy induced seizure
M.P.
- M.P. presented to ER with a worsening headache at home (Day 4 following birth)
- 2 days post discharge from hospital
- No medications, no allergies
- On arrival:
  - BP 180/124, P 98, RR 22
  - Hyperreflexia noted (3+)
  - Bloodwork drawn for LFT's and CBC
- During assessment, M.P. had a seizure

Case study (cont'd)
- Diazepam 10 mg. IV given
- Hydralazine 10 mg. IM stat
- Patient still c/o headache, blurred vision, and “not well”
- BP 170/110, P92, RR 24
- Consult to OB

Triaging Postpartum patients
- Assessment includes:
  - Knowledge of normal postpartum physiology
  - Medical and pregnancy complications
  - Potentially different response to medications

Lab Results

<table>
<thead>
<tr>
<th></th>
<th>2 hours</th>
<th>1 hour</th>
<th>ER</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hgb</td>
<td>120</td>
<td>113</td>
<td>109</td>
<td>115-160</td>
</tr>
<tr>
<td>Platelets</td>
<td>104</td>
<td>85</td>
<td>65</td>
<td>150-400 X10/L</td>
</tr>
<tr>
<td>Albumin</td>
<td>28</td>
<td>22</td>
<td>21</td>
<td>35-50 g/L</td>
</tr>
<tr>
<td>AST</td>
<td>164</td>
<td>249</td>
<td>375</td>
<td>10-42 U/L</td>
</tr>
<tr>
<td>ALT</td>
<td>177</td>
<td>222</td>
<td>415</td>
<td>10-40 U/L</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>11</td>
<td>17</td>
<td>22</td>
<td>3-17 umol/L</td>
</tr>
</tbody>
</table>

Case study (cont’d)
- Consult to OB—Mg SO4 started
- CT scan ordered
- Admitted to CCTC for 24 hours
- No further seizures
- Transferred to postpartum for an additional 24 hours. Baby rooming-in with her.

ACLS in Pregnancy
ACLS Modifications

- Hand position
- Uterine displacement
- Removal of fetal monitoring
- Consider calcium salts
- Perimortem C section at 4 minutes if no ROSC (to perform effective CPR)
- BEAU CHOPS
- Primary goal is saving mother
Maternal ACLS


http://circ.ahajournals.org/content/122/18_suppl_3/S829.full

Rule out and Treat

B Bleeding/DIC
E Embolism cardiac/pulmonary/amniotic fluid
A Anaesthetic complications
U Uterine atrophy
C Cardiac disease: MI/ischemia/aortic dissection/cardiomyopathy
H Hypertension/preeclampsia/eclampsia
O Review standard ACLS guidelines (Hs and Ts)
P Placental abruptio, previa
S Sepsis

Neonatal Resuscitation

- Warm
- Position airway (sniff)
- Suction (80-100 mmHg)
  - Mouth before Nose
- Dry and stimulate
- Don’t dry if < 28 weeks, place neonate wet into food grade plastic bag to maintain thermal regulation
- Bag/mask ventilation
- Keep baby below unclamped placenta

Bleeding in Our Case

- Post cesarean
- Post tPA
- Post CPR
- Deep sedation
- Hypothermia
- Boggy, compliant abdomen
- Fibrinogen deficit (12:4 red cell:plasma)
- Fibrinogen deficit of pregnancy

Post Partum Hemorrhage: The Five T’s

- Tone
- Tissue
- Trauma
- Thrombin
- Therapeutic anticoagulation
Recognition of PPH (SOGC, 2008)

<table>
<thead>
<tr>
<th>Blood Loss</th>
<th>SBP</th>
<th>Signs/ Symptoms</th>
<th>Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>500-1000ml (10-15%)</td>
<td>Normal</td>
<td>↗ HR, palpitations, Dizziness</td>
<td>Compensated</td>
</tr>
<tr>
<td>1000-1500ml (15-25%)</td>
<td>Slight ↓</td>
<td>Diaphoresis, Cap refill, Cool extremities, Anxiety</td>
<td>Mild</td>
</tr>
<tr>
<td>1500-2000ml (25-35%)</td>
<td>70-80 mmHg</td>
<td>↑ RR, Postural Hypotension, Oliguria</td>
<td>Moderate</td>
</tr>
<tr>
<td>2000-3000ml (35-45%)</td>
<td>50-70 mmHg</td>
<td>Hypotension, Altered LOC</td>
<td>Severe</td>
</tr>
</tbody>
</table>

Assessment
- Fundus and flow q15 minutes in 1st hour *Most Important Finding*
- CBC, INR/PTT and fibrinogen
- Continuous BP and HR monitoring

Lochia Assessment
- Small amount: less than 4 inch stain on peripad
- Moderate: less than 6 inch stain on peripad
- Heavy: pad saturated within 1 hour

PPH medications

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose</th>
<th>Contraindications</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxytocin</td>
<td>10 IU IM, 20 U in 2000 @ 125ml/hour</td>
<td>none</td>
<td>Contraction of upper segment of myometrium</td>
</tr>
<tr>
<td>Methylergonovine</td>
<td>0.2 mg IM (q 2-4 hours)</td>
<td>Hypertension, toxemia, sepsis, hepatic or renal disease</td>
<td>Vasoconstriction</td>
</tr>
<tr>
<td>Carboprost (Hemabate)</td>
<td>0.25 mg IM or IM repeated q5 – q30 minutes for total of 2 mg.</td>
<td>Active pulmonary, renal, hepatic or cardiac disease</td>
<td>Improves uterine contractility</td>
</tr>
<tr>
<td>Misoprostil</td>
<td>200 – 600 ug p.o. or 200 – 1000 ug pr</td>
<td>Caution: cardiovascular disease</td>
<td>Smooth muscle contraction</td>
</tr>
</tbody>
</table>

![COOK Bakri Postpartum Balloon](https://i.imgur.com/5Q5Q5Q5.png)
Benefits of Early Initiation of Breast Pumping/Feeding

- Promotes uterine contraction to decrease post partum bleeding
- Even small amount of colostrum may be critical to enteric health of neonate (may prevent necrotizing enterocolitis)
- Preserves mothers ability to breast feed following recovery
- All of the other benefits to mother and baby