Patient Safety for Mom & Baby

Obstetric Hemorrhage

Coaching Call

June 17, 2014
Agenda

- Webinar is being recorded and lines are muted
- Do not use the hold feature on your phone
- To raise a question, please use the chat box or wait until the end of the call
- Presentation on OB Hemorrhage by Dr. Nick Carricato from Norton Healthcare
- Questions
Case Presentation

- Pt. presents to triage intense abdominal pain, weakness, and IUFD at 36 weeks. No vaginal bleeding.
- BP 100/60, HR 130.
- U/S confirms IUFD w/complete placental abruption.
- Massive transfusion protocol initiated -- 2 large bore IV sites placed, fluid bolus, labs drawn.
Case Presentation

- Red top tube clots at 7 minutes. Hg 7.5, fibrinogen 125 mg/dl, plt 120,000.
- 4 units PRBC, 1 Unit platelets, 12 units cryoprecipitate transfused.
- AROM, pitocin: Pt. had SVD 1 hour later.
- 2000 ml clot evacuated from uterus after delivery.
- Excessive bleeding encountered: 800 mcg rectal cytotec, 0.2 mg methergine IM.
- Bleeding stopped: repeat Hg 8.4 mg/dl, plt 150,000, fibrinogen 335 mg/dl.

Bleeding
Definition of Obstetric Hemorrhage

- PPH is best defined/diagnosed clinically as excessive bleeding that makes the pt. symptomatic and/or results in signs of hypovolemia
- Symptoms: pallor, lightheadedness, weakness, palpitations, diaphoresis, restlessness, confusion, air hunger, syncope
- Signs: hypotension, tachycardia, oliguria, O2 sat < 95%
Why is it important?

- Obstetric/postpartum hemorrhage accounts for 8% of all maternal deaths.
- Rate of maternal death has tripled from 6 per 100,000 births in 1996 to 17 per 100,000 births in 2006.
- African American women rate of death has risen from 28 to 54 per 100,000 live births between 1999 and 2006.
Objectives

- To recognize signs/symptoms of obstetric/postpartum hemorrhage.
- To understand the organization for managing obstetric hemorrhage.
- To know agents available for managing obstetric hemorrhage.
Risk Factors

- Retained placenta
- Failure to progress during 2\textsuperscript{nd} stage of labor
- Placenta accreta
- Lacerations
- Instrumental delivery
- Large for gestational age newborn (eg, >4000g)
- Hypertensive disorders
- Induction of labor
- Augmentation of labor with oxytocin
PPH: Etiology

- **4 T’s**
  - Tone
  - Tissue
  - Trauma
  - Thrombosis
**Tone: Atony**

Uterus is not firm after massage and administration of uterotonic agents.

- Prolonged/rapid labor
- Medicines
- Infection
Tissue

- Retained placenta
- Placenta Accreta
Trauma

- Cervical and vaginal lacerations
- Vulvar hematoma
- Retroperitoneal hemorrhage/bulging broad ligament
Thrombosis

- Defective hemostasis
  - Coagulation abnormalities (DIC/consumptive coagulopathy, placental abruption.
  - VWD
  - Hemophilia
  - Vitamin K deficiency
PPH: Clinical Presentation

- Vaginal Bleeding
- Enlarging Uterus
Clinical Presentation

- Important to remember initial Hgb/Hct value does not accurately reflect the amount of blood loss.
- Coagulation studies can be normal in the early stages of hemorrhage.
**PPH: Clinical Presentation**

<table>
<thead>
<tr>
<th>Blood Volume Loss</th>
<th>Blood Pressure (systolic)</th>
<th>Symptoms &amp; Signs</th>
<th>Degree of Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>500-1000 mL (10-15%)</td>
<td>Normal (\text{tachycardia})</td>
<td>Palpitations</td>
<td>Compensated</td>
</tr>
<tr>
<td>1000-1500 mL (15-25%)</td>
<td>Slight fall (80-100\text{mm Hg}) (\text{Tachycardia})</td>
<td>Dizziness Weakness</td>
<td>Mild</td>
</tr>
<tr>
<td>1500-2000 mL (25-35%)</td>
<td>Moderate fall (70-80\text{mm Hg}) (\text{Pallor, Oliguria})</td>
<td>Sweating Restlessness</td>
<td>Moderate</td>
</tr>
<tr>
<td>2000-3000 mL (35-50%)</td>
<td>Marked fall (50-70\text{mm Hg}) (\text{Air hunger})</td>
<td>Collapse, Anuria</td>
<td>Severe</td>
</tr>
</tbody>
</table>
## Classification of Hemorrhagic Shock

<table>
<thead>
<tr>
<th></th>
<th>Compensated</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Loss (mL)</td>
<td>≤1000</td>
<td>1000-1500</td>
<td>1500-2000</td>
<td>&gt;2000</td>
</tr>
<tr>
<td>Heart rate (bpm)</td>
<td>&lt;100</td>
<td>&gt;100</td>
<td>&gt;120</td>
<td>&gt;140</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Normal</td>
<td>Orthostatic chg</td>
<td>Marked fail</td>
<td>Profound fail</td>
</tr>
<tr>
<td>Capillary refill</td>
<td>Normal</td>
<td>May be delayed</td>
<td>Usually delayed</td>
<td>Always delayed</td>
</tr>
<tr>
<td>Respiration</td>
<td>Normal</td>
<td>Mild increase</td>
<td>Moderate tachypnea</td>
<td>Marked tachypnea</td>
</tr>
<tr>
<td>Urinary output (mL/h)</td>
<td>&gt;30</td>
<td>20-30</td>
<td>5-20</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>Mental status</td>
<td>Normal</td>
<td>agitated</td>
<td>confused</td>
<td>Lethargic, obtunded</td>
</tr>
<tr>
<td></td>
<td>agitated</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Management of PPH

- Stage 1
- Stage 2: vaginal >500 ml EBL, C-section >1000 ml EBL
- Stage 3: > 1500 ml of EBL with HR, BP, and O2 changes
Management

- Identify the cause.
- Resuscitate.
- Definitive treatment if applicable.
Target Values

- Hematocrit greater than 21%
- Platelet count greater than 50,000/uL
- Fibrinogen greater than 100 mg/dL
  - Red top tube -- clots in 8-10 minutes equals adequate fibrinogen stores.
  - Fibrinogen < 200 mg/dL has 12 fold increase in maternal death, emergency surgery, ICU admission.
- Prothrombin (PT) and partial thromboplastin time (PTT) less than 1.5 times control
Management of PPH

- Remedy the cause of bleeding
  - If antepartum, deliver the fetus and placenta
  - If postpartum, use oxytocin, prostaglandin, or ergonovine
  - Explore and empty the uterine cavity, and consider uterine packing
  - Examine the cervix and vagina, ligate any bleeding vessels, and repair trauma
Management of PPH Cause

- Uterine Atony
  - Uterine massage
  - Uterotonic Agents
    - Pitocin 40 units/1 liter NS
    - Methergine → 0.2 mg IM
    - Hemabate (PGF2 alpha), 75% respond to a single dose
      - 250 mcg IM
      - Maximum dose 2 mg
    - Misoprostol-800 mcg per rectum
Management of PPH Cause

- Genital tract trauma
  - Lacerations
  - Hematomas

- Coagulopathy
  - History
Management of PPH Cause

- Retained Tissue
  - Placenta → manually remove
  - Uterine inversion
Sequential Steps in Managing Postpartum Hemorrhage

- Uterine massage, establish large bore intravenous access
- Uterotonic drugs:
  - Oxytocin (10-40 U in 1 liter of NS via intravenous infusion; 80 U in 1 liter of NS may be given for a short time)
  - Methergine (0.2mg intramuscularly) if not hypertensive
  - Carboprost tromethamine (hemabate) (250mcg intramuscularly every 15-90 minutes, as needed, to a total dose of 2mg) if no asthma
  - Misoprostol (800-1000 mcg rectally) can be given to women with hypertension or asthma
  - Cytotec and Hemabate have the same mechanism of action
- Inspect vagina and cervix for lacerations; repair as necessary. Evacuate any retained products of conception.
- Uterine tampondade (Bakri or BT-Cath balloon, Sengstaken-Blakemore tube, Foley catheter balloon, packing) is performed if medical therapy fails and prior to, or in conjunction with, preparations for surgery or transarterial embolization.
- Transarterial embolization—if the woman is stable and there is time for personnel and facilities to mobilize.
Sequential Steps in Managing Postpartum Hemorrhage

- Laparotomy: if the above measures fail, surgical approaches that are quick, relatively easy, and effective should be tried first. In utilizing these measures, the surgeon should be cognizant of the amount of blood loss and the stability of the patient, and should perform hysterectomy rather than resort to temporizing measure if her cardiovascular status is unstable or if it appears that the anesthesiologist will not be able to keep up with her fluid needs.
  - Ligation of bleeding sites
  - Uterine artery ligation, including utero-ovarian arcade
  - B-Lynch stitch
  - Hysterectomy: is the last resort, but should not be delayed in women who have disseminated intravascular coagulation and require prompt control of uterine hemorrhage to prevent death
  - Suturing and tacking of deep pelvic bleeders
  - Pelvic packing
Bakri Balloon: why should every L&D have one?

- Silicone balloon connected to 24 french 54 cm catheter
- Easily inserted into the uterus, and balloon adapts to the configuration of the uterus when filled with fluid.
- Tamponades uterine bleeding
- Central tube lumen allows for drainage to monitor bleeding. Must periodically flush drainage port with warm saline to ensure not occluded and to remove blood clots
- max volume 500 ml
- leave in 8-24 hours
Why Bakri Balloon?

<table>
<thead>
<tr>
<th>Method</th>
<th>Number</th>
<th>Success %</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-Lynch/compression sutures</td>
<td>108</td>
<td>91.7%</td>
</tr>
<tr>
<td>Arterial Embolization</td>
<td>193</td>
<td>90.7%</td>
</tr>
<tr>
<td>Uterine artery ligation</td>
<td>501</td>
<td>84.6%</td>
</tr>
<tr>
<td>Balloon tamponade/Bakri Balloon</td>
<td>162</td>
<td>84.0%</td>
</tr>
</tbody>
</table>
Management of PPH

- Surgical therapy
  - Uterine artery ligation
  - Ovarian artery ligation
  - Hypogastric artery ligation
  - Hysterectomy
  - Arterial embolization
  - B-Lynch suture
    - Transmural uterine compression
  - CHO Stitches
Postoperative Care/Complications

- ARDS
- Renal failure
- Pulmonary edema
- Venous thrombosis
- Hypopituitarism
Establish a Protocol

• Identify.
• Evaluate.
• Resuscitate.
• Definitive intervention as needed.
# Blood Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Contents</th>
<th>Uses/Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole blood</td>
<td>All components</td>
<td>Rarely used</td>
</tr>
<tr>
<td>1 unit = 500 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRBC</td>
<td>Red cells</td>
<td>1 unit increase hct 3% and hemoglobin 1 g/dL.</td>
</tr>
<tr>
<td>1 unit = 350 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FFP</td>
<td>All clotting factors, no platelets</td>
<td>1 unit increases fibrinogen by 7-10 mg/dL.</td>
</tr>
<tr>
<td>1 unit = 200-300 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>Fibrinogen, factors VIII, XIII, VWF</td>
<td>10 units increases fibrinogen 70 mg/dL.</td>
</tr>
<tr>
<td>1 unit = 10-20 mL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platelets</td>
<td>Platelets</td>
<td>6 units WB derived or 1 unit apheresis derived raises plt 30,000/uL</td>
</tr>
<tr>
<td>1 unit = 200-300 mL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Norton Protocol: Nursing

Call for additional assistance:
- OB, Hospitalist, Anesthesia
- RNs, OB tech, US, L & D Manager
- House supervisor if ICU bed needed
Norton Protocol: Postpartum Hemorrhage in LDR Room

- Notify attending MD/Hospitalist/Anesthesia
- Fundal massage, Foley Catheter
- 02 face mask, 10-12 L
- Establish 2nd IV site -- LR with 20 units Oxytocin -- bolus 500-1000 mL -- continue as needed
- Blood Bank: type and cross 2 units PRBCs
- Notify MD of change in VS greater than 25% of baseline
- Bring PP hemorrhage cart to room
- Obtain PP hemorrhage kit from Pyxis to bedside
- Labs as ordered
Norton Protocol: Postpartum Hemorrhage in OR

- Notify Hospitalist/Anesthesia/additional nursing personnel as needed
- Bring PP Hemorrhage cart to room
- Assist anesthesia to establish 2nd IV line, intubation, arterial line, central line placement as requested
- Obtain PP hemorrhage kit from Pyxis
- Keep patient warm -- use blankets or Bair Hugger
Norton Protocol: Equipment

- PP Hemorrhage cart
- Bakri Balloon
- Hysterectomy tray
- Blood warmer
- Bair Hugger
- Rapid Infuser
- Transport monitor
Norton Protocol: Blood Bank

- Ensure blood bank has available:
  - 4 units PRBC
  - 4 units FFP
  - 10 units cryoprecipitate
  - 1 unit platelet pheresis
Norton Protocol: Labs

- After every 4 units of blood draw STAT CBC, PT/INR, aPTT, fibrinogen, serum and ionized blood calcium
- After every 8 units of blood draw: CMP and D-dimer
Norton Protocol: Medication

- Obtain from Pyxis under “Kits” -- Postpartum hemorrhage kit
  - Methergine 0.2 mg/mL amp IM only
  - Hemabate 250 mcg/mL amp IM only
  - Cytotec 200 mcg -- oral, rectal, vaginal
  - Oxytocin 10 units IV
Norton Protocol: Stage I MOH

- Stage I: every woman in labor/giving birth
- Identify risk factors for postpartum hemorrhage
- Type and Screen order on pre-op c-section and labor admit orders
- At physician discretion order T & C 2 PC, notify blood bank of possible need for platelets and FFP
Norton Protocol: Stage 2 MOH

- Blood loss > 500 mL vaginal delivery, > 1000 mL c-section
- OB or anesthesia activates Stage 2 protocol, nurse notifies blood bank
- Nurse initiates PPH standing orders
  - Notify MD/Hospitalist immediately
  - Fundal massage
  - Foley Catheter
  - VS q 5-15 min until bleeding controlled/pt stable
  - continuous pulse oximetry
  - 02 at 10-12 L/minute face mask
  - Notify physician of pulse >120 or BP <100/60, RR >30
  - Establish IV access, at least 18 gauge: LR 1000 mL w/ 20 units oxytocin/1000 mL and infuse Bolus of 500-1000 mL. To be continued upon MD order
  - Blood Bank: Crossmatch for 2 units PRBC
Norton Protocol:
Stage 2 MOH

- If continuous bleeding or worsens proceed to stage 3
- Notify MD/Hospitalist/Anesthesia with updated status
- Keep patient warm with blanket/Bair Hugger
- Obtain: Bakri Balloon, massive OB hemorrhage cart
- MD may consider Bimanual or direct uterine massage
- Start second IV site, NS at fast rate connected to Hot line set until further orders
- Obtain PPH Kit from Pyxis and have available at bedside: Methergine 0.2 mg/mL amps, Hemabate 250 mcg/mL amps, Cytotec 200 mcg tablets, Oxytocin 10 unit vials
- Physicians may consider: administration of colloids, start transfusion if necessary, or uncross matched blood if no cross matched blood available
- Labs: STAT CBC PT/INR, aPTT, Fibrinogen
- Notify Blood Bank to prepare: 4 units PRBC, 4 units FFP, 10 Units CRYO, 1 unit PLTPH
- After every 4 units of blood obtain STAT CBC, PT/INR, aPTT, Fibrinogen, serum and ionized Calcium
- After every 8 units of blood obtain: CMP and D-dimer
Norton Protocol: Stage 3 MOH

- Blood loss > 1500 ml with:
  - BP decrease 15% below baseline, HR 15% above baseline, o2 <95%
  - requiring > 4 units of PRBCs in first hour of resuscitation
  - Patient bleeding at admission or during resuscitation with prolonged PT or aPTT >1.5 times upper limits of normal and INR > 1.5, decreased fibrinogen levels <150 mg/dL, platelet count <100,000 or clinical evidence of coagulopathy
  - OB and anesthesia have determined bleeding is not surgically correctable regardless of the laboratory results and bleeding will lead to fatal outcome if not immediately corrected
Norton Protocol: Stage 3 MOH

- Ob/Anesthesia activates Stage 3 MOH protocol.
- Nurse designee informs blood bank and laboratory of Stage 3 MOH guidelines.
Norton Protocol: Stage 3 MOH

- Physician considers:
  - securing airway (intubation) and mechanical ventilation
  - arterial and central line placement
  - transfuse aggressively
  - B-lynch suture, intrauterine balloon, laparotomy, hysterectomy, uterine artery ligation, or intermittent compression of the aorta
Norton Protocol: Stage 3 MOH

- If the patient continues to bleed in spite of blood products and surgical hemostasis physician considers restricted off label use of one of the following:
  - Factor VIIa (NovoSevenRT) at 50 mcg/kg IV bolus -- if no improvement consider 2nd dose at 25 mcg/kg IV bolus
  - Epsilon-Aminocaproic Acid
  - DDAVP at 0.3 mg/kg slow IV for patients with type I VWD or those taking aspirin within 7 days of delivery
Norton Protocol: Stage 3 MOH

- Upon Stage 3 notification the blood bank prepares for STAT pick up: 4 PRBC, 4 FFP, 1 PLT, 10 CRYO (2-5 unit pre-pool)
- When requested subsequent containers will be prepared with: 4 PRBC, 2 FFP, and any additional products
Questions