Postpartum Hemorrhage

Learning objectives

- Understand the etiology and risk factors for postpartum hemorrhage
- Understand the medical and surgical interventions for the treatment of uterine atony and other common causes of postpartum hemorrhage

Why do we care?

- Hemorrhage is the leading cause of maternal mortality worldwide.
- Approximately 140k deaths annually, or one every four seconds

It is normal to bleed with delivery...

- 40-50% increase in blood volume
- 25% increase in red blood cell mass
- Hypercoagulable state

But, how much is too much?

- 500cc with vaginal delivery?
- 1000cc with cs?
- 10% fall in hematocrit?
- Estimations of EBL notoriously inaccurate
- Know it when you see it...

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Postpartum Hemorrhage

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Definitions

- Primary postpartum hemorrhage
  - Within 24 hours of delivery
  - Approx. 5% of deliveries
- Secondary postpartum hemorrhage (delayed)
  - 24 hours to 6 weeks postpartum

Etiologies

- Primary
  - Uterine atony (#1)
  - Retained placenta
  - Abnormal placentation
  - Coagulation defects
  - Uterine inversion
  - Vaginal/cervical lacerations
  - Uterine rupture
  - Hematomas

Etiologies

- Secondary
  - Subinvolution of the placenta site
  - Retained products
  - Infection
  - Coagulation defects

Risk factors

- Prolonged labor - atony
- Augmented labor - atony
- Rapid labor - atony
- Over distended uterus (macrosomia, polyhydramnios, multiple gestation) - atony
- Episiotomy - lacerations
- Operative delivery – lacerations, atony
- Preeclampsia – coagulopathy, atony
- Chorioamnionitis - atony
- Hispanic, Asian - atony
- Red heads?? – atony
- History of uterine surgery – rupture, abnormal placentation

Management of atony

- Drain the bladder
- Uterine massage (manual sweep)

Management of atony

- Labs
  - CBC, fibrinogen, PT, PTT, INR (baseline)
    - A fibrinogen <200 is predictive of massive hemorrhage
    - Tube to observe – 5 cc in red top; should clot in 8-10 minutes
  - Type and cross
- Access
  - 2 large bore IVs
### Uterotonics

- No absolute best sequence or regimen
  - Pitocin (oxytocin)
    - 10-40 units in 1 liter LR or NS (prophylaxis/treatment)
    - 10 units IM
    - 20 units umbilical vein
  - Maximum dosing unclear
  - Avoid undiluted rapid infusion as may cause hypotension - i.e. no IV bolus

- Cytotec (misoprostol)
  - PGE1 analogue
  - 200-1000 mcg PR, PV, PO, sublingual, intrauterine
  - Most helpful in settings where injectable uterotonics not available
  - OK for hypertension, asthma

- Methergine (methylergonovine)
  - Ergot derivative
  - 0.2 mg IM, may repeat every 2-4 hours (20 minutes)
  - Can not use in setting of hypertension, scleroderma, Raynauds

- Hemabate (carboprost)
  - PGF2a derivative
  - 250 mcg IM, may repeat every 15 minutes intrauterine
  - 8 dose maximum
  - Side effects: diarrhea, hypertension, etc.
  - Contraindicated in asthmatics

### Management of atony

- Thorough inspection of cervix and vagina
- D&C to ensure no retained products
- Rule out of other causes – i.e. hematoma, uterine rupture
- Tamponade

- Tamponade
  - Packing
    - Kerlex, can impregnate with thrombin
    - Time intensive
    - Doesn’t really allow assessment of ongoing bleeding
    - Antibiotics
  - Balloons (Bakri, BT-Cath)
    - Rapidly placed
    - Allow for ongoing assessment of bleeding
    - Antibiotics
Intrauterine balloon tamponade in the management of postpartum hemorrhage

- 23 patient case series
- Proper placement achieved in 20/23
- Of properly placed balloons hemorrhage was controlled in 18/20
- In cases of hemorrhage due to atony uterine preservation was achieved in 11/11 cases


Management of atony

- Uterine artery embolization
  - Interventional radiology
  - Requires hemodynamic stability, essentially non-coagulopathic
  - Angiography is performed to assess for bleeding site
  - Gelfoam is preferred agent (temporary 2-6 weeks)
  - Balloon catheters an option
- Uterine artery embolization in the treatment of postpartum uterine hemorrhage
  - 66 women undergoing UAE for obstetrical hemorrhage
  - 95% uterine preservation rate
  - 4.5% complication rate (pain, necrosis)

Surgical treatment
- Exploratory laparotomy
- Ligation of uterine arteries – O’Leary stitches
- Ligation of hypogastric arteries
- B-lynch compression sutures
- Hysterectomy

- B-Lynch suture: a case series
  - 22 patients with obstetrical hemorrhage unresponsive to uterotonics at time of CS
  - 12 cases – B-Lynch only; 10 cases arterial ligation + B-Lynch
  - 77% uterine preservation in all cases
  - 85% uterine preservation in cases of atony

Resuscitation
- Foley – to monitor urine output
- Adequate access
- Large volume infusions of crystalloid to prevent hypotension; 3:1

Resuscitation
- pRBCs
  - Each unit has 300 cc of fluid, 200 of which are RBCs and will raise the hct by approx. 3%
- Platelets
  - for plt in DIC, transfuse 10 pack of plt when they fall below 50,000
- Fresh frozen plasma
  - for INR (PT) and PTT that are 1.5x greater than normal, has factors V, VIII, XI, XII, and fibrinogen, each unit 250 cc
- Cryoprecipitate
  - Each unit 50 cc, has factors VIII and VWF and fibrinogen, can give much faster than FFP
New frontiers in resuscitation

- Recombinant factor VII
  - Primarily used with traumatic hemorrhage
  - Limited data in obstetrical hemorrhage

The use of recombinant activated FVII in postpartum hemorrhage

- Literature review of case series and case reports
- No randomized controlled trials
- 272 PPH refractory to traditional interventions
- 85% of cases experienced a “reduction” in bleeding at dose of 81.5 mcg/kg

Use of recombinant activated factor VII in severe post-partum hemorrhage: data from the Italian Registry: a multicentric observational retrospective study

- 35 patients
- Noted lower INR, increased fibrinogen following administration
- No adverse thromboembolic complications
- 29 patients with uterine preservation (16 hysterectomies)

Uterine inversion

- Primary causes
  - Excessive cord traction
  - Fundal pressure
- Risk factors
  - Fundal placenta
  - Uterine atony
  - Cord characteristics: strong or short
  - Macrosomia
  - Multiple gestation
  - Use of oxytocin or magnesium sulfate
  - Multiparity
  - Uterine anomalies
  - Manual extraction of placenta
  - Placenta accreta

Management of uterine inversion

- Replace the uterus!
- Relax uterus
  - Terbutaline
  - Magnesium sulfate
  - IV Nitroglycerin—onset in 30-60 sec, duration 60-120 sec. May require 50-500 mcg, in three doses of 50-250 mcg
  - General anesthesia—halogenated or fluoridated hydrocarbon agents
Management of uterine inversion

- Nitro
- Replacement of the uterus
- Uterotonics

Let’s go through a case...

35 yo G5 P5005 has just undergone a vaginal delivery of an AGA neonate following a rapid labor course and delivery. She delivers her placenta spontaneously and intact but is noted to have vaginal significant bleeding. What is in the differential diagnosis for the etiology of her bleeding?

- Atony!
- Lacerations
- Uterine rupture
- Uterine inversion
- Coagulopathy
- Retained products

The provider performs bimanual massage and a sweep of the lower uterine segment and believes the bleeding is consistent with atony. What should we do next?
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- Empty the bladder
- Call for additional help
- Consider administration of uterotonics
- Access
- Labs

The provider drains the bladder and continues bimanual massage. The patient continues to have significant bleeding. What uterotonics should we administer?

- Pitocin
- Methergine
- Hemabate
- Cytotec

40 units of Pitocin is administered in 1L LR. Methergine is given IM. The patient is continuing to bleed and the provider gives an EBL of 1000cc. What should we do now?

- Consider OR for better visualization and support
- Consider cross-match of blood

The patient is taken to the OR and an EUA is performed. No vaginal or cervical lacerations are identified. The patient is continuing to bleed and Hemabate has been administered. What should we do next?
- Consider readministration of Methergine and/or Hemabate
- Consider D&C

- An additional dose of Methergine is administered. A D&C is performed without evidence of retained products of conception. The patient is continuing to bleed and now has an EBL of 1500cc. What should we do now?

- Consider tamponade
- Consider surgical exploration

- An intrauterine balloon is placed. The patient’s labs return and she is found to have a hct of 24, fibrinogen of 100, plt of 75k. The patient is continuing to bleed and now has an EBL of 2000cc. What should we do now?

- Resuscitation!

- The patient is given packed RBC, plt, FFP. She continues to bleed through the tubing on the intrauterine balloon. Her EBL is now 2500cc. What should we do now?
Labs – is her coagulopathy corrected?
Surgical exploration
IR?

Labs return and her coagulopathy has improved with resuscitation, but she is continuing to bleed and has a hct of 22. The physician elects to perform a surgical exploration. What are the options for management?

O’Leary
B-Lynch
Hypogastric artery ligation
Hysterectomy

The physician opts to perform a hysterectomy. Bleeding is controlled after a total EBL of 3500cc. The patient recovers well and is discharged home POD#3 ☺.

Questions??