Postpartum Hemorrhage and Tranexamic Acid

Copyright 2019. Gregory Collins, DNP CRNA, Dawn Lewellen, MHS, CRNA.
All Rights Reserved.
We have no financial relationships with any commercial interest related to the content of this activity.

We will **not** discuss off-label use during our presentation.
**LEARNER OUTCOMES**

**Identify** indications for tranexamic acid (TXA) use in women with postpartum hemorrhage.

**List** mechanisms of action and possible side effects from TXA use.

**Describe** the patient safety bundle for obstetrical hemorrhage and how to implement the guidelines with your facility.
MATERNAL MORTALITY & PPH

100,000 DEATHS PER YEAR¹
MATERNAL MORTALITY & PPH

1. 1.938 /100,000²
2. 7 /100,000³
3. 1,570 /100,000³
ETIOLOGY:

- TONE: 70%
- TISSUE: 10%
- TRAUMA: 20%
- THROMBIN: ~1%

PPH: 4-6%

SEVERE PPH: 1.86%
CASE STUDY: PPH, ROTEM, AND TXA
24 YO G1P1A0 presented at 39w2d with PROM, thin meconium, positive cocaine, amphetamine, cannabinoids

- Induction with Pitocin
- After 24 hours, to OR for ASAP C/S under epidural. 1000 mL EBL
- After skin closure, patient became tachycardic, HR 150s, SBP 90
- 500 mL on sheets
- Carboprost (Hemabate) X3, pitocin, and 2 units PRBCs
- Uterine atony continued, reopened incision and converted to GETA
▪ EBL 1500 mL
▪ Uterine atony
▪ ABG: pH 7.25, PaCO2 53, PaO2 99, HCO3 23, BE -4, Lactate 2
▪ 80/50, HR 130’s
▪ Proceeded to hysterectomy
▪ Massive Transfusion Protocol (MTP)
▪ ROTEM sent

TIME POINT 1: 20 MIN AFTER RE-OPENING

<table>
<thead>
<tr>
<th>MTP Shipment Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shipment</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>
- Determine phases of clotting of WHOLE blood
- POC, fast turnaround
- Allows for targeted resuscitation of coagulation deficiencies (yellow stuff: platelets, plasma, or cryo)
- Alleviate (in part) blind blood component resuscitation therapy.
- Rapid TEG another option available
Normal Trace

- Short CT (stem)
- Wide MCF (body)

Red Wine Glass

The greater the amplitude the firmer the clot

<table>
<thead>
<tr>
<th>EXTEM</th>
<th></th>
<th>EXTEM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CT:</td>
<td>67s</td>
<td>CFT:</td>
<td>87s</td>
</tr>
<tr>
<td>CFR:</td>
<td>54mm</td>
<td>MCF:</td>
<td>57mm</td>
</tr>
<tr>
<td>α:</td>
<td>73°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ML:</td>
<td>-%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ROTEM IN TERM PREGNANCY

ROTEM Algorithm for Post-Partum Hemorrhage

PPH
Blood loss > 1500 ml – Severe + Ongoing Bleeding

Yes – Run EXTEM and FIBTEM

A10<45 mm
And
A10w<13 mm

Yes
Cryoprecipitate
Target: A10ina ≥ 16mm
(for dose calculation see 1)

No
Done

A10<45 mm
And
A10w≥13 mm

Yes
Platelets
1 unit apheresis platelets2

No
Done

CTe > 90 s

Yes
Thawed Plasma3
10 15cc/kg

No
Done

MLw ≥ 5%
(within 60 min)

Yes
Aminocaproic Acid4
5g Bolus over 1 hour

No
Done
- $A_{10_{\text{EX}}}$ on EXTEM is 32 (>45)
  - Needs either cryo or platelets
- $A_{10_{\text{FIB}}}$ is 21 (>16)
- Prolonged clotting time 177 (<80)
  - Needs FFP/Plasma
- Maximum Lysis 72%!! (<15%)
  - Needs TXA
Time Point 1: TREATMENT

HYPERFIBRINOLYSIS

- TXA Tranexamic acid 1 gram
- Continued MTP
  - 5 PRBCs
  - 3 FFP
HR 130s, 102/70, Temp 36.1
ABG: pH 7.38, PaCO2 36, PaO2 185, HCO3 22, BE -4
Lactate 3.4
Fibrinogen <60
Calcium 3.7++
- Banked blood has citrate, binds calcium
- Hypocalcemia: low BP, decreased clotting, decreased contractility
Time Point 2: 2\textsuperscript{nd} ROTEM

ROTEM Algorithm for Post-Partum Hemorrhage

- **PPH**
  - Blood loss > 1500 ml – Severe
  - Ongoing Bleeding

- **Yes** – Run EXTEM and FIBTEM

- **A10_{ex} < 45 \text{ mm}**
  - And
  - **A10_{re} < 13 \text{ mm}**
  - **Yes**
  - **Cryoprecipitate**
    - Target: A10_{re} ≥ 15 mm
    - (for dose calculation see 1)
  - **Done**

- **No**
  - **A10_{ex} < 45 \text{ mm}**
  - And
  - **A10_{re} ≥ 13 \text{ mm}**
  - **Yes**
  - **Platelets**
    - 1 unit apheresis platelets
  - **Done**

- **CT_{ex} > 90 \text{ s}**
  - **Yes**
  - **Thawed Plasma**
    - 10-15cc/kg
  - **Done**

- **ML_{re} ≥ 5\%**
  - (within 60 min)
  - **Yes**
  - **Aminocaproic Acid**
    - 5g Bolus over 1 hour
  - **Done**
Time Point 2: TREATMENT

- Cryoprecipitate 2 bags (10 units)
- MTP shipment #2 completed (10 PRBCs, 6 FFP, 1 platelets)
2.5 HR AFTER RE-OPENING

- HR 120 BP 110/70
- pH 7.36, CO2 41, O2 180, HCO 3 24, BE -2,
- Lactate 2.9
- Calcium 2.7++
- Fibrinogen 226
Intubated in ICU (extubated 7 hours later)

VSS

Totals:
- Crystalloids 5300 mL
- PRBCs 13
- FFP 6
- Cryo 2
- Platelets 1
CASE SUMMARY

- Prompt recognition of hyperfibrinolysis (only 1500 mL loss reported at this time)
- TXA given
- Resolution of hyperfibrinolysis
- Only 3 shipments of MTP required for EBL 7000
- Patient extubated 7 hours after ICU arrival and discharged 6 days later
FIBRINOLYSIS

PLASMINOGEN

PLASMIN

tPA/uPA

FIBRIN

D DIMER

FSP
TRANEXAMIC ACID

A. Activation of fibrinolysis

B. Inhibition of fibrinolysis

Figure 2. Activation of Fibrinolysis Showing Lysine Binding Site

Figure 3. Plasminogen–Tranexamic Acid Complex Prevents Fibrinolysis by Inhibiting Interaction of Plasminogen and Fibrin
Effect of early tranexamic acid administration on mortality, hysterectomy, and other morbidities in women with post-partum haemorrhage (WOMAN): an international, randomised, double-blind, placebo-controlled trial

WOMAN Trial Collaborators*
WOMAN TRIAL

- 20,000+ patients
- 193 hospitals
- 23 countries
- 1000mg TXA
- Placebo
- Death due to bleeding hysterectomy
WOMAN TRIAL\textsuperscript{1}

MATERNAL DEATH DUE TO PPH

OVERALL
1.5\% vs 1.9\%
p=0.045

\leq 3 \text{ HR}
1.2\% vs 1.7\%
p=0.008

NO SIGNIFICANT INCREASE IN ADVERSE EVENTS
RECOMMENDATIONS

1000mg TXA IV OVER 10min

IMMEDIATELY UPON DX OF PPH

MAY REPEAT x1 IN 30min
FUTURE OF TXA & PPH

THE JOURNAL OF MATERNAL-FETAL & NEONATAL MEDICINE
https://doi.org/10.1080/14767058.2019.1571576

REVIEW ARTICLE

Prophylactic use of tranexamic acid after vaginal delivery reduces the risk of primary postpartum hemorrhage

Gabriele Saccone, Luigi Della Corte, Pietro D’Alessandro, Bruno Ardino, Luigi Carbone, Antonio Raffone, Maurizio Guida, Mariavittoria Locci, Fulvio Zullo and Vincenzo Berghella

398 Prophylactic tranexamic acid usage in prevention of postpartum hemorrhage a pilot study

Seifeldin Sadek, Emre Kayaalp, Vani Movva, Nimra Dad

1East Virginia Medical School, Norfolk, VA, 2Flushing Hospital Medical Center, Flushing, NY
Utilizes straightforward, evidence-based recommendations that improve outcomes

Bundles aid implementation and consistency of practice

Denial and Delay common
MATERNAL SAFETY BUNDLE for PPH

- Hemorrhage cart
- Hemorrhage kit (Pyxis) (uterotonics, TXA)
- Response team (anesthesia, pharmacy, critical care, main OR)
- Massive transfusion protocol (MTP)
- Drills in situ

Box 1. Obstetric Hemorrhage Safety Bundle From the National Partnership for Maternal Safety, Council on Patient Safety in Women’s Health Care

Readiness (Every Unit)
1. Hemorrhage cart with supplies, checklist, and instruction cards for intrauterine balloons and compression stitches
2. Immediate access to hemorrhage medications (kit or equivalent)
3. Establish a response team—who to call when help is needed (blood bank, advanced gynecologic surgery, other support and tertiary services)
4. Establish massive and emergency-release transfusion protocols (type-O negative or uncrossmatched)
5. Unit education on protocols, unit-based drills (with postdrill debriefs)

Recognition and Prevention (Every Patient)
6. Assessment of hemorrhage risk (prenatal, on admission, and at other appropriate times)
7. Measurement of cumulative blood loss (formal, as quantitative as possible)
8. Active management of the 3rd stage of labor (department-wide protocol)

Response (Every Hemorrhage)
9. Unit-standard, stage-based obstetric hemorrhage emergency management plan with checklists
10. Support program for patients, families, and staff for all significant hemorrhages

Reporting and Systems Learning (Every Unit)
11. Establish a culture of huddles for high-risk patients and postevent debriefs to identify successes and opportunities
12. Multidisciplinary review of serious hemorrhages for systems issues
13. Monitor outcomes and process metrics in perinatal quality improvement committee

http://www.safehealthcareforeverywoman.org
MATERNAL SAFETY BUNDLE for PPH

Massive Transfusion Protocol

<table>
<thead>
<tr>
<th>Shipment</th>
<th>RBC</th>
<th>Thawed Plasma</th>
<th>Platelets</th>
<th>Cryoprecipitate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>3</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>3</td>
<td></td>
<td>1 pool of 5 units</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>3</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>3</td>
<td></td>
<td>1 pool of 5 units</td>
</tr>
<tr>
<td>7</td>
<td>5</td>
<td>3</td>
<td></td>
<td>1 pool of 5 units</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>3</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>3</td>
<td></td>
<td>1 pool of 5 units</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If needed, recombinant Factor VIII (NovoSeven) 2.0 is available and can be obtained by entering an order in EPIC.

Circulator (DELEGATE as needed)

Pre-huddle before expected PPH, review checklists and roles
- Communication EBL
- Bring PP hemorrhage cart
- Handout cognitive aids/checklists
- Contact charge nurse, OR if needed
- Bring PPH medication kit
- Order MTP
- Encourage a debrief
- Complete safety post
Resources

- ROTE PPH Algorithm, Trauma Algorithm, and MTP: https://drive.google.com/open?id=19dYOCp2wm7QBz-5q55bKrfYEm4QSo4T
- https://www.cmqcc.org/resources-tool-kits/toolkits
- UptoDate
  - Anesthesia for the patient with peripartum hemorrhage
  - Postpartum hemorrhage: Medical and minimally invasive management
EMERGENCY MANAGEMENT PLANS

OBSTETRIC HEMORRHAGE EMERGENCY MANAGEMENT PLAN: CHECKLIST FORMAT

<table>
<thead>
<tr>
<th>CMOQC Obretnic Hemorrhage Emergency Management Plan: Checklist Format</th>
<th>Revision 9/10/14</th>
</tr>
</thead>
</table>

**Stage 0: All Births – Prevention & Recognition of OB Hemorrhage**

**Prenatal Assessment & Planning**

- Identify and prepare for patients with special considerations: Placenta Previa/Acute, Bleeding Disorder, or those who decline Blood Products
- Screen and aggressively treat severe anemia: if oral iron fails, initiate IV iron Sucralfate Protocol to reach desired HGB/Hct, especially for all risk mothers.

**Admission Assessment & Planning**

- Verify Type & Antibody Screen from prenatal record
- If not available:
  - Order Type & Screen (lab will notify if 2nd specimen needed for confirmation)
- If prenatal or current antibody screen positive (if not low level anti-D from RhO-GAM), Type & Crossmatch 2 units PRBCs
- All other patients:
  - Send specimen to blood bank

**Ongoing Risk Assessment**

- Evaluate for Risk Factors on admission, throughout labor, and postpartum (all every 4 hours)
- If medium risk:
  - Order Type & Screen
  - Review Hemorrhage Protocol
- If high risk:
  - Order Type & Crossmatch 2 units PRBCs
  - Review Hemorrhage Protocol
  - Notify OB Anesthesiology
  - Identify women who may decline transfusion
  - Notify OB provider for plan of care
  - Early consult with OB anesthesiology
  - Re-evaluate Consent Form

**Admission Hemorrhage Risk Factor Evaluation**

- Low (Clot only)
- Medium (Type and Screen)
- High (Type and Crossmatch)

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>No previous uterine incision</td>
<td>Prior cesarean births or uterine surgery</td>
<td>Placenta previa, low-lying placenta</td>
<td></td>
</tr>
<tr>
<td>Singleton pregnancy</td>
<td>Multiple gestation</td>
<td>Suspected Placenta accreta or previa</td>
<td></td>
</tr>
<tr>
<td>x 4 previous vaginal births</td>
<td>&gt; 4 previous vaginal births</td>
<td>Hematocrit &lt; 30 AUD other risk factors</td>
<td></td>
</tr>
<tr>
<td>No known bleeding disorder</td>
<td>Chorioamnionitis</td>
<td>Platelets &lt; 100,000</td>
<td></td>
</tr>
<tr>
<td>No history of PPH</td>
<td>History of previous PPH</td>
<td>Active bleeding (greater than show) on admission</td>
<td></td>
</tr>
<tr>
<td>Large uterine fibroids</td>
<td>Known coagulopathy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**All Births – Prophylactic Oxytocin, Quantitative Evaluation of Blood Loss, & Close Monitoring**

<table>
<thead>
<tr>
<th>Active Management of Third Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxytocin infusion: 10-40 units oxytocin/1000 ml solution starts infusion rate to uterine tone, or 10 units IM, do not give oxytocin as IV push</td>
</tr>
</tbody>
</table>

**Ongoing Quantitative Evaluation of Blood Loss**

<table>
<thead>
<tr>
<th>Ongoing Evaluation of Vital Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>If: Cumulative Blood Loss &gt; 500mL vaginal birth or &gt; 1000mL C/S with continued bleeding, OR:</td>
</tr>
<tr>
<td>Vital signs, &gt; 15% change or HR &gt; 110, BP &gt; 85/45, O2 sat &gt; 95% OR Increased bleeding during recovery or postpartum, proceed to STAGE 1</td>
</tr>
</tbody>
</table>

https://www.cmqcc.org/resources-tool-kits/toolkits
# Obstetric Hemorrhage Care Guidelines

All patients are active participants in their care. Patients should be informed of any risk factors they may have or develop for PPH and advised of recommendations for their care. These recommendations may be individualized to reflect the patient’s decisions.

## Prenatal Assessment Planning

Identify and prepare for patients with special considerations: placenta previa/accreta, bleeding disorders or those who decline blood products (and have risk factors).

<table>
<thead>
<tr>
<th>Admission Hemorrhage Risk Factor Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Risk</strong></td>
</tr>
<tr>
<td>• No previous uterine incision</td>
</tr>
<tr>
<td>• Singleton pregnancy</td>
</tr>
<tr>
<td>• ≤4 previous births</td>
</tr>
<tr>
<td>• No known bleeding disorder</td>
</tr>
<tr>
<td>• No history of PPH</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

## Admission Assessment & Planning

- Type and Screen all patients on admission
- Evaluate for risk factors on admission
  - It is strongly recommended that all women who meet criteria for medium/high risk have IV access
  - If high risk, T&C for 2 units PRBC’s & keep ahead 2 IV lines
  - Identify women who may decline transfusion and counsel and consent
  - If the patient has moderate/high risk for PPH:
    - Review OB Hemorrhage Guideline

## Ongoing Risk Assessment

- Evaluate for development of additional risk factors in labor:
  - Prolonged 2nd stage labor (4 hours, including time for “rest and descend”)
  - Any oxytocin use
  - Sustained antepartum bleeding
  - Chorioamnionitis

Risk factors in this column are considered medium risk and need to be added to admission risk factors

## Stage 2: All Births – Prevention & Recognition of OB Hemorrhage

- Active management of the third stage of labor
- Administer all IV Pitocin per postpartum Pitocin guideline or give 10 U Pitocin IM
- After initial EBL for delivery is determined all subsequent blood loss will be quantified (weighed) for 24 hrs and documented in I&O
- Ongoing evaluation of vital signs per guideline/orders
- Empty bladder; patients who have received an epidural/spinal are cathed (straight or Foley) prior to transfer to postpartum
- If patients fundus is not firm but EBL <500:
  1. Vigorous crede for at least 15 seconds
  2. Empty her bladder
  3. Consider giving the ordered Metherine/Hemabate (must notify the OB Resident if this is given)*

Steve Davis CRNA
References


References


Thanks for Coming!!

Questions????????