BLOOD PRODUCTS
UTILISATION IN OBSTETRICS
MANAGEMENT OF
OBSTETRIC HEMORRHAGE

DR MRS. I. THACOOR
CONSULTANT GYNECOLOGIST &
OBSTETRICIAN
VICTORIA HOSPITAL
MAURITIUS
Obstetric hemorrhage is the first cause of preventable maternal death worldwide. Obstetric hemorrhage can be antepartum or postpartum. Hemorrhage occurring in 1st 24 hours after delivery is called Primary PPH. Secondary PPH – Occurs after 24 hours and up to 12 weeks PP.
DEFINITIONS OF OBSTETRIC HEMORRHAGE

- Blood loss of more than 500 ml following vaginal delivery & ≥1000 ml following C.S.
- Others define obstetric hemorrhage as a 10% fall in hematocrit value or need for blood transfusion.
- Any amount of blood loss that threatens the hemodynamic stability of the women.
<table>
<thead>
<tr>
<th>CAUSES OF HEMORRHAGE</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abruptio Placentae</td>
<td>19%</td>
</tr>
<tr>
<td>Laceration/uterine rupture</td>
<td>16%</td>
</tr>
<tr>
<td>Uterine Atony</td>
<td>15%</td>
</tr>
<tr>
<td>Coagulopathies</td>
<td>14%</td>
</tr>
<tr>
<td>Placenta praevia</td>
<td>7%</td>
</tr>
<tr>
<td>Placenta accreta/increta/percreta</td>
<td>6%</td>
</tr>
<tr>
<td>Uterine bleeding</td>
<td>5%</td>
</tr>
<tr>
<td>Retained placenta</td>
<td>4%</td>
</tr>
</tbody>
</table>

From Chichakli and Collegues (1999)
CONDITIONS THAT PREDISPOSE TO OR WORSEN OBSTETRIC HEMORRHAGE

- ABNORMAL PLACENTATION
- UTERINE ATONY
- TRAUMA DURING LABOUR & DELIVERY
- UTERINE RUPTURE
- COAGULATION DEFECTS
- OTHER FACTORS
ABNORMAL PLACENTATION

- Placenta Praevia
- Placenta accreta/percreta/increta
- Placenta abruptio
- Ectopic pregnancy
- Hydatidiform mole
CONDITIONS THAT PREDISPOSE TO OR WORSEN OBSTETRIC HEMORRHAGE (Cont’d)

UTERINE ATONY

- Overdistended uterus
- Big Baby
- Multiple Pregnancy
- Hydramnios
- Analgesia or anaesthesia
- Conductive analgesia with hypotension
- Rapid labour
- Prolonged Labour
CONDITIONS THAT PREDISPOSE TO OR WORSEN OBSTETRIC HEMORRHAGE (cont’d)

UTERINE ATONY (CONT’D)

- Oxytocin or prostagladin stimulation
- Chorio amnionitis
- Previous uterine atony

TRAUMA DURING LABOUR & DELIVERY

- Instrumental delivery
- Macrosomia
- Caesarian delivery & hysterectomy
CONDITIONS THAT PREDISPOSE TO OR WORSEN OBSTETRIC HEMORRHAGE

UTERINE RUPTURE

- In high parity
- Previous scarred uterus
- Forceps
- Obstructed labour
CONDITIONS THAT PREDISPOSE TO OR WORSEN OBSTETRIC HEMORRHAGE

**COAGULATION DEFECTS**

- Placental abruptio
- Prolonged intra uterine demise
- Amniotic fluid Embolism
- Sepsis
- Severe PET/Eclampsia
- Massive transfusion
- Anticoagulants
- Congenital coagulopathies
CONDITIONS THAT PREDISPOSE TO OR WORSEN OBSTETRIC HEMORRHAGE

OTHER FACTORS

- Obesity
- Previous PPH
- Small maternal blood volume
- Small women
- Pregnancy hypervolumenia restricted by: Severe PET/Eclampsia
Management of Obstetric Hemorrhage

- Involves 2 components
  1. Resuscitation and management of obstetric hemorrhage
  2. Identification and management of causes of hemorrhage
- Both components are dealt with simultaneously
Management of Obstetric Hemorrhage

1. ORGANISATION

- Evaluate AMOUNT of blood lost and patients clinical state
- Continuously monitor VITAL signs
- Call MULTIDISCIPLINARY team
  - Obstetrician
  - Anaesthetist
  - Pediatrician (if APH)
  - Skilled midwives and nurses to record vital signs, urine output, fluid and drugs intake
Alert blood bank and hematologist.

Place operation theatre on standby

2. RESUSCITATION

Administer $O_2$ by mask

Trendelenberg’s position

Place 2 large bore (14 gauge) IV lines

Take blood for cross match of 6 units of PRBCs

Obtain coagulation profile, FBC, urea and electrolytes, creatinine
Management of Obstetric Hemorrhage
- RESUSCITATION (fluid, blood and blood products)

FLUID RESUSCITATION

- NS or LRS through IV lines
- Central venous access for massive hemorrhage
- 1L of blood loss requires replacement with 4-5L of crystalloids
- Blood loss of more than 1500ml of blood requires PRBCs transfusion
- Use of crystalloids compared to colloid solution is associated with decreased maternal mortality (Bonnar).
Management of Obstetric Hemorrhage
- RESUSCITATION (fluid, blood and blood products)

1. USE OF BLOOD AND BLOOD PRODUCTS IN OBSTETRIC HEMORRHAGE

- Indications for blood and blood products:
  1. When bleeding is ongoing
  2. Estimated blood loss > 2L
  3. Presence of signs of shock
Management of Obstetric Hemorrhage
- RESUSCITATION (fluid, blood and blood products)

1. USE OF BLOOD AND BLOOD PRODUCTS IN OBSTETRIC HEMORRHAGE (cont’d)

- Good communication with blood transfusion service is important
  - stress nature of emergency
  - amount of blood products required
- Use an integrated filter and blood warmer for blood transfusion
- Use pressure cuff when transfusion rate has to be > 100ml/min
Management of Obstetric Hemorrhage

1. Use of Packed red blood cells (PRBCs) in Obstetric Hemorrhage

- PRBCs and crystalloid infusion are the mainstays of transfusion therapy for most cases of obstetric hemorrhage.
- Transfusing 2-4 units PRBCs rapidly restores O2 carrying capacity of blood and also circulatory volume.
- Uncrossmatched O type Rh–ve PRBCs reserved for catastrophic bleeding.
- Adding 100ml of NS to PRBCs decreases viscosity of PRBCs.
Whole blood used only for torrential hemorrhage

- compatible whole blood is ideal for severe acute hemorrhage as:

  Shelf life is 40 days

70% of transfused red cells remain viable for more than 24 hours.

Whole blood is rich in coagulation factors specially fibrinogen
3. Use of Platelets in Obstetric Hemorrhage

- Transfusion of platelets is indicated when platelet count is < 50 x 10^9 /L
- Platelets transfusion are given in packs of 5 – 6 units.
- If platelets count is < 50 x 10^9 /L, 10 – 12 units of platelets are given initially.
- If surgery is required, maintain platelet count > 50 – 100 x 10^9 /L
- In non surgical patient, bleeding is rarely encountered if platelet count is more than 5 -10 x 10^9 /L
- Platelet preparations have some RBCs, therefore anti-D immunoglobulin is recommended for Rh–ve patients receiving platelets.
Management of Obstetric Hemorrhage

4. USE OF FFP IN OBSTETRIC HEMORRHAGE

- FFP is prepared from separation of plasma from whole blood and then freezing it.
- FFP is not appropriate as volume expander
- FFP is a source of labile stable clotting factors
- FFP is used when fibrinogen count is below 100mg/dL
  And when prothrombin and thromboplastin time are abnormal
- FFP is used before surgical intervention
- FFP is used in cases of defective coagulopathy
5. USE OF CRYOPRECIPITATE IN OBSTETRIC HEMORRHAGE

- Used when abnormal coagulation is not corrected with FFP.
- It provides a more concentrated form of fibrinogen and other clotting factors.
- Main indication of cryoprecipitate is abruptio with severe hypofibrinogenemia.

6 – 12 units is commonly given.
Management of Obstetric Hemorrhage

6. Autologous Blood Transfusion

- Blood is drawn from pregnant patient in third trimester and stored to be used in case of obstetric hemorrhage.

ADVANTAGE

NO blood transfusion reaction.

DISADVANTAGE

Use of blood generally cannot be predicted

( according to Etchason and associates 1985 concluded that autologous transfusion are not cost effective )
Management of Obstetric Hemorrhage

- RISK FACTORS ASSOCIATED WITH BLOOD TRANSFUSION

- Infection – most feared is HIV (risk of HIV transmission in screened blood is 1 in 500,000 – 1,000,000)
  - non A non B hepatitis
  - Hep C (routine screening since 1990, 1-2% of blood donors)
  - Malaria (1 in 1,000,000)
  - CMV (1 in 1,000,000)

- Transfusion Reactions

- Development of atypical antibodies

- Hyperkalemia and acidosis with stored blood

- Hypocalcemia due to citrate intoxication is rare
## Blood products commonly transfused in Obstetrics

<table>
<thead>
<tr>
<th>Products</th>
<th>Indication</th>
<th>Content</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole blood (450ml)</td>
<td>Symptomatic anemia with large volume deficits</td>
<td>All components</td>
<td>Increases Hematocrit 3-4% per unit</td>
</tr>
<tr>
<td>Packed red cells (250ml)</td>
<td>Symptomatic anemia</td>
<td>Erythrocytes</td>
<td>Increases Hematocrit 3-4% per unit</td>
</tr>
<tr>
<td>Fresh frozen plasma (250ml)</td>
<td>Deficit of labile and stable coagulation factors</td>
<td>All clotting factors</td>
<td>Supplies fibrinogen 150mg per unit and other factors</td>
</tr>
<tr>
<td>Cryoprecipitate (50ml)</td>
<td>Hypofibrinogenemia</td>
<td>Factors VIII, vWF, XIII, fibronectin, fibrinogen</td>
<td>Supplies select clotting factors</td>
</tr>
<tr>
<td>Platelets (50ml/U)</td>
<td>Bleeding from thrombocytopenia</td>
<td>Platelets</td>
<td>Increases platelet count 5000-8000/µL per unit</td>
</tr>
</tbody>
</table>
Defective blood coagulation is of 2 types:

1. DILUTIONAL COAGULOPATHY

2. DIC (Disseminated Intravascular Coagulation)
DEFECTIVE BLOOD COAGULATION

1. DILUTIONAL COAGULOPATHY

Occurs when more than 80% of original blood has been replaced with crystalloids and packed cells causing depletion of platelets and soluble clotting factors.

- CLINICAL SIGNS

- Oozing from wound and puncture sites
DEFECTIVE BLOOD COAGULATION

MANAGEMENT

- Start with 4 units of FFP
- 1 unit of FFP given for every 5 units of PRBCs for patient who need continuous transfusion.
- Thrombocytopenia occurs when 1.5 – 2 times blood volume has been replaced.
- Platelet transfusion indicated when platelets count less than $50 \times 10^9$ /L.
- Platelets transfusion are given in packs of 5 to 6 units.
- If platelets count is $< 50 \times 10^9$ /L give 10 – 12 units initially.
DIC develops when hypoperfusion of tissues causes intravascular damage and release of thromboplastins.

CAUSES OF DIC

- Abruptio placentae
- HELLP Syndrome
- Intrauterine fetal demise
- Amniotic fluid embolism
- Septicaemia
- Fatty liver of pregnancy
DEFECTIVE BLOOD COAGULATION

DIAGNOSIS OF DIC

- Low platelets
- Increased fibrin degradation products
- Increased D-dimer
- Prolonged prothrombin time and prolonged partial thromboplastin time

TREATMENT

- Same as dilutional coagulopathy
DEFECTIVE BLOOD COAGULATION

RECOMBINANT ACTIVATED FACTOR VIIa (RFVIIa)

- Indicated in PPH when medical treatment and hysterectomy have failed.
- Very expensive
- Maybe potentially harmful
EVALUATION OF RESPONSE TO RESUSCITATION

- Monitor BP, Pulse, Blood gas status, Acid-Base status
- Measure urine output with indwelling catheter (> 30ml/h for good renal perfusion).
- Pulse oxymeter for evaluation of tissue perfusion.
- Auscultate lungs to exclude edema or adult RDS.
- Place in ICU patients who needs central venous line or arterial line placement.
- Order CBC counts and coagulation tests to guide blood components therapy.
IDENTIFICATION AND MANAGEMENT OF CAUSES OF OBSTETRIC HEMORRHAGE

^APH (ANTEPARTUM HEMORRHAGE)

There are 2 main types:

• ABRUPTIO PLACENTA

  - sudden onset / Partial or complete / Hemorrhage may be concealed, revealed or mixed
  - Associated with hypertension / PET and eclampsia
  - Patient presents with severe abdominal pain and persistent uterine hypertonia
  - Often associated with consumptive coagulopathy

○ MANAGEMENT

  - Intensive resuscitation with crystalloid and blood
  - Prompt delivery
IDENTIFICATION AND MANAGEMENT OF CAUSES OF OBSTETRIC HEMORRHAGE

• PLACENTA PRAEVIA
  - Location of placenta over or very near the cervical os
  - Painless bleeding which tends to recur
  - Rarely associated with coagulopathy

  ○ MANAGEMENT
  - In case of severe hemorrhage Caeserian Section
  - When associated with placenta accreta, hysterectomy
IDENTIFICATION AND MANAGEMENT OF
CAUSES OF OBSTETRIC HEMORRHAGE

PPH (POSTPARTUM HEMORRHAGE)

a) UTERINE ATONY

- Failure of uterus to contract after delivery

- MANAGEMENT

- Vigorous fundal massage

- 20 units oxytocin in 1000ml of RL or NS given IV, 10ml / min, i.e 200mU /min.

- PPH unresponsive to Oxytocin:

  Ergot derivatives

  Prostaglandins PGF2α, carboprost initial dose 250mcg IM, may be repeated at 15 - 90 min interval
IDENTIFICATION AND MANAGEMENT OF CAUSES OF OBSTETRIC HEMORRHAGE

- PPH unresponsive to Oxytocin:
  
  Rectally administer PGE2 2mg suppository

  Misoprostol 1000mcg given rectally
IDENTIFICATION AND MANAGEMENT OF CAUSES OF OBSTETRIC HEMORRHAGE

PPH (POSTPARTUM HEMORRHAGE)

b) HEMORRHAGE DUE TO RETAINED PLACENTA & PLACENTAL FRAGMENTS

- TREATMENT

   EUA / Manual exploration of uterine cavity

   Hysterectomy when associated with placenta accreta

c) INVERSION OF UTERUS

   May be due to strong traction on cord before detachment of placenta

   - TREATMENT

   Relax uterus

   Reduction of inversion followed by oxytocin infusion
IDENTIFICATION AND MANAGEMENT OF OBSTETRIC HEMORRHAGE

PPH (POSTPARTUM HEMORRHAGE )

d) GENITAL TRACT LACERATIONS

Bleeding with well contracted uterus suggests genital tract laceration or retained placental tissue

-TREATMENT

Thorough inspection in lithotomy position using right angled retractors and ovum forceps to hold the cervix.

Look for upper angle of wound and apply first suture 1 cm above angle.
IDENTIFICATION AND MANAGEMENT OF OBSTETRIC HEMORRHAGE

PPH (POSTPARTUM HEMORRHAGE)

e) UTERINE RUPTURE

Commonest cause is rupture at a previous LSCS scar. May also occur after previous curettage, previous myomectomy and overstimulation with oxytocin or PGE2.

-Presents with pain, tenderness, signs of shock and fetal heart deceleration or intrauterine death.

- TREATMENT

- Repair or Hysterectomy
IDENTIFICATION AND MANAGEMENT OF OBSTETRIC HEMORRHAGE

PPH (POSTPARTUM HEMORRHAGE)

f) PUERPERAL HEMATOMAS

- TREATMENT

  Incision of hematoma and ligation of bleeders

  Packing if no bleeder seen
Surgical Treatment of Obstetric Hemorrhage

INDICATIONS

- Unresponsive and atonic uterus
- Ruptured uterus
- Large cervical laceration extending into uterus

Most laparatomies are due to bleeding during or after LSCS mainly due to Placenta praevia and Placenta accreta
Surgical Treatment of Obstetric Hemorrhage

LAPARATOMY

- Inspect uterus and surrounding structures
- If uterine rupture present, decide repair Vs hysterectomy
- Keep uterus warm and well perfused if uterus is exteriorized
- Leave drain before closing abdomen
- Antibiotics cover pre and post - op
Surgical Treatment of Obstetric Hemorrhage

1. Uterine Artery Ligation

- Uterine arteries provide 90% of uterine blood flow; therefore ligation will control most of the bleeding

a) The uterus is grasped and tilted to expose vessels coursing through the broad ligament. Stitches are placed 2cm below CS incision site; using round body needle and absorbable sutures
Surgical Treatment of Obstetric Hemorrhage
- UTERINE ARTERY LIGATION

b) Include full thickness of myometrium to anchor stitch, then pass needle through avascular part of broad ligament.

c) Bilateral uterine arteries are ligated
Surgical Treatment of Obstetric Hemorrhage

2. OVARIAN ARTERY LIGATION

3. INTERNAL ILIAC (HYPOGASTRIC) ARTERY LIGATION

More difficult to perform.

Reduces bleeding from all sources within the genital tract.
Surgical Treatment of Obstetric Hemorrhage

HYSTERECTOMY

- Curative for bleeding of uterine, cervical and vaginal origin.
- Total Hysterectomy is preferred to subtotal

However subtotal hysterectomy is effective for controlling bleeding due to uterine atony alone.
Surgical Treatment of Obstetric Hemorrhage

SELECTIVE ARTERIAL EMBOLIZATION

- Useful if fertility is to be preserved

B – LYNCH AND CHO SUTURE

- Transmural uterine compression sutures
Preventive Measures for Obstetric Hemorrhage

- Identification of women with risks factors for Obstetric Hemorrhage.
- Type and screen before delivery all women with risk factors.
- Detection and treatment of anemia antenatally
- Delivery with skilled attendants
- Active management of third stage of labour
  - 10 IU of oxytocin is given IM at birth of baby
  - Controlled Cord Traction (CCT) for delivery of placenta

Unfortunately 2/3 of women with Obstetric Hemorrhage have no risk factors and all pregnant women should be considered at risk for obstetric hemorrhage
SUMMARY

- Importance of identifying risk factors before and during labour
- Obstetric hemorrhage may occur in absence of risk factors
- All caregivers involved in maternity care must have a clear plan for prevention and management of PPH
THANK YOU