بسم الله الرحمن الرحيم

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Antepartum & Postpartum Hemorrhage
Obstetrics is "bloody business."

Death from hemorrhage still remains a leading cause of maternal mortality.

Hemorrhage was a direct cause of more than 18 percent of 3201 pregnancy-related maternal deaths.
Obstetric Hemorrhage Can Be Challenging

- Bleeding can be rapid
  - life threatening

- Dilution with amniotic fluid
  - can be difficult to quantify
  - Blood loss may be concealed

- Physiological changes of pregnancy
  - mask the normal clinical signs of hypovolemia
Definition of Massive Obstetric Hemorrhage

- Acute transfusion of > 4 units blood
- Blood loss from the uterus > 1500ml
- Decrease in hemoglobin of > 4 g/dl
Definition

Antepartum:
- after 24th week gestation & before delivery
  - placenta previa
  - placental abruption
  - bleeding from vaginal or cervical lesions

Postpartum:
- Primary: within 24 h of delivery
- Secondary: 24 h to 6 weeks post delivery
  - uterine atony, retained products, genital tract trauma, uterine inversion
ANTEPARTUM HEMORRHAGE
COMMON CAUSES

- Placenta Previa
- Placental Abruption
- Uterine Rupture
- Vasa Previa
- Bloody Show
- Coagulation Disorder
- Hemorrhoids
- Vaginal Lesion/Injury
- Cervical Lesion/Injury
- Neoplasia
Placenta Abruption

Classification of Abruptio Placentae

- External Abruption
- Relatively Concealed Abruption
- Concealed Abruption
Placenta Abruption

Premature separation of a normally sited placenta from the uterine wall after the 20th week of gestation and prior to delivery.
- Occurs in 1-2% of all pregnancies

- Perinatal mortality rate associated with placental abruption was 119 per 1000 births compared with 8.2 per 1000 for all others.
Placenta abruption

- Risk factors:
  - Previous history of abruption
  - Maternal hypertension
  - Smoking
  - History of premature rupture of membranes
  - Abdominal trauma
  - High parity
  - Cocaine use
Placental Abruption

Pathology

- Placental abruption is initiated by hemorrhage into the decidua basalis.
- The decidua then splits, leaving a thin layer adherent to the myometrium.
- Development of a decidual hematoma that leads to separation, compression, and the ultimate destruction of the placenta adjacent to it.
Placental Abruption

- Bleeding with placental abruption is almost always maternal.

- Significant fetal bleeding is more likely to be seen with traumatic abruption.

- In this circumstance, fetal bleeding results from a tear or fracture in the placenta rather than from the placental separation itself.
Placental Abruption

- The hallmark symptom of placental abruption is pain which can vary from mild cramping to severe pain.

- A firm, tender uterus and a possible sudden increase in fundal height on exam.

- The amount of external bleeding may not accurately reflect the amount of blood loss.

- Importantly, negative findings with ultrasound examination do not exclude placental abruption. Ultrasound only shows 25% of abruptions.
<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Asymptomatic with a small retroplacental clot</td>
</tr>
<tr>
<td>1</td>
<td>Vaginal bleeding with no signs of maternal or fetal compromise</td>
</tr>
<tr>
<td>2</td>
<td>Vaginal bleeding with signs of fetal compromise</td>
</tr>
<tr>
<td>3</td>
<td>Vaginal bleeding accompanied by uterine tetany, abdominal pain, and signs of fetal and maternal compromise Coagulopathy in 1/3 of cases</td>
</tr>
</tbody>
</table>
Signs and symptoms

- Vaginal bleeding
- Lower abdominal tenderness
- Rapid abnormal uterine contractions
- Fetal heart rate abnormalities: Intrauterine death
- Maternal cardiovascular collapse
- Disseminated intravascular coagulation
Placental Abruption

- Shock
- Consumptive Coagulopathy
- Renal Failure
- Fetal Death
- Couvelaire Uterus
Management

The management of placental abruption, including the timing and route of delivery, depends on:

- degree of maternal & fetal compromise
- fetal presentation, gestational age.
Placenta Previa

Placenta previa occurs when the placenta is totally or partially inserted in the lower uterine segment.
Placenta Previa

1. *Total placenta previa.* The internal cervical os is covered completely by placenta.

2. *Partial placenta previa.* The internal os is partially covered by placenta.

3. *Marginal placenta previa.* The edge of the placenta is at the margin of the internal os.

4. *Low-lying placenta.* The placenta is implanted in the lower uterine segment such that the placenta edge actually does not reach the internal os but is in close proximity to it.
Placenta Previa

- **Incidence** about 1 in 300

- *Perinatal morbidity and mortality are primarily related to the complications of prematurity, because the hemorrhage is maternal.*
<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Risk Factor Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>Recurrent abortions</td>
</tr>
<tr>
<td>Multiparity</td>
<td>Prior uterine surgery</td>
</tr>
<tr>
<td>Cocaine use</td>
<td>Advancing age (&gt; 35 years)</td>
</tr>
<tr>
<td>Erythroblastosis</td>
<td>Low socioeconomic status</td>
</tr>
<tr>
<td>Nonwhite ethnicity</td>
<td>Short interpregnancy interval</td>
</tr>
<tr>
<td>Infertility treatment</td>
<td>Multiple gestation (larger surface area of the placenta)</td>
</tr>
</tbody>
</table>
Placenta Previa

- The most characteristic event in placenta previa is painless hemorrhage.

- This usually occurs near the end of or after the second trimester.

- The initial bleeding is rarely so profuse as to prove fatal.

- It usually ceases spontaneously, only to recur.
Placenta Previa

- Placenta previa may be associated with *placenta accreta, placenta increta* or *percreta*.

- Coagulopathy is rare with placenta previa.
Placenta Previa

**Diagnosis.**

- Placenta previa or abruption should always be suspected in women with uterine bleeding during the latter half of pregnancy.

- The possibility of placenta previa should not be dismissed until appropriate evaluation, including sonography, has clearly proved its absence.

- The diagnosis of placenta previa can seldom be established firmly by clinical examination. **Such examination of the cervix is never permissible unless the woman is in an operating room with all the preparations for immediate cesarean delivery, because even the gentlest examination of this sort can cause torrential hemorrhage.**
Placenta Previa

- The simplest and safest method of placental localization is provided by *transabdominal sonography*.

- *Transvaginal ultrasonography* has substantively improved diagnostic accuracy of placenta previa.

- MRI

- At 18 weeks, 5-10% of placentas are low lying. Most ‘migrate’ with development of the lower uterine segment.
Placenta Previa Management

- Admit to hospital
- **NO VAGINAL EXAMINATION**
- IV access
- Placental localization
Placenta Previa Management

Severe bleeding → Resuscitate → Caesarean section

Moderate bleeding → Gestation → >34/52

Mild bleeding → Gestation

- <34/52 → Resuscitate Steroids → Unstable
- >36/52 → Conservative care
- <36/52 → Stable
Placenta Previa
Management

- Delivery is by Caesarean section
- Occasionally Caesarean hysterectomy necessary.
Uterine Rupture

- Incidence: 1/2000 deliveries

**Complete**
- All the 3 layers are involved

**Incomplete**
- Peritoneum remains intact
Uterine Rupture

- Classic presentation includes vaginal bleeding, pain, cessation of contractions, absence/deterioration of fetal heart rate, loss of station of the fetal head from the birth canal, easily palpable fetal parts, and profound maternal tachycardia and hypotension.

- Patients with a prior uterine scar should be advised to come to the hospital for evaluation of new onset contractions, abdominal pain, or vaginal bleeding.
Uterine Rupture

Most life-threatening emergencies in obstetrics

Associated with high maternal and peri-natal morbidity and mortality.

Uterine tenderness
Non-reassuring fetal heart patterns

Localized abdominal pain
Rapid onset of maternal hypovolemic shock
Uterine Rupture

Risk factors:
- Multiparity
- Previous uterine surgery
- Use of oxytocin
- Fetal malpresentation
Uterine Rupture

- Management: Emergent laparotomy
Vasa Previa

- Rarely reported condition in which the fetal vessels from the placenta cross the entrance to the birth canal.

- Incidence varies, but most resources note occurrence in 1:3000 pregnancies.

- Associated with a high fetal mortality rate (50-95%) which can be attributed to rapid fetal exsanguination resulting from the vessels tearing during labor.
There are three causes typically noted for vasa previa:

1. Bi-lobed placenta
2. Velamentous insertion of the umbilical cord
3. Succenturiate (Accessory) lobe
Vasa Previa
Vasa Previa

Risk Factors:

- Bilobed and succenturiate placentas
- Velamentous insertion of the cord
- Low-lying placenta
- Multiple gestation
- Pregnancies resulting from in vitro fertilization
- Palpable vessel on vaginal exam
Vasa Previa

Management:

- When vasa previa is detected prior to labor, the baby has a much greater chance of surviving.
- It can be detected during pregnancy with use of transvaginal sonography.
- When vasa previa is diagnosed prior to labor, elective caesarian is the delivery method of choice.
Kleihauer-Betke Test

- Is a blood test used to measure the amount of fetal hemoglobin transferred from a fetus to the mother's bloodstream.

- Used to determine the required dose of Rh immune globulin.

- Used for detecting fetal-maternal hemorrhage.
Apt test

- The test allows the clinician to determine whether the blood originates from the infant or from the mother.
  - Place 5 mL water in each of 2 test tubes
  - To 1 test tube add 5 drops of vaginal blood
  - To other add 5 drops of maternal (adult) blood
  - Add 6 drops 10% NaOH to each tube
  - Observe for 2 minutes
  - Maternal (adult) blood turns yellow-green-brown; fetal blood stays pink.
  - If fetal blood, deliver STAT.
Postpartum Hemorrhage
4 T’s RULE:

- **Tone** (uterine atony)
- **Thrombin** (coagulation disorder)
- **Tissue** (retained products)
- **Trauma** (cervical and genital tract damage during delivery)
Other risk factors

- Abnormal placentation
- Obesity
- Previous cesarean delivery
- Puerperal sepsis
Uterine Atony

- Lack of efficient uterine contractility after placental separation
- Risk factors:
  - Overdistended uterus
  - Polyhydramnios
  - Multiple gestation
  - Macrosomia
  - Unable to contract due to tocolytics
    - Or
    - General anesthesia
Abnormal placentation refers to abnormal attachment of the placenta to the uterine wall.
Abnormal Placentation + Uterine atony

> 1 litre of blood

most common cause of postpartum hysterectomy
<table>
<thead>
<tr>
<th>Prior CD</th>
<th>MFMU Accreta % (N=143)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0.2</td>
</tr>
<tr>
<td>One</td>
<td>0.3</td>
</tr>
<tr>
<td>Two</td>
<td>0.6</td>
</tr>
<tr>
<td>Three</td>
<td>2.1</td>
</tr>
<tr>
<td>Four</td>
<td>2.3</td>
</tr>
<tr>
<td>Five or More</td>
<td>6.7</td>
</tr>
</tbody>
</table>
Obstetric Trauma

Lacerations & Hematomas
- most common injuries at delivery

Advanced maternal age

Operative delivery

Breech presentation

Multiple gestation

Episiotomy
Obstetric Trauma

- No evidence of hemodynamic compromise
- Conservative management

- Small pelvic hematoma

- Surgical exploration, evacuation
- Ligation of vessels
- Avoid infection, septicemia, pressure necrosis, profuse hemorrhage.

- Large hematoma
Coagulopathy

- PPH can be the first indication of Von Willebrand’s disease (VWD).

- Less common, bleeding disorders associated with PPH include deficiencies in prothrombin, fibrinogen, and factors V, VII, X, and XI.
Prevention of Obstetric Hemorrhage
Avoidance of prolonged labor

Minimal trauma during assisted vaginal delivery

Detection and treatment of anemia during pregnancy

Identification of placenta previa by ante-natal ultrasound examination
Shock is a critical condition and a life threatening medical emergency.

Shock results from acute, generalised, inadequate perfusion of tissues; below that needed to deliver the oxygen and nutrients for normal function.

Prompt recognition and management can improve maternal and fetal outcome in obstetrical shock.
<table>
<thead>
<tr>
<th>Degree of Shock</th>
<th>Compensation</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss</td>
<td>500-1000 ml 10-15%</td>
<td>1000-1500 ml 15-25%</td>
<td>1500-2000 ml 25-35%</td>
<td>2000-3000 ml 35-45%</td>
</tr>
<tr>
<td>Blood Pressure Change</td>
<td>none</td>
<td>slight fall (80-100 mmHg)</td>
<td>marked fall (70-80 mmHg)</td>
<td>profound fall (50-70 mmHg)</td>
</tr>
<tr>
<td>(systolic pressure)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptoms and Signs</td>
<td>palpitations</td>
<td>weakness</td>
<td>restlessness</td>
<td>collapse</td>
</tr>
<tr>
<td></td>
<td>dizziness</td>
<td>sweating</td>
<td>pallor</td>
<td>air hunger</td>
</tr>
<tr>
<td></td>
<td>tachycardia</td>
<td>tachycardia</td>
<td>oliguria</td>
<td>anuria</td>
</tr>
</tbody>
</table>
A high index of suspicion and physical signs of inadequate perfusion and oxygenation are the basis of initiating prompt treatment.

Initial management does not rely on knowledge of the underlying cause.

There are no laboratory tests for shock.

Basic investigations should be sent e.g. Hb, BT, CT, PCV. Blood for grouping and cross matching, FB Sugar, routine urine analysis.
MANAGEMENT OF PPH

Call For Help!!

**Step 1**
Initial Assessment and Treatment

**Resuscitation**
- large bore IV (s)
- oxygen by mask
- monitor BP, P, R, U/O
  +/- catheter
  +/- oxygen saturation

**Assess Etiology**
- explore uterus (tone, tissue)
- explore LGT (trauma)
- review history (thrombin)
- observe clots

**Laboratory Tests**
- CBC
- coagulation screen
- group and cross
First line management
Volume replacement

**Fluid**
- Crystalloids
- Colloids

**Blood:**
- Blood once available.
- 'O' Rh-negative or group specific blood if life threatening blood loss.

**Coagulopathy**
- Fresh frozen plasma if PT/APTT > 1.5× normal.
- Cryoprecipitate if fibrinogen < 1 g/L.
- Platelet concentrates if platelet level < 50×10⁹/L
MANAGEMENT OF PPH

Step 2
Directed Therapy

"Tone"
- massage
- compress
- drugs

"Tissue"
- manual removal
- curettage

"Trauma"
- correct inversion
- repair laceration
- identify rupture

"Thrombin"
- reverse
- antiacoagulation
- replace factors
MANAGEMENT OF PPH

Step 3
Intractable PPH

Get Help
- obstetrician/surgeon
- anaesthesiologist
- lab and ICU

Local Control
- manual compression
  +/- pack uterus
  +/- vasopression
  +/- embolization

BP and Coagulation
- crystalloid
- blood products
Role of Tranexamic Acid.

- The use of TXA in women with PPH decreases blood loss and maternal morbidity.

*High-dose tranexamic acid reduces blood loss in postpartum haemorrhage.* Crit Care 2011;15(2):R117

The initial dose is a slow IV bolus of 1g followed by a further 1g 4 hours later.
Role of Tranexamic Acid

- Blood loss
- Bleeding duration
- Progression to severe PPH
- Need for oxytocin administration in women undergoing cesarean delivery
A. CELL SALVAGE

- Auto transfusion with salvaged red cells avoids the hazards of homologous transfusion. Blood is removed from operative site through heparinised suction tubing and a filter collecting reservoir and processed by washing and centrifugation to remove contaminating debris.

- The resulting RBC have a haematocrit of 55-80% and can be returned to patient quickly.

- The risk of amniotic fluid is obviously a concern. Use of separate suction for amniotic fluid and leukocyte depletion filter has been found in...
Disadvantages of salvaged cell transfusion-

1. Units have capital and maintenance cost.
2. Staff require training and regular CME/workshops to update itself.
3. Technique is of no use in PPH as faecal and urine contamination with blood.
Recombinant factor VIIa (Novoseven®)

- Treatment of uncontrolled obstetric hemorrhage
- Promote clotting in open vessels. Effectiveness diminished by hypothermia, acidosis

Given in a dose of 90 mcg/Kg every 3 hrs for a maximum of 9 doses
Correction of electrolyte imbalance include:

- Hyperkalemia (transfused blood)
- Hypocalcemia (chelated by the citrate found in transfused FFP)
Oxytocin

Acts within 2-3 minutes; Effect lasts about 15 – 30 min

- Give slowly: Do NOT give as an IV bolus
- Causes vasodilation and may be especially harmful in the hemodynamically unstable patient.

- Dose and Route: IV: Infuse 20 -30 units in 1 L IV fluids at 60 drops per minute.

Ergometrine

* Causes nausea, vomiting, headache
* May precipitate severe hypertension

Avoid in PRE-ECLAMPSIA

Typical dose of 500 mcg can be given either intravenously (slowly) or intramuscularly
Prostaglandin F2 Alpha (e.g. Carboprost)

- 0.25 mg dose can be given intramuscularly, repeated to a total dose of 2 mg

- Side effects include:
  - Hypertension
  - Pulmonary hypertension
  - Bronchospasm

- Intramyometrial administration has a more rapid onset but is an ‘off-label’ use.

Use with caution in asthmatic patients
Misoprostol

- A prostaglandin E1 analogue
- Often overlooked but can prove useful in combination with the other uterotonic agents
- Can be used rectally, orally or sublingually
- The recommended dose is 800 mcg.
- Shivering and transient elevated temperature is common.
Failure to control bleeding...

Invasive procedures must be performed
MANAGEMENT OF PPH

Step 4
Surgery

- Repair Lacerations
- Ligate Vessels
  - uterines
  - internal iliac artery
  - ovarians
- Hysterectomy
MANAGEMENT OF PPH

Step 5
Post Hysterectomy Bleeding

Abdominal Packing  Angiographic Embolization
Surgical Management

- Provide hydrostatic intra-uterine balloon tamponade:
  - Bakri tamponade balloon
  - Rusch urological balloon
  - Sengstaken-Blakemore tube.
Surgical Management

- Perform a uterine compression suture (e.g. B-Lynch suture).
Figure 1  Ligation of the anterior branch of the internal iliac artery with its associated vein. 
(a) Demonstrable vulnerability of internal iliac vein and obturator nerve in close proximity; (b) A ‘skeletal’ anatomy, showing proximity of external iliac artery, ureter and anterior branches of sciatic nerve.
Surgical Management

- Perform a peripartum hysterectomy.
RADIOLOGICAL MANAGEMENT
RADIOLOGICAL MANAGEMENT

- Requires the mother to be stable enough to be transferred to a radiology suite

- **Embolisation** requires fluoroscopic guidance and Availability of an interventional radiologist with appropriate facilities and team.
RADIOLOGICAL MANAGEMENT

- May potentially reduce blood loss
- Minimal impact on future fertility

- Adverse fetal & maternal outcomes
Evaluation of response

- Monitor pulse, blood pressure, blood gas status, & acid-base status ± monitoring central venous pressure.

- Measure urine output using an indwelling catheter

- Order regular FBC counts and coagulation tests to guide blood component therapy
Secondary PPH

- Infection
- Retained placenta
- Trophoblastic disease
- Antibiotics
- Evacuation of retained products if bleeding persistent or significant amount of tissue retained.
THANK YOU