Postpartum haemorrhage (PPH)

- Blood loss more than 500 mL at the time of vaginal delivery or more than 1000 mL following cesarean delivery.
- Leading cause of maternal mortality
- 3% of all births
- Major obstetrics emergency

Types

- Immediate (primary): within first 24 hours of delivery
- Delayed (secondary): after 24 hours of delivery

Etiology

- Uterine atony
- Retained placental tissues.
- Genital tract lacerations
- Consumptive or dilutional coagulopathy
- Uterine inversion
- Uterine rupture
Uterine atony

- 75-80% of PPH
- Failure of myometrial muscles contractions

**Factors Predisposing to Postpartum Uterine Atony**

- History of postpartum hemorrhage
- Prolonged labor
- Grand multiparity (a parity of 5 or more)
- Overdistention of the uterus
- Multiple gestations
- Polyhydramnios
- Fetal macrosomia
- Oxytocin augmentation of labor
- Precipitous labor (one lasting <3 hr)
- Magnesium sulfate treatment of pre eclampsia
- Chorioamnionitis
- Halogenated anesthetics
- Uterine leiomyomata
- Vitamin D deficiency
- Genetic and epigenetic factors (maternal, environmental, and fetal)

**Prevention:**
- Identify risk factors and anticipate
- Active management of 3rd stage of labor
- Uterine massage

Uterine atony

- Management
  - Call for help
  - Cross match blood and 2 large IV canal
  - Uterine massage & bimanual compression
  - Uterotonic agents: Oxytocin, ergometrine, prostaglandin F2α
  - Uterine artery embolization
  - Internal iliac artery ligation
  - Hystectomy

Genital tract lacerations

- 2nd most common cause of PPH
- suspect if uterus is well contracted
- EUA or good analgesia
Retained placental tissues

- Secondary PPH
- Subonvolution
- US if stable

Uterine inversion
Uterine rupture
Amniotic fluid embolism
Coagulopathy

Disseminated intravascular coagulopathy (DIC)

During pregnancy
- Pregnancy is a prothrombotic state (hypercoagulable)
- Total protein S, free protein S, and protein S activity decrease due to the hormonal changes of pregnancy.
- Resistance to activated protein C increases in the second and third trimesters.
- Fibrinogen, factors II, VII, VIII, X, XII, and XIII increase by 20 to 200%.
- Von Willebrand factor increases.
- Activity of the fibrinolytic inhibitors, thrombin activatable fibrinolytic inhibitor (TAFI), PAI-1, and PAI-2, increases. PAI-1 levels increase markedly.
- Antithrombin, protein C, Factor V and Factor IX levels remain unchanged or increase slightly
- Net effect of these changes is to increase the tendency for thrombus formation and extension
Pathophysiology

Clinical findings

- Bleeding: severe bleeding (e.g., vaginal, intrauterine, intraabdominal) and/or diffuse oozing of blood from skin (at intravenous sites) or mucosa (from a bladder catheter)
- Shock (tachycardia, hypotension, weak peripheral pulses, altered mental status, cool extremities, narrow pulse pressure <25 mmHg)
- Dyspnea, hemoptyis
- Acute renal failure

Management

- Identify underlying cause
- Transfusion treatment:
  - FFP 6 units
  - PRBC 6 units
  - Platelet
  - Cryoprecipitate 10 units
- Massive transfusion protocol

Pregnancy related causes of DIC

- Abruptio placentae
- Severe preeclampsia, eclampsia, or HELLP syndrome
- Amniotic fluid embolism
- Acute fatty liver of pregnancy
- Dead fetus syndrome
- Septic abortion
- Massive hemorrhage, which may be a consequence of disorders such as placenta previa, uterine rupture, placenta accreta, or postpartum uterine atony
<table>
<thead>
<tr>
<th>Product (mL)</th>
<th>Contents</th>
<th>Uses and effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC (1 unit = 350 mL)</td>
<td>Red cells</td>
<td>One unit increases hematocrit by 3% and hemoglobin by 1 g/dL.</td>
</tr>
<tr>
<td>Frozen plasma (1 unit = 200 to 300 mL)</td>
<td>All clotting factors, but no platelets</td>
<td>One unit FFP increases fibrinogen by 7 to 10 mg/dL.</td>
</tr>
<tr>
<td>Cryoprecipitate (1 unit = 10 to 20 mL)</td>
<td>Fibrinogen, factors VIII, XIII, VWF</td>
<td>total of 10 units), which will raise plasma fibrinogen by 70 mg/dL.</td>
</tr>
<tr>
<td>Platelets (1 unit = 50 mL)</td>
<td>Platelets</td>
<td>platelet count by approximately 30,000/ microL.</td>
</tr>
</tbody>
</table>

Questions?