Anaesthetic Management of Bleeding Obstetric Patient

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According to the latest UN Report “Globally an estimated 287,000 women died in pregnancy and childbirth in 2010 and India accounting for nearly 19% (56,000) “. The report said every ten minutes a woman dies of pregnancy-related complications like severe bleeding after childbirth(38%), infections(11%), high blood pressure during pregnancy (5%), unsafe abortion(8%) and Other Condition (34%) in our country. And our Maternal Mortality Ratio (MMR) has declined to 212 in 2007-2009 as against 254 in 2004-2006, recording a fall of 42 points or 17 per cent, as per latest results of the Sample Registration Survey (SRS). The latest figure of MMR in South India is Kerala- 81, Tamilnadu-97, Andhra Pradesh -134 and Karnataka -178. Anaesthesiologist plays a pivotal role in reducing the mortality rate.

There are many reasons for Bleeding in Obstetric patients. They can be broadly classified into broad four categories

1. Bleeding in early pregnancy
2. Antipatum Haemorrhage
3. Post partum Haemorrhage
4. Non obstetric cause of bleeding during Pregnancy

(In this lecture notes I have confide to Antipatum Haemorrhage and Post partum Haemorrhage)

Postpartum Haemorrhage (PPH)

Quite often PPH is life threatening and it is the major cause of maternal mortality world wide and it occurs nearly in 5% of the deliveries. In our country (India) out of estimated 25 million deliveries 18 million deliveries take place in peripheral centers where perinatal care is poor or nonexistent. There fore we should move on a war footing to reduce the MMR.

World Health Organization definition of primary PPH encompasses all blood losses over 500ml.
Factors predisposes to PPH

- Multiple gestation
- Macrosomia
- Polyhydramnios
- Abruption of placenta
- Adherent Placenta
- Foetal death
- High parity
- Prolonged labor
- Chorioamnionitis
- Precipitous labor
- Augmented labor
- Uterine Myoma
- High concentration of a volatile halogenated anesthetic agent
- Instrumental delivery

The Causes of PPH may be Primary or Secondary. Primary PPH occurs within 24 hours. Secondary PPH occurs from 24 hours to 6 weeks.

Primary PPH Causes

- Uterine atony
- Injury in Genitaltract
- Retained product
- Abnormal placenta
- Coagulopathies
- Inversion of the Uterus

Secondary PPH

- Retained product
- Infection
- Subinvolution
- Anticoagulant

Management of PPH

The management depends upon the clinical status. The patient may fall into any one of the categories. Rapid clinical assessment and treatment should be started without delay as per the protocol laid by the Institute.
<table>
<thead>
<tr>
<th>Haemorrhage Class</th>
<th>Acute Blood loss</th>
<th>Blood loss in %</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>500-1000ml</td>
<td>10-15%</td>
<td>Asymptomatic or Tachycardia</td>
</tr>
<tr>
<td>II</td>
<td>1000-1500ml</td>
<td>15-25%</td>
<td>Orthostatic hypotension or Supine Hypotension</td>
</tr>
<tr>
<td>III</td>
<td>1500-2000ml</td>
<td>25-35%</td>
<td>Marked Tachycardia/Tachypnea/Hypotension</td>
</tr>
<tr>
<td>IV</td>
<td>&gt;2000ml</td>
<td>&gt;35%</td>
<td>Shock/Air hunger/Oliguria/Anuria</td>
</tr>
</tbody>
</table>

Many cases of PPH have no identifiable risk factors. So prevention of PPH is wiser.

- Active management of the third stage of labour lowers maternal blood loss and reduces the risk of PPH.
- Prophylactic oxytocics should be offered routinely in the management of the third stage of labour in all women as they reduce the risk of PPH by about 60%.
- For women without risk factors for PPH delivering vaginally, oxytocin (5 iu or 10 iu by intramuscular)
- For women delivering by caesarean section, oxytocin (5 iu by slow intravenous injection) should be used
- Methyl ergometrine may be used in the absence of hypertension but increases vomiting.
- Misoprostol is not as effective as oxytocin but it may be used when the latter is not available
- All women who have had a previous caesarean section must have their placental site determined by ultrasound. Where facilities exist, magnetic resonance imaging (MRI) may be a useful tool and assist in determining whether the placenta is accreta or percreta.
- Women with placenta accreta/percreta are at very high risk of major PPH. If placenta accreta or percreta is diagnosed antenatally, there should be consultant-led multidisciplinary planning for delivery.
- Consultant obstetric and anaesthetic staff should be present, prompt availability of blood, fresh frozen plasma and platelets
- Access to intensive care.
- Available evidence on prophylactic occlusion or embolisation of pelvic arteries in the management of women with placenta accreta is equivocal. The outcomes of prophylactic arterial occlusion require further evaluation.
Management of PPH

Once PPH has been identified, management involves four components, all of which must be undertaken simultaneously

- Communication
- Resuscitation,
- Monitoring and investigation,
- Arresting the bleeding.

**Prompt and Precise Communication mandatory**

- Call obstetric middle grade and alert consultant.
- Call anaesthetic middle grade and alert consultant
- Experienced Nurse.
- Alert consultant clinical haematologist on call.
- Alert blood transfusion laboratory.
- Call ward boys.
- Alert one member of the team to record events, fluids, drugs and vital signs.

**Resuscitation,**

- A high concentration of oxygen (10–15 litres/minute) via a facemask should be administered, regardless maternal oxygen concentration.

- If intubation necessary do not postpone.

- Establish two 16-gauge intravenous lines;

- 20 ml blood sample should be taken and sent for diagnostic tests,
- including full blood count, coagulation screen, urea and electrolytes and cross match (4 units).

- Position flat.

- Keep the patient warm using appropriate available measures.

- Until blood is available, infuse up to 2.5 litres of warmed crystalloid

- or Colloid (1–2 litres) as rapidly as required.

- Transfuse blood as soon as possible.

  Further Fluid and Blood Transfusion depends upon patient response and clinical situation. Usually the blood loss is Under estimated. If crystalloid is infused three times the lost blood volume and if colloids are used same of lost blood volume to be infused till blood is available. Over enthusiastic fluid replacement especially in patients associate with comorbid conditions may lead to over infusion and dilutional coagulopathy.
Monitoring

- CVP - provides a means of accurate central venous pressure monitoring but also a route for rapid fluid replacement. Do not venture if the person is not adequately trained
- NIBP /Arterial line pressure monitoring
- Oxygen saturation and Blood gas and electrolytes
- Coagulation Profiles-prothrombin time, thrombin time, partial thromboplastin time and fibrinogen assay.

- Hourly urine output
- Temperature

Arresting of bleeding.

Causes for PPH may be considered to relate to one or more of ‘the four Ts’:
_ Tone (abnormalities of uterine contraction)
_ Tissue (retained products of conception)
_ Trauma (of the genital tract)
_ Thrombin (abnormalities of coagulation).

When uterine atony is perceived to be a cause of the bleeding, the following mechanical and pharmacological measures should be instituted, in turn, until the bleeding stops:

- Bimanual uterine compression (rubbing up the fundus) to stimulate contractions.
- Syntocinon 5 units by slow intravenous injection (may have repeat dose).
- Ergometrine 0.5 mg by slow intravenous or intramuscular injection (contraindicated in women with hypertension).
- Carboprost 0.25 mg by intramuscular injection repeated at intervals of not less than 15 minutes to a maximum of 8 doses (contraindicated in women with asthma).
- Direct intramyometrial injection of carboprost 0.5 mg (contraindicated in women with asthma),
- Misoprostol 1000 micrograms rectally.

If pharmacological measures fail to control the haemorrhage, initiate surgical haemostasis depending on clinical circumstances and available expertise:

- Balloon tamponade
- Haemostatic brace suturing (such as using procedures described by B-Lynch or modified compression sutures)
- Bilateral ligation of uterine arteries
- Bilateral ligation of internal iliac (hypogastric) arteries
- Selective arterial embolisation.
- Hysterectomy
**Blood transfusion**

The main therapeutic goals of management of massive blood loss is to maintain:
- Haemoglobin > 8g/dl
- Platelet count > 75 x 109/l
- Prothrombin < 1.5 x mean control
- Activated prothrombin times < 1.5 x mean control
- Fibrinogen > 1.0 g/l.

Fully cross matched blood is the ideal. If it is unavailable by the time 3.5 litres of clear fluid have been infused, the best available alternative to restore oxygen-carrying will be O RhD-negative blood.

**Blood Product**

Packed Red blood cells Increase the oxygen carrying capacity of Blood. One unit raise the Hb by 1gram%

Dilution of coagulation factors and hypothermia may lead to coagulopathy independent to DIC of pregnancy related problems.

Fresh frozen plasma contain all coagulation factors and it is indicated in coagulopathy and it is to be transfused prophylactically in massive blood transfusion at a rate of one unit for every 4 PRBC.

Cryoprecipitate in bleeding patient with fibrinogen level less than 80 to 100mg/dl

Platelet are indicated when the level less than 50000/cu.mm.

rFVII- Although the case reports suggested that rFVIIa reduced bleeding, 30 of the 65 women underwent peripartum hysterectomy and particular caution is required in interpreting data from uncontrolled case reports. In the face of life-threatening PPH rFVIIa may be used as an **adjuvant to standard pharmacological and surgical treatments**. A suggested dose is 90 micrograms/kg, which may be repeated in the absence of clinical response within 15–30 minutes. Although there is no clear evidence of thrombosis with the use of rFVIIa in obstetric practice.

Intraoperative cell salvage is accepted, but practical availability will be rare.

**Anaesthetic management**

The primary role of anaesthetist to initiate and continue resuscitation to restore intravascular volume and provide adequate anaesthesia for surgical procedure.

When there is continuous bleeding and the cardiovascular stability is compromised, general anaesthesia is the choice. Rapid sequence induction is the gold standard to reduce the risk of aspiration. Ketamine or etomidate can be the choice induction agent.
anaesthetics will relax the uterus and cause vasodilation and further compromise the haemodynamic status. Fentanyl and medazolem will be a better alternative. Ventilation with high oxygen concentrations may be needed until the bleeding is under control. Atonic PPH during cesarean delivery under neuraxial block should be converted to general anaesthesia for better ventilation, anaesthesia and comfort for the patient.

If cardiovascular stability has been achieved and if there is no evidence of coagulation failure, regional anaesthesia can be used. This may be particularly appropriate where a working epidural has been in place during labour.

**Injury in Genitaltract**
Depending upon the injury and the haemostatic status the anaesthetic technique should be chosen. Many time with haematoma pudental block is difficult. Neuraxial block or single shot ketamine is enough. If the procedure is going to be lengthy with haemodynamic unstability general anaesthesia is mandatory.

**Retained placenta**
Retained product with hypotension is not urgent. Hypotension should be appropriately corrected before the procedure. Then with 1.5 MAC of Sevoflurane or Isoflurane relax the uterus for manual removal and uterine tone will be regained quickly after cessation of the drug. Nitroglycerine has 1-3 min plasma half life and it has been successfully used with out hypotension in case of manual removal.

**Adherent placenta**
Adherent placenta is of Three types
Placenta accreta vera is defined as adherence to the myometrium without invasion of—or passage through—uterine muscle.
Placenta increta represents invasion of the myometrium.
Placenta percreta includes invasion of the uterine serosa or other pelvic structures.
Antenatal diagnosis of placenta accreta has Improved by ultrasound and MRI imaging
The incidence is high in low lying placenta and in previous cesarean
Following precautions to be taken
- Shift the patient to higher center
- The patient should be counseled about the likelihood of hysterectomy
- Blood products, including clotting factors, should be available.
- Preoperative internal iliac artery balloon placement especially in Placenta percreta

**Uterine inversion**
The reported incidence of inversions is 1 in 5000 to 1 in 10,000 pregnancies. Uterine atony blood loss and shock will be associated with inversion. Uterus has to be replaced immediately and the tone of the uterus should be maintained with uterotonics. Resuscitation with fluid, blood and oxygen is inevitable. General anesthesia with halogenated volatile agents relaxes the uterus and aids in restoring to normal place. Terbutaline, magnesium sulfate and sublingual nitrate has been used to reduce the tone of the uterus.


**Antepartum haemorrhage**

Antepartum hemorrhage is a relatively frequent problem, occurring in 5% to 6% of pregnant women. Antepartum hemorrhage of unknown origin does produce more premature labor and delivery and subsequently, more fetal and neonatal problems. The most common causes are placenta previa and placental abruption.

**Placenta previa**

The incidence of placenta previa is 3.6 per 1000 pregnancies. The types of placenta previa are

- Total placenta previa completely covers the cervical os.
- Partial placenta previa covers part but not all of the cervical os.
- Marginal placenta previa lies lose to, but does not cover, the cervical os.

The classic sign of placenta previa is painless vaginal bleeding during the second or third trimester. The first episode of bleeding typically occurs preterm.

Conditions associated with placenta previa include

- Multiparity,
- Advanced maternal age,
- Previous cesarean delivery
- Other uterine surgery, and
- Previous placenta previa.

The presence of placenta previa increases the likelihood that the patient will require a peripartum hysterectomy.

Tocolytic therapy like ritodrine was associated with a clinically significant delay in delivery and an increase in birth weight but did not reduce the frequency or severity of recurrent vaginal bleeding. Tocolytic therapy is of no value for patients with uncontrolled hemorrhage or those in whom placental abruption is suspected.

The plan of anaesthetic technique as per the clinical situation.

- Planned for elective Cesarean with full term or preterm foetus
- One or more episode of bleeding with foetal distress
- Life threatening bleeding

In modern obstetric practice with ultrasound techniques the need for double set up examination rarely required.

Neuraxial block can be performed when there is no history of bleeding and haemodynamic stability is assured. Patients who have placenta previa—without active preoperative
Bleeding has a risk of increased intraoperative blood loss due to
1. Cutting into an anteriorly located placenta during uterine incision.
2. After delivery, the lower uterine segment implantation site does not contract.
3. A patient with placenta previa is at increased risk for placenta accreta, especially if there is a history of previous cesarean delivery.

If above situation is anticipated or haemodynamic unstable, general anaesthesia is mandatory.

**Placental Abruption**

Placental abruption is defined as complete or partial separation of the placenta from the decidua basalis before delivery of the fetus. Maternal hemorrhage may be revealed by vaginal bleeding or may be concealed behind the placenta. Fetal compromise occurs because of the loss of placental surface area for maternal-fetal exchange of oxygen and nutrients. The incidence is 0.4% to 1.0% of pregnancies.

**Presentation**

May of vaginal bleeding, uterine tenderness, increased uterine activity, preterm labor, fetal bradycardia, or loss of variability. In cases of concealed abruption, vaginal bleeding may be absent, and a gross underestimation of maternal hypovolemia can occur. Ultrasonography is a useful guide.

The major complications of placental abruption are

- Hemorrhagic shock,
- Acute renal failure (ARF),
- Coagulopathy
- Foetal loss.

The obstetric and anaesthetic management should be focused towards it.

Epidural analgesia for vaginal delivery is highly controversial since coagulopathy and hypotension may occur in the course of labour. So an experienced team under close monitor can only perform.

General anesthesia is preferred for most cases of urgent cesarean with a foetal distress pattern. Severe hypotension after the administration of sodium thiopental or Propofol can occur in concealed haemorrhage. Ketamine is the choice. Aggressive volume resuscitation with crystalloid and colloid with central line preferably in the cubital area is ideal if coagulopathy is suspected. Blood and blood product to be given as per the coagulation profile and they should be treated in high dependency unit.

Life-threatening bleeding during pregnancy should be managed by a dedicated team. Every hospital should have a protocol, mock drill and confidential audit to reduce the MMR rate with in reasonable number.