Obstetric emergencies and anaesthia

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KIMS ,NARKETPALLY.

Obstetric emergencies

- *life threatening to the mother-to-be, the fetus or both.*
- bleeding can be catastrophic, and timely intervention is important.

The anesthesiologist play an important role in resuscitation and management of the situation.

:

Obstetric patient is different from non-obstetric patient because it involves

- Two lives with different physiology
- Maternal pharmacokinetics are different in pregnancy and they affect uteroplacental circulation & fetus
- Positional changes in the mother cause radical changes in hemodynamics
- Every parturient is a high risk patient with altered physiology and pharmacokinetics and dynamics. difficult airway, increased risk of aspiration , increased oxygen consumption and decreased FRC makes them vulnerable to hypoxia.

- ***Anesthesiologist plays a major role in managing these emergencies.***
- ***He will play an important role in***:

- Establishing airway control
- Establish intravenous access
- Guide fluid resuscitation and blood component therapy
- Diagnose and treat life-threatening conditions
- Transport critically ill patient
- Monitor & manage patient in ICU
- Administration of anaesthesia for definitive surgical procedure

- As soon as the patient arrives in emergency department, after ascertaining ABC, large bore venous access should be secured and blood samples should collected for investigations .detailed history, clinical examination should be undertaken
- *Monitoring*: includes Pulse rate, rhythm and volume, respiratory rate, noninvasive blood pressure, ECG, urine output, Temperature.
- Invasive monitoring is required in patients where precise hemodynamic data can improve decision making.

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Indications for Central venous line are

- Measurement of CVP
- Administration of vasoactive drugs
- When no peripheral veins are available

Intra arterial line is needed:

- When accurate and frequent blood pressure monitoring is needed
- Hypertensive crisis
- Patients with circulatory collapse
- Frequent ABG and other blood tests are required.

Requirements for managing obstetric emergencies:

- Airway and intubation equipment including LMA ,Intubating LMA, combitube ,fibreoptic bronc
- Anaesthesia drug cart with all resuscitation drugs and defibrillator
- Monitoring equipment –noninvasive & invasive
- Anaesthesia machine with ventilator
- Rapid infusion system

Obstetric Hemorrhage

- Major obstetric hemorrhage remains the leading cause of maternal mortality and morbidity worldwide
- Maternal physiology is well prepared for hemorrhage, with an increase in blood volume of approximately 1to 2 L (estimated blood volume = 6 L), a hypercoagulable state, and the "tourniquet' effect of uterine contractions on the blood vessels.
- Maternal response to bleeding can be misleading because vital signs may remain near normal until more than 30% of blood volume is lost, and tachycardia can be attributed to pregnancy, stress, pain, and delivery.
- Pregnant women also have an increased susceptibility to develop disseminated intravascular coagulopathy.

CLASS	Acute blood loss	%of blood loss	Clinical finding
1	<1000ml	15	none
2	1200-1500	15-25	Orthostatic bp change,puls pressure<30mm hg
3	1500-2000	25-30	Cold extremities, tachycardia,tachypnoea,Hypotension
4	>2000	>35	Profound shock, altered sensorium,non-recordable blood pressure

- Causes of maternal hemorrhage are classified by their timing of occurrence.
- Causes of antepartum hemorrhage (5% of pregnancies) include placenta previa, abruptio placenta, and uterine rupture.
- Postpartum hemorrhage (10% of deliveries) can be defined as a blood loss after delivery of more than 500 mL, any amount of blood loss that threatens the woman's hemodynamic stability, or a 10% decrease in hematocrit from admission.

Placental Abruption

the separation of the normally implanted placental bed from the decidua basalis before delivery of the fetus.

- The classic presentation is that of vaginal blood loss, uterine tenderness, and increased uterine activity.
- Associated conditions are hypertension (chronic or PIH), premature rupture of membranes, previous abruption, high parity, smoking, cocaine abuse, trauma, and decompression of polyhydramnios.
- The fetal status, the maternal hemodynamics, and the coagulation status correlate with the degree of placental separation.

- Hemorrhage may be obvious or concealed (up to 2.5 L), usually associated with fetal death) A large, concealed retroplacental hematoma, resulting in dangerous underestimation of the true blood loss.
- A concealed hematoma increases intrauterine pressure, and amniotic debris may be forced through open venous sinuses, provoking disseminated intravascular coagulopathy (10%).
- Blood infiltrating the myometrium may result in a “Couvelaire” uterus, preventing adequate uterine contraction even following delivery.

- If abruption is suspected blood should be drawn immediately for Hb/Hct, platelet count, fibrinogen and fibrin split products as well as type and cross match .
- Anesthetic management depends on severity of situation.
- If FHR tracing is reassuring, there is not ongoing blood loss, maternal hypovolemia or coagulopathy, regional anaesthesia may be employed.
- Once delivery is accomplished and hemorrhage is controlled, coagulation should return to normal within hours, .

Placenta previa

- ***when placental implantation takes place in the lower segment of the uterus in front of the fetal presentation***.
- It varies in degree and may be total, partial, or marginal.
- Risk factors include prior placenta previa, uterine scar, advanced maternal age, and multiparty.
- Placenta previa accounts for one third of antepartum bleeding which is the result of placental separation during cervical dilatation and lengthening of the lower uterine segment.
- An elective cesarean section is planned as soon as the fetus reaches maturity. With massive blood loss and a hemodynamically unstable mother, cesarean section under general anesthesia is the best way to deliver the infant and stabilize the mother.
- Postpartum hemorrhage may occur when the surgical incision goes through an anterior placenta.

Placenta accrete

- ***an abnormal implantation of the placenta in the uterine wall***
- ***three types***:
- (1) accreta vera, in which the placenta adheres to the myometrium without invasion into the muscle,
- (2) increta, in which it invades into the myometrium, and
- (3) percreta, in which it invades the full thickness of the uterine wall and possibly other pelvic structures, most frequently the bladder.
- .

- After delivery, the placenta does not completely separate and severe, life-threatening blood loss may result.
- In a patient with a previous cesarean section and a placenta previa, the risk of accreta is 14% to 24%; this risk increases for a patient with two (23%) or three (47%) previous cesarean sections.
- Unfortunately, most cases of placenta increta and percreta require a hysterectomy.
- General anesthesia may be safer when an antenatal diagnosis of placenta increta or percreta is made.
- Aggressive resuscitation is required for massive hemorrhage

Uterine rupture

- Uterine rupture involves separation of the old incision with possible extension and rupture of the fetal membranes, with either all or part of the fetus extruded into the peritoneal cavity.
- The incidence of uterine rupture has increased from less than 1% to 3% in the last 10 years because of the increased incidence of vaginal birth after cesarean .
- The most common sign of uterine rupture is a nonreassuring fetal heart rate pattern, with variable decelerations that may evolve into late decelerations, bradycardia, and loss of fetal heart rate.
- Severe abdominal pain is rarely a presenting symptom
- General anesthesia is mandatory for cases with fetal compromise or maternal hemodynamic instability

Uterine inversion

- An atonic uterus and an open cervix allow the uterus to "turn inside out" through the birth canal.
- Fundal pressure and inappropriate traction on the umbilical cord to hasten placental delivery contribute to uterine inversion.
- Administration of general anesthesia (with endotracheal intubation and a volatile halogenated agent) is the most proven method for producing the uterine relaxation needed for reduction of the inversion.
- Nitroglycerin may be tried Fluid resuscitation should take place at the same time. Once the uterus is replaced, all medications that cause uterine relaxation should be stopped.
- Uterotonic treatment should be started to prevent uterine atony.

Postpartum hemorrhage

- Primary PPH is defined as blood loss of greater than 500 mL within 24 hours of delivery and affects about 5% of deliveries.
- Causes of early postpartum hemorrhage (first 24 hours) include uterine atony, genital lacerations, retained placenta, and uterine inversion.
- The causes of postpartum hemorrhage can be thought of as the four Ts: tone, tissue, trauma, and thrombin.
- Parturients with antepartum hemorrhage are also at risk for postpartum bleeding

Uterine atony

- Uterine atony is the leading cause of PPH ,it presents as painless continuous bleeding, often developing slowly at the beginning.
- Blood can be concealed in the uterus and not exteriorized until external compression of the uterine fundus is performed.
- Prevention relies on active management of the third stage of labor plus slow prophylactic injection of oxytocin (5–10 IU) when the anterior shoulder is delivered or right after placenta delivery .
- Treatment is based on bladder emptying and oxytocin (10–20 IU ±uterine massage) and then be followed by rapid implementation of prostaglandin treatment if bleeding still persists.

Cervical/vaginal lacerations:

- This is the third cause of PPH (roughly 10% of cases), and it is more likely to occur after instrumental extraction, fetal macrosomia, or quick labor and delivery before full cervical dilation.
- It is made by performing a thorough examination of the vagina and cervix under perfect analgesia/anesthesia

Retained placenta:

- Retained placental fragments are a leading cause of early and delayed postpartum hemorrhage. Treatment is manual removal.
- General anesthesia with any volatile agent (1.5–2 minimum alveolar concentration (MAC)) may be necessary for uterine relaxation.
- Nitroglycerin, 50 to 250 mg intravenously or two puffs (800 mg) inhaled

Coagulation disorders:

- Coagulation disorders can be the cause or the consequence of PPH.

Resuscitation:

Priorities of treatment are

- Restoration of blood volume to maintain tissue perfusion and oxygenation.
- Achieving homeostasis by:

  By treating any surgical source of bleeding

  Correcting coagulopathy by judicious use of blood component therapy

- A successful outcome requires prompt action and good communication between clinical specialities, diagnostic labs and blood bank staff
- Restoration of circulating blood volume is initially achieved by rapid infusion of crystalloids and colloids through large bore cannulae.

Transfusion therapy and resuscitation

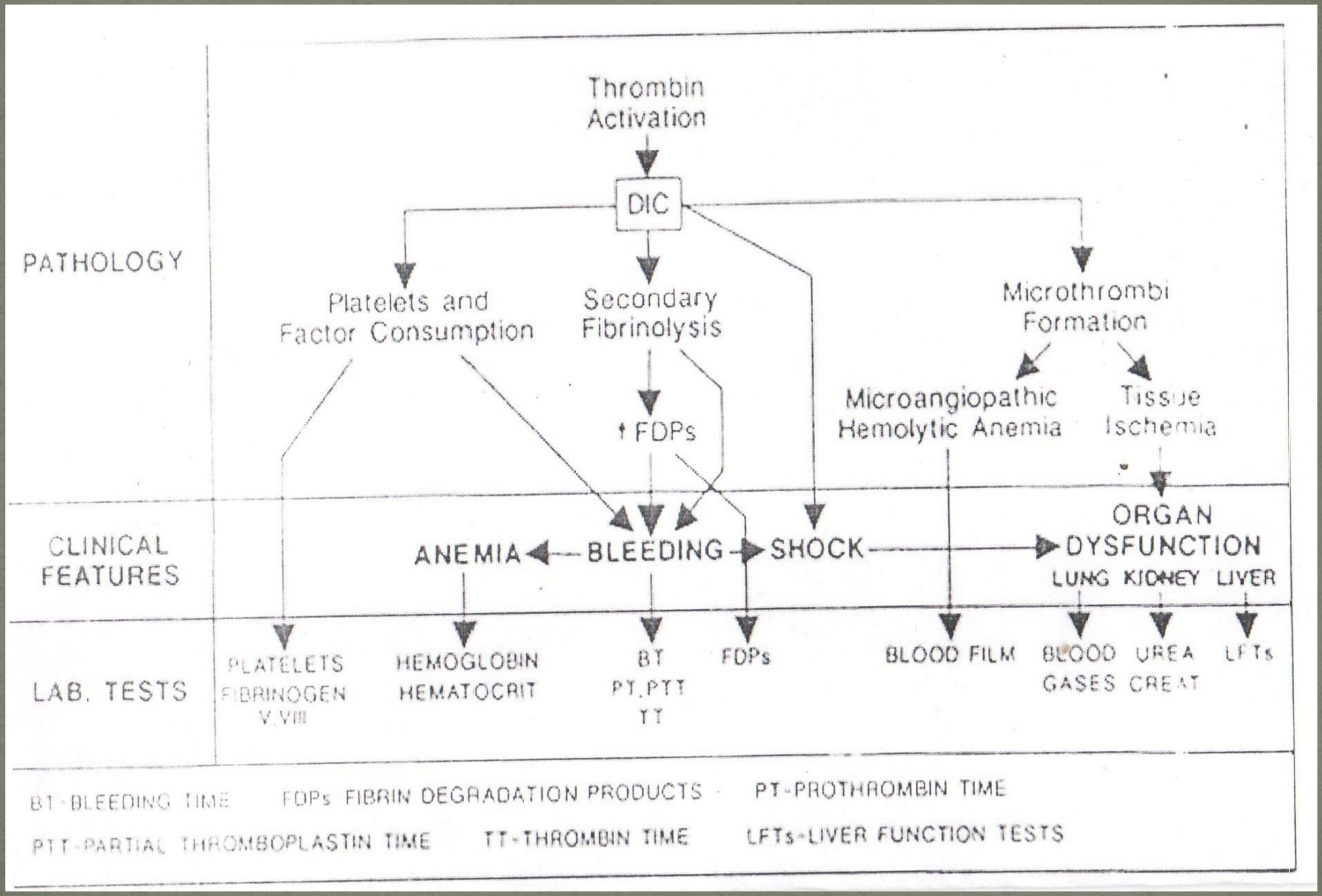
- Massive blood loss often requires blood transfusion.
- Transfusion should be initiated with red blood cells in all obstetric patients with signs of inadequate oxygen carrying capacity and inmost obstetric patients with hemoglobin of less than 7 g/dL, or when blood loss is ongoing and the hemoglobin is around 7 g/dL.
- If hemorrhage is accompanied by coagulation disorders, 15 to 20 mL/kg of fresh frozen plasma should be given as first-line treatment and target hemoglobin should be set higher, above 8 g/dL, to improve overall coagulation activity.

- Transfusion of platelet concentrates is recommended to treat active bleeding associated with thrombocytopenia below 50
- An arterial (radial or femoral) line allows precise and beat-to- beat blood pressure measurement and facilitates blood sampling for laboratory evaluation.

Diagnosis of D. I. C.

CLINICAL FEATURES

- CAUSE- often dominates the overall picture.
- BLEEDING- is particularly problematic in acute phase. Excessive & at times uncontrolled bleeding is seen in obstetric patients.
- HYPOTENSION- out of proportion to blood loss (cardiac depression due to F. D.P.'s)
- MICRO-VASCULAR THR OMBOSIS
- ORGAN FUNCTION-
- Lungs
  - Kidneys- ARF
  - Liver- hepatic failure
  - CNS- mental status changes.


PATHOLOGY
Thrombin Activation
DIC
Platelets and Factor Consumption
Secondary Fibrinolysis
Microthrombi Formation
↑ FDPs
Microangiopathic Hemolytic Anemia
Tissue Ischemia
CLINICAL FEATURES
ANEMIA
BLEEDING
SHOCK
ORGAN DYSFUNCTION
LUNG KIDNEY LIVER
LAB. TESTS
PLATELETS FIBRINOGEN V,VIII
HEMOGLOBIN HEMATOCRIT
BT PT,PTT TT
FDPs
BLOOD FILM
BLOOD GASES
UREA CREAT
LFTs
BT-BLEEDING TIME
FDPs FIBRIN DEGRADATION PRODUCTS
PT-PROTHROMBIN TIME
PTT-PARTIAL THROMBOPLASTIN TIME
TT-THROMBIN TIME
LFTs-LIVER FUNCTION TESTS

DIAGNOSTIC ALGORITHMS

- SCORE OF GLOBAL COAGULATION

PLATELENT COUNT	>100000(0)	<100 000(1)	<50 000(2)
F.D.P.`S	No rise(0)	Moderate(1)	Strong(2)
P.T	<3SECONDS(0)	3 to 6 seconds(1)	Strong(2)
FIBRINOGEN LEVEL	>1GM/LIT(0)	<1gm/lit(1)	---------

Treatment of DIC

- Primary means of treating DIC is to identify and remove the initiating cause of thrombin activation.
- Resuscitation of mother in shock should be first priority when bleeding is significant.
- Replacing consumed platelets and clotting factors will not correct the underlying problem but may help to slow bleeding which will be required prior to vaginal or operative delivery.
- One unit of platelets raise platelet count by 5,000-10,000/ mm 3
- each 250ml FFP contains 200 -400 mgm of fibrinogen

Surgical methods

- Uterine packin
- Insertion of balloon devices into cervical canal
- Placement of balloon into aortic / internal iliac arteries
- Ligation of internal iliac arteries
- Transcatheter arterial embolization
- Hysterectomy

- Recombinant factor VIIA:

dosage used 60-120mcg/kg

- Blood substitutes:

Polyfluro-octobromide is the most promising of this class because it is less viscous and has the highest oxygen carrying capacity.

- Blood salvage.

Pregnancy Induced Hypertension:

- PIH another leading cause for maternal mortality
- due to imbalance in prostaglandin metabolism and abnormal trophoblastic invasion at the time of placentation.

Pathophysiology ; It affects virtually all maternal organ systems

CVS: reduced BV & colloid osmotic pressure, increased BP leads to pulmonary edema

Respiratory system :

- Exggerated odematous changes of upper air ways and difficultintubation
- In severe cases pulmonary oedema can occur due to LVF, circulatory overload or pulmonary aspiration.

Neurological changes : CNS hyper excitability and hyper reflexia are common. Headache, cortical blindness, seizures can occur.

***Coagulation* :**

- Endothelial injury in microvasculature results in increased platelet activation, consumption and thrombocytopenia.
- Coagulation tests such as PT, APTT and fibrinogen levels deteriorate with onset of DIC.

Renal:

- In preeclampsia, vasospasm and capillary endothelial swelling lead to a reduction GFR.
- Serum creatinine and uric acid are elevated.

Hepatic: Impaired liver function may affect drug metabolism. due to periportal necrosis, sub capsular hemorrhage and fibrinogen deposition in hepatic sinusoids.

General anaesthesia is indicated

- 1.In conditions where the placement of epidural catheter is contraindicated eg.coagulopathy,abruptioplacenta
- 2. Immediate delivery of fetus is required eg.foetal distress
- 3. When mother is semiconscious and protection of her airway is mandatory.

While considering G.A. remember following issues:

- Upper airway oedema particularly laryngeal oedema can increase the chances of difficult intubation. Keep a variety of small diameter endotracheal tubes and bougies.
- Impaired coagulation may cause profuse bleeding during laryngoscopy.

- Laryngoscopy and intubation may result in exaggerated elevation of blood pressure, which has to be blunted with NTG or SNP. $MgSO_4$ can prolong neuromuscular blockade.
- Advantages of general anaesthesia include speed, reliability and controllability.
- Rapid sequence induction with thiopentone and suxamethonium, after preoxygenation and aspiration prophylaxis using Sellick's maneuver is the technique of choice

- NTG or labetolol or esmolol used to blunt the responses to laryngoscopy and intubation.
- Maintenance 50% nitrous oxide in oxygen and a volatile agent (isoflurane) Narcotics are given after delivery of baby.
- Titrating doses of depolarizing agents or Atracurium 1/5 th . doses are used if $MgSO_4$ is given.
- Monitoring consists of NIBP, SPO 2, ECG, urine output, ETCO 2, n.m.monitor.
- Extubation should be done in awake state, after full recovery .Cardiovascular responses to extubation should be blunted

Eclampsia

- ***occurrence of seizures in women with preeclampsia that cannot be attributed to other causes.***
- Management generally is symptomatic care.
- First priority in these cases is to arrest convulsions.
- Usually small dose of thiopentone (75-100mg) or diazepam (2.5-5mg) is given to arrest convulsions.
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- Oxygen is supplemented.
- Mouth should be kept open with soft mouth gag to prevent injury to the tongue.
- Patient should be nursed in lateral position. Facilities for lowering of head end of bed ,suction of respiratory passage, intubation, positive pressure ventilation, oxygen therapy should be available.
- MgSO 4 , antihypertensive agents are administered .
- Light should be dimmed ,sound stimuli should be minimized..Appropriate obstetric management follows

HELLP Syndrome:

- The acronym was first suggested by Weinstein in 1982 to describe the presence of hemolysis (H), elevated liver enzymes (EL), as evidence of hepatic dysfunction and low platelets (LP) in woman considered to have preeclampsia or Eclampsia.
- Significant maternal (24%), perinatal mortality risk (30-50%), involved in this atypical variant of severe preeclampsia.
- Diagnosis is based on laboratory evidence of microangiopathic hemolytic anaemia, thrombocytopenia (platelets count <1,00,000), hepatic dysfunction
- In management early diagnosis is important.
- Assess maternal and fetal condition; stabilize the mother and delivery the baby as soon as possible.

- High blood pressure should be controlled, administer MgSO 4 to prevent convulsions, optimize fluid balance .Judicious hemotherapy ,platelet transfusion has been recommended in women with severe preeclampsia when platelet count <50,000.
- Aggressive use of dexamethasone to treat the patient with platelet count < 1,00,000 because of HELLP syndrome has eliminated the need for platelet transfusion..
- Refractory HELLP syndrome may respond to the plasma exchange therapy.
- Anesthetic management consists of control of high blood pressure, correction of coagulation abnormalities, and optimization of intravascular volume.
- Usually general anaesthesia is technique of choice for these cases

Amniotic fluid embolism;

- Amniotic embolism is a rare but potential lethal complication.
- It can occur during labour, delivery, caesarean section or postpartum.
- AFE is thought to occur when amniotic fluid, fetal cells, hair, or other debris enter the maternal circulation.

Risk factors

• Advanced maternal age • Placenta accreta • Polyhydramnios • Uterine rupture • Maternal history of allergy or atopy • Chorioamnionitis • Macrosomia • Male fetal sex	• Oxytocin (controversial) • Multiparity • Meconium • Cervical laceration • Intrauterine fetal death • Very strong frequent or uterine tetanic contractions • Sudden fetal expulsion (short labour)

AFC

Solution
- Surfactant
- Endothelin
- Leukotrienes
- IL-1&TNF-
- Thromboxane A2
- Prostaglandins
- Arachidonic acid
- Thrmboplastin
- Collagen&tissu factor 111
- Phospholipase A2
- PF 111

Major effect

Anaphylactcide reaction&multi-system involvememnt

Suspention
- Lanugo hair
- Vernix caseosa
- Fetal squames
- Bile stained meconium
- Fetal gut mucin
- trophoblasts

Minor effect

Mechnical obstruction

Clinical presentation:

- The classic clinical presentation of the syndrome has been described by five signs that often occur in the following
- (1) Respiratory distress
- (2) Cyanosis
- (3) Cardiovascular collapse cardiogenic shock
- (4) Hemorrhage
- (5) Coma.

- A sudden drop in O 2 saturation can be the initial indication of AFE during cesarean section.
- More than 50% of patients die within the first hour. Of the survivors 50 % will develop DIC which may manifest as persistent bleeding from incision or venipuncture sites.
- The coagulopathy typically occurs 0.5 to 4 hours after phase 1. 10-15% of patients will develop grand mal seizures.
- CXR may be normal or show effusions, enlarged heart, or pulmonary edema. ECG may show a right strain pattern with ST-T changes and tachycardia.

Diagnosis:

- Diagnosis is mostly by exclusion.
- pregnant patient who has sudden onset of respiratory distress, cardiac collapse, seizures, unexplained fetal distress, and abnormal bleeding.
- Presence of fetal squames, lanugo hair, vernix or mucin in the buffy coat of heparinized maternal blood sample from pulmonary arterial catheter
- eventually prove more useful in the rapid diagnosis of AFE .

Lab.investgation

NON SPECIFIC	SPECIPIC
• complete blood count • coagulation parameters including FDP, fibrinogen • arterial blood gases • chest x-ray • electrocardiogram • V/Q scan • echocardiogram	• cervical histology • serum tryptase • serum sialyl Tn antigen • zinc coproporphyrin • PMV analysis (if PA catheter in situ)

GOALS OF MANAGEMENT

- Restoration of cardiovascular and pulmonary equilibrium
  - Maintain systolic blood pressure >90 mm Hg.
  - Urine output > 25 ml/hr
  - Arterial pO 2 > 60 mm Hg.
- Re-establishing uterine tone
- Correct coagulation abnormalities

IMMEDIATE MEASURES:

- IV Infusion and O2 administration should be started.
- Endotracheal intubation may be required for airway control and ventilation
- Blood samples should be sent for CBC, ABG, PT, PTT, fibrinogen, FDP.
- Hypotension should be treated with volume infusion and vasoactive agents.
- Once hypotension is corrected restrict crystalloids to maintenance fluid, 40-70% of s these patients develop ARDS.
- Steroids are usually administered, although there is evidence as to their value.
- Continuously monitor SPO2, ECG, and urineoutput, ABG.

- Early placement of CVP and pulmonary catheters provide critical information and guide specific therapy.
- Central venous pressure monitoring is important to diagnose right ventricular overload and guide fluid infusion and vasopressor therapy.
- Pulmonary artery and capillary wedge pressures and echocardiography are useful to guide therapy and evaluate left ventricular function and compliance.
- An arterial line is useful for repeated blood sampling and blood gases to evaluate the efficacy of resuscitation.
- After 5 minutes of unsuccessful CPR in arrested mothers, abdominal delivery is recommended.

Fetal distress:

- Cesarean for fetal distress is usually considered as urgent and emergent situation and a quick anesthetic technique is required.
- Left uterine displacement should be maintained.
- Oxygen should be administered. Oxytocin should be discontinued.
- Available time and patient condition will determine choice of anaesthesia.
- Spinal anesthesia and epidural block through previously placed epidural catheter for labor analgesia are often used for cesarean delivery.

- *Most of obstetric emergencies are life threatening.*
- *Early recognition and prompt treatment and team effort is required for successful management*

THANK U