AMNIOTIC FLUID EMBOLISM

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AMNIOTIC FLUID EMBOLISM

CLINICAL SCENARIOS
**AMNIOTIC FLUID EMBOLISM**

**CLINICAL SCENARIO #1**

- 28 year old white female, Gavida 1 Para 0, uncomplicated pregnancy, 38 weeks gestation.
- Notified nurse that she thought “her water broke”.
- Patient found one minute later unresponsive, slumped over in bed, no respirations, no pulse, agonal rhythm, FHR 40, massive vaginal bleeding.
- CPR started, and emergency C-section performed, A line, PA catheter, 14 gauge IV’s placed.
- Mass transfusion protocol instituted.

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**CLINICAL SCENARIO #2**

- 40 year old white female, Gravida 2 Para 1, 39 weeks gestation admitted for ruptured membranes, thought to be in early labor.
- One hour later noted to have severe pain with tetanic-like contractions, FHR 60, patient found to have difficulty breathing, O2 SAT 83%.
- Emergency C-section performed under general anesthesia, surgery was uneventful, viable baby boy delivered, with Apgars 9/9.
- After extubation patient complained of “not feeling well”, BP dropped from 110/60 to 60/40, O2 SAT decreased from 100% to 63%, bleeding noted from vagina and incision site, as well as all venipuncture sites.
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CLINICAL SCENARIO #3

- 27 year old black female, Gravida 4 Para 4, status post uncomplicated spontaneous vaginal delivery.
- Noted to have increased vaginal bleeding after delivery of the placentae.
- Vaginal exam by the obstetrician noted a possible cervical laceration.
- Despite repair of cervical laceration, vaginal bleeding increased, D and C was attempted with worsening post partum hemorrhage.
- Emergency laperotomy and hysterectomy performed under general anesthesia, arterial line and pulmonary artery catheter placed, inotropic support started and mass transfusion protocol instituted.

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CLINICAL SCENARIO #4

- 36 year old female, Gravida 1 Para 0, having an elective cesarean section for breech presentation under spinal anesthesia.
- After delivery of baby, patient suddenly became unresponsive, sinus bradycardia, and arms and hands in a decerebrating posture.
- Before CPR could even be started patient became responsive again without any complaints, three minutes later patient became unresponsive again with some decerebrating posture.
- Obstetrician performing surgery complaining of increased bleeding from all serosal surfaces and wound sites, as well as increasing uterine atony.
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Historical Description

1926 ..... first clinical report ..... Myer

1948.. 8 cases of peripartum collapse ..... Steiner & Lushbaugh

AMNIOTIC FLUID EMBOLISM

Historical Description

Shnider and Hoya

"sudden and without warning, the signs of amniotic fluid infusion appear: hyperpnea or tachypnea, cyanosis and shock progressing into profound coma"
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Epidemiology

3 per 100,000 live births

4.5 to 9% of peripartum maternal deaths

Mortality rate 60 to 80%

15% of survivors are neurologically intact

Neurologically intact neonatal survival ~ 40%

CAUSES OF PERIPARTUM MATERNAL DEATH

Obstetric Hemorrhage 33%

Obstetric Infection 15%

Preeclampsia / Eclampsia 20%

Pulmonary Embolism 13%

Amniotic Fluid Embolism 9%

Cardiomyopathy 7%

Anesthetic 3%
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Predisposing Factors

- Advanced maternal age
- Multiparity
- Placental Abruption

Time of Diagnosis

- Labor ..... 70%
- Cesarean delivery ..... 19%
- Postpartum ..... 11%
Amniotic Fluid Embolism (AFE) has occurred:

- During first trimester abortion
- After abdominal trauma
- During second trimester terminations

**Symptoms:***

- Respiratory Distress: 57%
- Hypotension: 37%
- Coagulopathy: 13%
- Seizures: 10%
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Differential Diagnosis

OTHER OBSTETRIC COMPLICATIONS

- Placental abruption
- Eclampsia

Amniotic Fluid Embolism

Differential Diagnosis

NON OBSTETRIC COMPLICATIONS

- Pulmonary complications
- Venous air embolism
- Septic shock
- Myocardial infarction
- Anaphylaxis
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Differential Diagnosis

ANESTHETIC COMPLICATIONS

Total spinal

Local anesthetic toxicity

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Anaphylactic Syndrome of Pregnancy

“Syndrome of acute peripartum hypoxia, hemodynamic collapse and coagulopathy”
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BIPHASIC RESPONSE

*Early Phase*  duration 30mins,  
50% mortality

- Transient pulmonary vasospasm
- Right heart failure
- Ventilation perfusion mismatch
- Hypoxemia
- Hypotension

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- **BIPHASIC RESPONSE**
  
  *Second Phase*

  - Left ventricular dysfunction
  - Pulmonary edema
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CARDIOPULMONARY EFFECTS

- Severe hypotension out of proportion to blood loss
- Tachycardia
- Invasive monitoring.....left ventricular dysfunction
- Pulmonary edema
- Adult respiratory distress syndrome

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INVASIVE MONITORING

- Elevated pulmonary artery pressures
- Left ventricular failure
- Low systemic vascular resistance can be present
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COAGULOPATHY

Ranges from subclinical coagulopathy to DIC

Decreased fibrinogen and platelets

Elevated fibrin split products

Prolonged PT and PTT
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**COAGULOPATHY**

- Uterine atony
- Persistent vaginal bleeding
- Incisional bleeding
- Oozing from venipuncture sites

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**NEUROLOGIC MANIFESTATIONS**

- Seizures
- Hypoxic brain injury
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ACUTE RENAL FAILURE

![Diagram of a kidney]

TABLE 4. Differential diagnosis of amniotic fluid embolism

<table>
<thead>
<tr>
<th>Condition</th>
<th>Respiratory distress</th>
<th>Hypotension</th>
<th>Coagulopathy</th>
<th>Seizures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulmonary thromboembolism</td>
<td>+</td>
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<tr>
<td>Venous air embolism</td>
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<tr>
<td>Septic or hypovolemic shock</td>
<td>+</td>
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<tr>
<td>Myocardial infarction</td>
<td>+</td>
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<tr>
<td>Peripartum cardiomyopathy</td>
<td>+</td>
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<tr>
<td>Decompensation of cardiac valvular disease</td>
<td>+</td>
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<tr>
<td>Uterine rupture</td>
<td>+</td>
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<tr>
<td>Supine hypotensive syndrome</td>
<td>+</td>
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<tr>
<td>Preeclampsia/eclampsia</td>
<td>+</td>
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<td>+</td>
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<tr>
<td>Local anesthetic toxicity</td>
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<td>+</td>
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<tr>
<td>Placental abruption</td>
<td>+</td>
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<tr>
<td>Cerebral vascular accident</td>
<td>+</td>
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<tr>
<td>Aspiration of gastric contents</td>
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</tbody>
</table>
**AMNIOTIC FLUID EMBOLISM**

**AMNIOTIC FLUID IN THE MATERNAL CIRCULATION**

- desquamated skin cells
- lanugo, scalp hairs
- prostaglandins
- arachidonic acid metabolites
- zinc coproporphyrin

**ENTRY INTO MATERNAL CIRCULATION**

- communication between amniotic sac and maternal venous system
- placental abruption
- disruption of fetal membranes
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**Treatment**

INITIATE CARDIOPULMONARY RESUSCITATION

- oxygenation via endotracheal tube
- support maternal circulation
- left uterine displacement
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*Treatment*

**PERFORM INTRAVENOUS VOLUME RESUSCITATION**

- establish IV access with several large bore catheters
- insert an intraarterial catheter and pulmonary artery catheter
- Begin ionotropic support (dopamine, epinephrine, norepinephrine)

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*Treatment*

- perform fetal monitoring
- expedite delivery of fetus
- immediate and rapid preparation for cesarean delivery
- prepare for uterine atony
- avoid prostaglandin F₂alpha
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Treatment
TREAT THE COAGULOPATHY

- factor and platelet replacement
- obtain early consultation from hematologist or blood bank pathologist

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Treatment
MANAGE SEQUELAE OF SHOCK

- cardiac failure
- pulmonary edema
- ARDS
- renal failure
- hepatic failure
- neurologic damage