Effective Resuscitation in Amniotic Fluid Embolus

Matthew Drake
Specialist Obstetric Anaesthetist & Supervisor of Training
National Women’s Health

PMMRC Conference, 13 June 2017
Te Papa, Wellington
Outline

• Background

• Theories of pathophysiology

• Generic Management

• Specific Therapy
Risk Factors for AFE

Incidence, risk factors, management and outcomes of amniotic-fluid embolism: a population-based cohort and nested case–control study

KE Fitzpatrick,† D Tuffnell,‡ JJ Kurinczuk,§ M Knight†

† National Perinatal Epidemiology Unit, University of Oxford, Oxford, UK ‡ Bradford Teaching Hospitals NHS Foundation Trust, Bradford, UK

Correspondence: KE Fitzpatrick, National Perinatal Epidemiology Unit, University of Oxford, Old Road Campus, Oxford OX3 7LF, UK.
Email Kate.fitzpatrick@npeu.ox.ac.uk

Accepted 7 December 2014. Published Online 12 February 2015.
## Risk factors for AFE

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Adj. Odds ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 35+</td>
<td>2.15</td>
<td>1.43-3.23</td>
</tr>
<tr>
<td>Multiple pregnancy</td>
<td>7.75</td>
<td>3.60-16.69</td>
</tr>
<tr>
<td>Induction by any method</td>
<td>2.53</td>
<td>1.70-3.75</td>
</tr>
<tr>
<td>Placenta praevia</td>
<td>5.75</td>
<td>1.64-20.19</td>
</tr>
<tr>
<td>Instrumental vaginal delivery</td>
<td>9.51</td>
<td>3.17-28.51</td>
</tr>
<tr>
<td>Caesarean delivery</td>
<td>16.15</td>
<td>6.20-42.05</td>
</tr>
</tbody>
</table>
Predictors of Death/Permanent Neurological Injury

• Had hysterectomy:
  • OR 2.49 (1.02-6.06, p=0.0441)

• Received Cryoprecipitate:
  • OR 0.3 (0.11-0.80, p=0.0163)

• Likely that worse coagulation (needing hysterectomy) is predictive of worse outcome

• Aggressive blood product resuscitation may improve outcome

Fitzpatrick et al BJOG 2016;123:100-109
NZ data

• 2015 PMMRC report:
  • NZ AFE mortality ratio: 2.37/100,000 maternities
  • Over one fifth of all direct maternal deaths
  • This is 5 times higher than the UK (p<0.0001)

• Does our population have more risk factors than UK?
  • Unlikely: induction, LSCS & instrumental rates very similar

• Do we over-diagnose?
  • Possibly

• Do we recognise late/under-treat?
  • Possibly
Systemic Pathophysiology

**Influx**
- Vessels exposed in lacerated uterus/cervix
- Amniotic components leak into maternal circulation

**Obstruct**
- Fetal materials create physical obstruction in microvasculature
  - **Obstructive Shock**

**React**
- **Anaphylactoid reaction** against liquid materials:
  - Pulmonary vasospasm
  - Activation of platelets, complement and leucocytes - DIC

Local (uterine) Pathophysiology

Influx
- Local flow of amniotic fluid into uterine tissues causes anaphylactoid reaction

DIC
- Disseminated Intravascular Coagulation (DIC) with excessive coagulation and fibrinolysis

Atony
- Inflammatory cytokines released including IL-8 & bradykinin
- Uterine muscles become oedematous & relax

....Two different presentations

Amniotic Fluid Embolus
- Dyspnoea
- Chest Pain
- Restlessness
- Cyanosis
- Seizures/LOC
- Fetal distress
- Shock

15%

Rapid progression to Cardiopulmonary collapse & Cardiac arrest

37 mins

Uterine Atony & DIC
- PV bleeding – excessive & non-coagulable
- Atonic bleeding
- Fetal distress

85%

Hypovolaemic shock then cardiac arrest

102 mins

Generic management

• Help – (C) A B C – 100% Oxygen – (L tilt/manual displacement)
• Activate Massive Transfusion Protocol
• Aggressive resuscitation
  • Oxygen
  • IV access (x several)
  • Usual management of obstetric bleeding
  • Keep warm/pH/Calcium
  • Bloods including Fibrinogen; (POCT)
• Transfer from primary setting ASAP
  • Transfer to operating theatre
Help! (Senior)

- Anaesthesia
- Critical Care
- Midwifery
- Neonatology
- Obstetrics
- Vascular surgeons
- Haematologist/Physician
- Transfusion Specialist
- Blood Bank
- HCAs/orderlies
Specific management

• Cardiorespiratory support
• RBCs
• FFP
• Cryoprecipitate
• Remember platelets
• Delivery (+/- perimortem CS)
• Consider hysterectomy

• Antithrombin (3000 units)
• C1 Esterase inhibitor (Berinert P)
• Hydrocortisone
• Cardiopulmonary Bypass
• Inhaled Nitric Oxide
Summary

• Remember AFE if:
  • Acute anxiety, agitation, restlessness, tingling, numbness, seizures
  • Dyspnoea, hypoxia, pulmonary oedema
  • Unexplained fetal distress
  • Excessive bleeding, blood that doesn’t clot
  • Hypotension, Unconsciousness, Cardiac arrest

• Get senior multidisciplinary help: ABC – LUD – MTP – CPR
• Aggressive resuscitation with early FFP and Cryoprecipitate
• Delivery - Perimortem CS – Consider Hysterectomy