Worcestershire Acute Hospitals NHS Trust

Amniotic Fluid Embolism (AFE)

Management of

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

Introduction

Guidance for the management of Amniotic Fluid Embolism

This guideline is for use by the following staff groups:
All Maternity Staff

Lead Clinician(s)

Dr Christine Azer	Obstetric Doctor
Mr P Suraweera	Consultant Obstetrician
Approved by *Maternity Governance Meeting* on:	21st April 2023
Review Date: This is the most current document and should be used until a revised version is in place	21st April 2026

Key amendments to this guideline

Date	Amendment	Approved by:
April 2023	Guideline Review - include more in depth outline on clinical presentation, diagnostic criteria, differential diagnosis and important management strategies (sending blood for clotting profile and fibrinogen levels, performing perimortem CS/urgent delivery)	MGM

Introduction

The estimated frequency of amniotic fluid embolism (AFE) lies somewhere between 1.25/100 000 and 12.5/100 000 maternities, with the most recent UK data giving an incidence of 1.7/100 000 maternities. Survival rates seem to have improved significantly over time, from 14% in 1979 to around 30% in 2005 and 81% in 2014 although neurological morbidity in survivors is well recognised. The perinatal mortality rate in cases of AFE is 67/1000 total births. Case fatality rate 19%.

Analysis of national registry revels that 70% of cases occur during labour, 19% during Caesarean delivery, and 11% in the immediate period after vaginal delivery.

Risk Factors:
Induction of labour, excessive uterine contractions (misuse of oxytocin / Misoprostol for IUD), operative vaginal delivery, Caesarean section, placental abruption, Multiparity, high maternal age, Trauma, Multiple pregnancy, Polyhydramnios Multiple pregnancy

Signs and symptoms: Effects of AFE are due to occlusive and toxic effects of fetal material in maternal circulation.

Fetal distress - disturbance to fetomaternal unit.

Cardiovascular: as a result of pulmonary hypertension leading to left ventricular dysfunction

- Hypotension
- Pulmonary oedema or ARDS
- Arrhythmias (Ventricular tachycardia/fibrillation, Pulseless electrical activity)
- Cardiopulmonary arrest

Respiratory: as a result of bronchospasm

- Dyspnoea, cough, acute hypoxia and cyanosis

CNS: due to acute hypoxia

- Agitation, Jitteriness Seizures

Coagulopathy and Massive Obstetric Haemorrhage (MOH)

- Disseminated intravascular coagulation (DIC) is commonly manifested by haemorrhagic complications including bleeding from venepunctures or surgical sites, haematuria, gastrointestinal haemorrhage, and vaginal bleeding and massive obstetric haemorrhage.

Clinical Presentation:

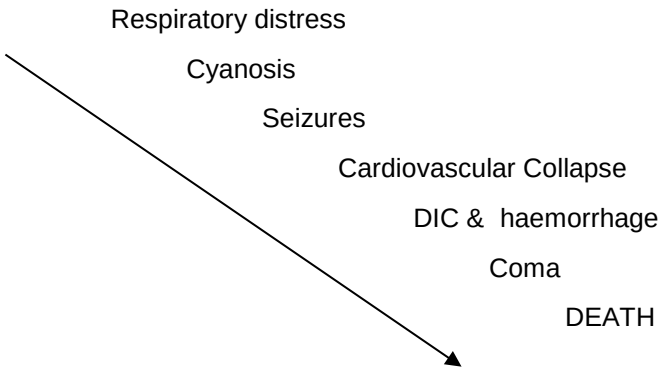
There are different phases to the disease progression, which clearly depend on maternal survival. Initially, pulmonary hypertension may develop secondary to vascular occlusion either by debris or vasoconstriction. This often resolves and left ventricular dysfunction or failure develops. Coagulopathy often develops if the mother survives long enough (will usually develop within 30 minutes) often giving rise to massive postpartum haemorrhage. If AFE occurs prior to birth, profound fetal distress develops acutely.

Presentations of AFE on UK registry papers

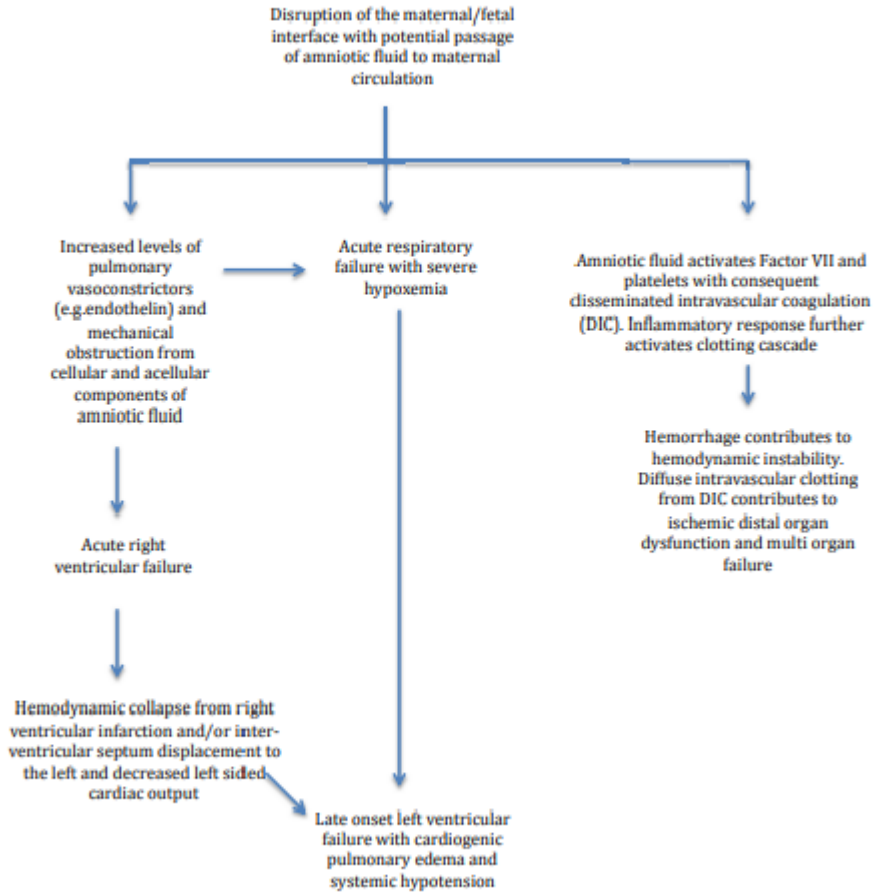
1. Fetal distress followed by maternal collapse either during or within 30 minutes of labour- 23%
2. LOC seizure and deliver -35%
3. LOC or seizure immediately following delivery -14%
4. SOB, Hypotension, Brady and deliver -14%
5. Maternal collapse after delivery of the baby at CS -14%

Obstetric collapse resulting from AFE could be manifested by multiple types of shock simultaneously.

- Respiratory collapse: cyanosis, dyspnoea, hypoxia, pulmonary oedema, respiratory arrest
- Cardiovascular collapse : Hypotension, tachycardia, cardiac arrest
- Coagulopathy (DIC)



Proposed pathophysiology of amniotic fluid embolism



DIC, disseminated intravascular coagulation.

SMFM. Amniotic fluid embolism: diagnosis and management. Am J Obstet Gynecol 2016.

Diagnosis

There is no accurate premortem diagnostic test, hence the diagnosis is clinical by exclusion: Standard tests, including full blood count, liver and renal function tests, electrolytes and arterial blood gases do not aid in diagnosis, but remain useful in management.

AFE Clinical Diagnostic Criteria

There have been few clinical diagnostic criteria been suggested

UK Obstetric Surveillance System criteria (UKOSS) for defining cases of amniotic fluidembolism.UK (Knight, Tuffnell et al. 2010)

Acute maternal collapse in the absence of any other clear cause (exclusion of other similar causes *****) with *one or more* of the following features: onset of during labour and within 30min of delivery

1. Acute fetal compromise
2. Acute hypotension /cardiac arrhythmias /arrest
3. Acute hypoxia (dyspnoea, cyanosis, respiratory arrest, agitation numbness, tingling, Seizure)
4. Coagulopathy

OR

Finding of fetal squamous cells or hair in lungs on post-mortem

The Society of Maternal Fetal Medicine (SMFM) and the Amniotic Fluid Embolism Foundation have recently (2020) proposed four diagnostic criteria for amniotic fluid embolism.
presence of (1) sudden cardiac arrest or both respiratory and hemodynamic collapse, and (2) biological disseminated intravascular coagulopathy (DIC), and (3) absence of fever, and (4) clinical onset during labour or within 30 min of delivery.

In summary all these criteria been based on a triad of sudden hypoxia and hypotension, followed in many cases by coagulopathy, all occurring in relation to labour and delivery with exclusion of similar causes.

* **Differential Diagnosis:**

- Pulmonary embolism
- Acute Coronary Syndrome
- Cardiac arrhythmias
- Peripartum cardiomyopathy
- Anaphylactic shock
- Septic shock
- MOH

Treatment Strategy

Amniotic fluid embolism should be considered in the differential diagnosis of sudden cardiorespiratory compromise in any pregnant or recently postpartum patient.
The management of AFE is supportive rather than specific as there is no proven treatment.
Initial resuscitation of cardiac arrest does not require a specific diagnosis of amniotic fluid embolism because initial maternal treatment (with basic cardiac life support and advanced cardiac life support protocols) is similar, regardless of the exact aetiology**.**
Early involvement of multidisciplinary senior experienced staff is essential, including an obstetrician, anaesthetist, intensivist and a haematologist.

Be alert to the risk:

- Avoid hyperstimulation of the uterus.
- Early diagnosis of obstructed labour (CEMD 2001)
-

1. Summon help immediately.
   - 2222 Adult resuscitation team
   - Consultant Obstetrician with Obstetric Registrar and SHO
   - Consultant /Registrar Anaesthetist
   - Labour ward coordinator
   - Additional midwifery/ support staff

   Aim to allocate specific tasks ideally with one person (does not have to be the consultant obstetrician) undertaking a "helicopter view" of the situation. Consider allocating a staff member for:
   - Observations
   - Scribing events, management decisions and timings
   - Communication with outside agencies e.g., blood bank
   - Runner for samples/ equipment
   - Providing family support

3. Assess Airway Breathing and circulation. See algorithm below.
4. Commence immediate high-quality cardiopulmonary resuscitation with standard basic cardiac life support and advanced cardiac life support protocols in patients who develop cardiac arrest.
5. Perform a perimortem caesarean delivery (for gestations >20weeks) if it has been a failure to obtain spontaneous circulation after 4 minutes of cardiopulmonary resuscitation. Therefore, preparations for emergent perimortem caesarean delivery be initiated simultaneously with the initiation of cardiopulmonary resuscitation,
6. Improve oxygenation with use of high flow O^2– Cardiopulmonary Resuscitation as appropriate (15liters of oxygen via non re-breathe mask).
7. Site 2 large bore cannula and send blood for:
   - Cross match (6 units)
   - FBC
   - Clotting profile
   - Fibrinogen levels
   - U&E/LFT/ glucose/ lactate

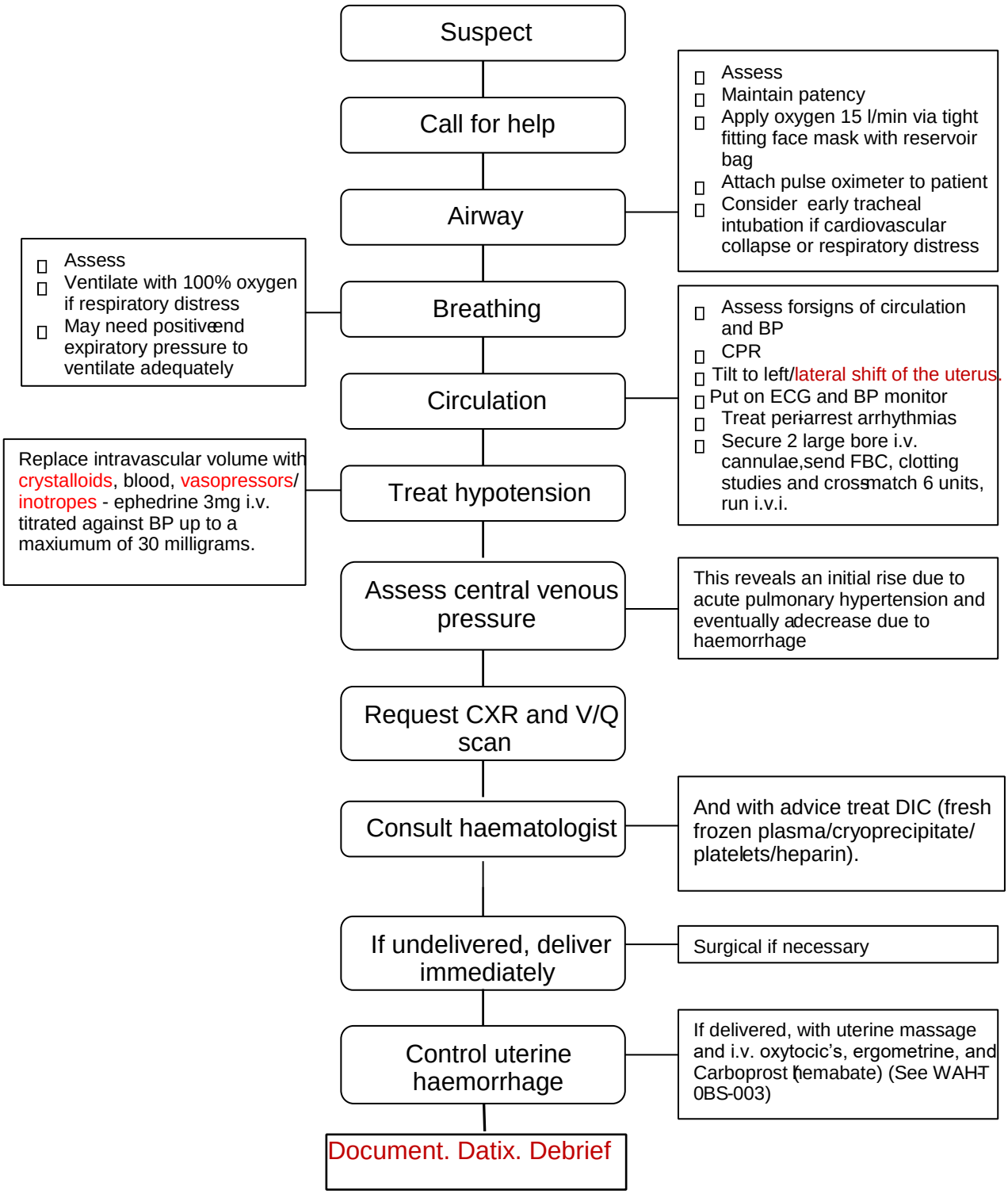
- Troponin I or T as a marker for myocardial infarction if the diagnosis is unclear.
- Blood/urine Cultures and an arterial blood gas should also be obtained.

NB 12 lead ECG and A Chest X-ray should also be obtained after initial resuscitation of the mother.

8. Consultant Obstetrician should liaise with Consultant Anaesthetist to develop plan of care:
   - If undelivered, she should be delivered immediately to reduce fetal compromise – ideally vaginally but otherwise via category 1 LSCS.
   - Preparation should be made to manage major obstetric haemorrhage at the outset with the 2nd line oxytocic's including carboprost and intrauterine tamponade balloon immediately available to control haemorrhage as DIC is corrected.
   - Postnatal care plan should be decided between consultant obstetrician and anaesthetist but will generally involve inotropic support, invasive monitoring and ITU transfer.
9. Anaesthetic involvement is vital throughout to ensure cardiac output and blood pressure are maintained with inotropic and vasomotor enhancing agents as needed and volume expansion as appropriate.
10. Early involvement of Consultant Haematologist is vital to correct self-limiting DIC. It is not necessary to wait for blood results.
11. Expedite delivery if initial resuscitation successful.
12. The woman and her family should be offered a full debrief both in the immediate postnatal period when she has capacity to retain this information and at an appropriate period in the future.

AMNIOTIC FLUID EMBOLISM

KEY POINTS ALGORITHM



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2. Amniotic fluid embolism – an update, Tuffnell D., . Knight, M . Plaat F

3. Anaesthesia, 2011, 66, pages 1–9

4. Amniotic fluid embolism Y. Metodiev1 P. Ramasamy1, * and D. Tuffnell2 1 University Hospitals of Leicester NHS Trust, Leicester, UK and 2 Bradford Royal Infirmary, Bradford, UK

5. Evaluation of the 4 diagnosis criteria proposed by the SMFM and the AFE foundation for amniotic fluid embolism in a monocentric population

6. Amniotic Fluid embolism -Implementation of international diagnostic criteria and subsequent pregnancy recurrence risk . Tal Caham, Hila De Castro.

7. UKOSS 2010,18

Contribution List

Contribution List

This key document has been circulated to the following individuals for consultation;

Designation
All Maternity staff – Newsletter
Maternity Guidelines Group
Maternity Governance Meeting

This key document has been circulated to the chair(s) of the following committee's / groups for comments;

Committee
Maternity Governance Meeting