



# An Uncommon Initial Presentation of Amniotic Fluid Embolism

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## Introduction

- Amniotic fluid embolism (AFE) is rare
  - 1 out of 15,000 deliveries in the United States.<sup>3</sup>
- High Risk of Mortality and Morbidity
  - A 1979 review placed the associated mortality rate at an astounding 86%
  - Recent studies indicate a mortality rate of 9 to 44%.<sup>3,5</sup>
  - Between 24% and 50% of surviving children manifest persistent neurological deficits
  - On average accounts for more than 1/10<sup>th</sup> of maternal deaths with some variation by country.<sup>1</sup>
- Pathogenesis is still not completely understood
  - Previously thought to be obstructive
  - Currently thought to be immune mediated
- Maternal, fetal and obstetric risks for AFE have been identified.

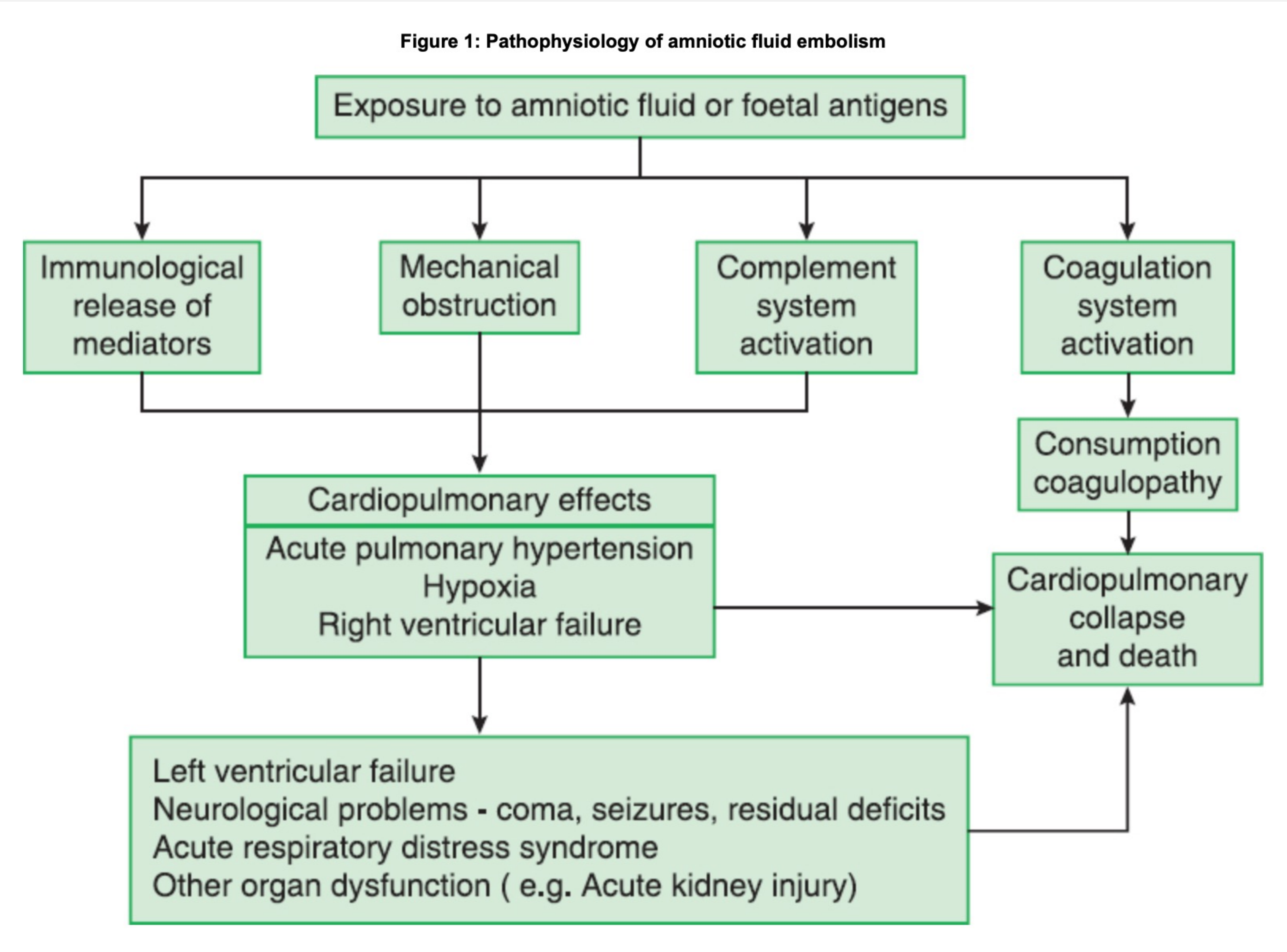
| TABLE 1                              |              |                              |                        |                     |
|--------------------------------------|--------------|------------------------------|------------------------|---------------------|
| Incidence of amniotic fluid embolism |              |                              |                        |                     |
| Country                              | Period       | Incidence (n/100 000 births) | Case-related mortality | Perinatal mortality |
| Australia* <sup>1</sup>              | 2001 to 2007 | 3.3                          | 35%                    | 32%                 |
| USA* <sup>1</sup>                    | 1999 to 2003 | 7.7                          | 21.6%                  | No data             |
| Canada* <sup>1</sup>                 | 1991 to 2002 | 6.0                          | 13%                    | No data             |
| U.K. * <sup>2</sup>                  | 2005 to 2009 | 2.0                          | 20%                    | 13.5%               |
| The Netherlands* <sup>2</sup>        | 2004 to 2006 | 2.5                          | 11%                    | 38.1%               |

\*<sup>1</sup> Retrospective population-based studies  
\*<sup>2</sup> Case-related validation from prospective studies  
Modified according to (12), Knight M. et al.: BMC Pregnancy & Childbirth 2012; 12: 7

Dtsch Arztebl Int 2014; 111(8): 126-32. DOI: 10.3238/arztebl.2014.0126

| Table 1. — Risk factors for AFE.                                                             |                                                                                                                                                 |                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Maternal Risk                                                                                | Fetal Risk                                                                                                                                      | Obstetric Risk                                                                                                                                                                                                                                           |
| - Age over 35 years<br>- Hypertensive disorder<br>- Pre-eclampsia or eclampsia<br>- Diabetes | - Polyhydramnios<br>- Multiparity<br>- Non-vertex at delivery<br>- Male fetus<br>- Fetal distress<br>- Fetal macrosomia<br>- Intrauterine death | - Amniocentesis<br>- Artificial amniotic fluid injection<br>- Oxytocin infusion<br>- Cesarean section<br>- Forceps or vacuum-assisted delivery<br>- Uterine rupture or laceration<br>- Placenta previa<br>- Placental abruption<br>- Cervical laceration |

Suvannasarn R, Theera T, Phudit J. Clinical and Experimental Obstetrics & Gynecology 47 (2020): 159-165.



Reference: (Sadera & Vasudevan, 2015)



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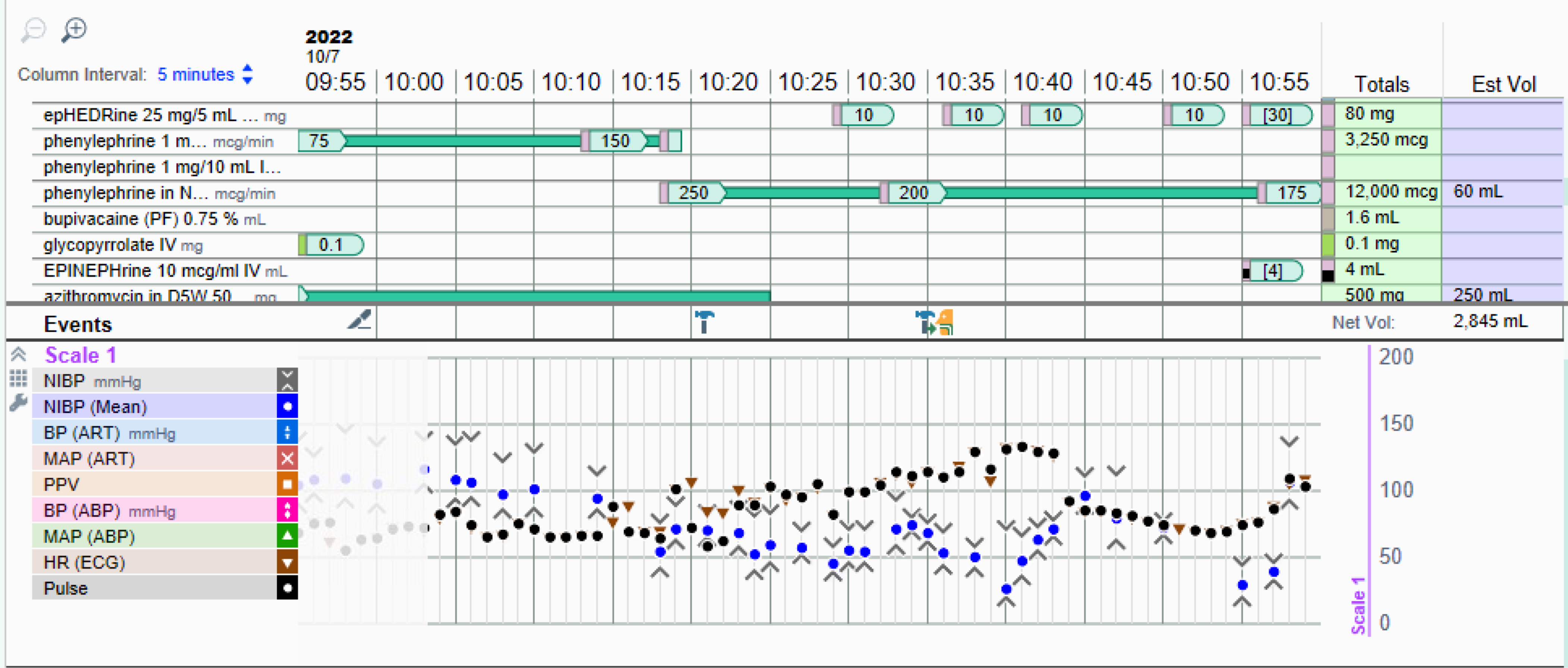
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## Case Presentation

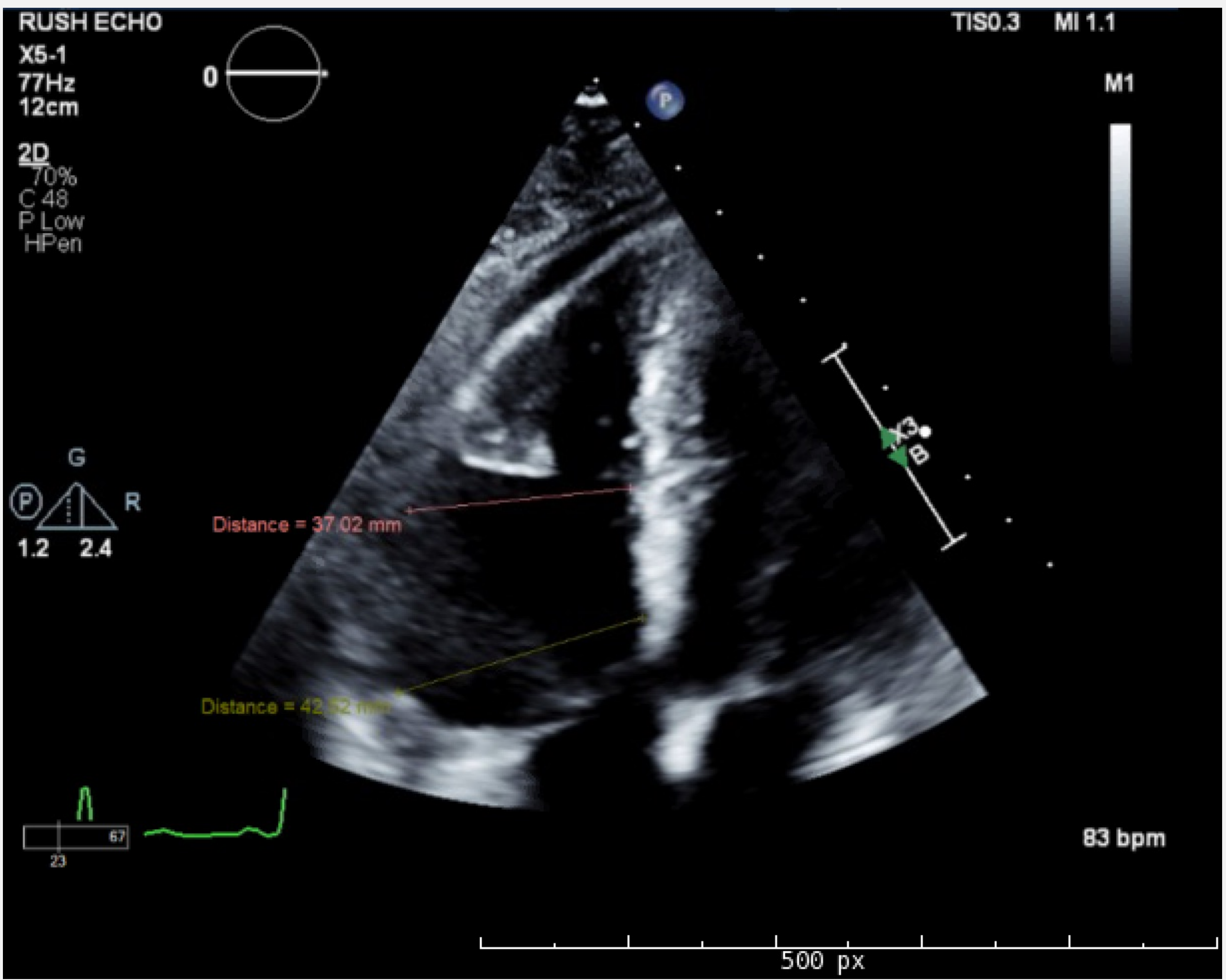
- 33-year-old G7p3124 presenting at 29w0d with placenta previa presenting to OB triage with her third episode of vaginal bleeding
- Her history was significant for a c-section during her first pregnancy secondary to eclampsia with three subsequent successful VBASs
- Pre surgical laboratories
  - Hgb 10.0 g/dL
  - Platelets  $235 \times 10^3$  mL
  - Fibrinogen 435 mg/dL
  - Coagulation studies WNL
- CSE 15 mcg of fentanyl, 0.1 mg morphine, and 1.6 mL of 0.75% bupivacaine.
- Phenylephrine infusion at 50 mcg/min
- The decision was made to proceed with repeat c-section for delivery.
- Uneventful delivers APGAR
  - 1 min 6
  - 5 min 9
- Blood loss 760 mL
- Immediately following placental delivery,
  - Patient began coughing with subsequent unresponsiveness, seizure-like activity, and profound hypotension.
- Phenylephrine infusion was titrated along with doses of ephedrine and epinephrine for hemodynamic support.

## Intraoperative record



- An arterial line was placed, and labs were drawn.
- Briefly returned to consciousness but following a second episode of seizure-like activity she was intubated for protection of her airway.
- Post-procedure: patient was transferred to ICU for hemodynamic stabilization for suspected amniotic fluid embolism.
- Coagulation data shown in table 1.

|                               | POD 0 |      |      |     |     | POD1 |     |     |     | POD2 | POD3 |
|-------------------------------|-------|------|------|-----|-----|------|-----|-----|-----|------|------|
|                               | 12p   | 2p   | 3p   | 5p  | 7p  | 12a  | 4a  | 8a  | 8p  | 8a   | 6a   |
| Hgb g/dL                      | 11.6  | 8.1  | --   | 8.4 | 8.3 | 8.7  | 8.1 | 8.2 | 8.3 | 8.3  | 9.1  |
| Platelets 10 <sup>3</sup> /mL | 94    | 142  |      | 105 | 101 | 66   | 78  | 92  | 78  | 98   | 117  |
| PT/PTT (sec)                  | ↑     | ↑    | ↑    |     |     |      |     |     |     |      |      |
| INR                           | 1.76  | 3.36 | 1.46 |     |     |      |     |     |     |      |      |
| Fibrinogen (mg/m))            | 54    | <50  | 66   | 247 | 257 | 262  | 257 | 319 | 414 | 413  | 387  |



- On SICU admission her Lactic Acid level was 5.9 mmol/L and LDH 684 IU/L
- Oxytocin infusion x 24 h
- Tranexamic acid 2 x 1 g doses
- Foley balloon placed to tamponade the uterus.
- TTE revealed right heart strain,
  - ECG revealed NSR
  - CT negative for PE.
- Patient received:
  - 9 units pRBCs,
  - 6 units FFP
  - 5 units of cryoprecipitate
  - 4 units of platelets.



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## Discussion

- The entry of amniotic fluid into the mother’s systemic circulation leads to a cascade of adverse clinical consequences
- Underlying pathogenesis is not well understood but thought to be immune mediated
- Can occur during any phase of delivery including labor, caesarean section, dilation and evacuation and the early postpartum period
- It damages the respiratory, cardiovascular, neurologic and hematologic systems potentially leading to pulmonary edema, arrhythmias and cardiac arrest, seizures, and DIC respectively
- Generally a clinical diagnosis/diagnosis of exclusion
- Can be confirmed by aspiration of blood from the right ventricle containing fetal hair and/or squamous cells
- Treatment involves collaborative ICU level care to support failing organ systems for optimal outcomes.
  - Management involves resuscitation and correction of coagulation abnormalities.
- Prompt recognition and treatment can improve outcomes; therefore, providers should be aware of and vigilant for both common and uncommon presenting signs and symptoms.

## Presentation of Amniotic Fluid Embolism

| >50% of Cases                                                                                                                                                                                       | 10-50% of cases                                                                                                                                                                      | <10% of cases                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>•Hypotension (100%)</li><li>•fetal distress (100%)</li><li>•Pulmonary edema or ARDS (93%)</li><li>•cardiac arrest (87%)</li><li>•Coagulopathy (83%)</li></ul> | <ul style="list-style-type: none"><li>•Dyspnea (49%)</li><li>•Seizure (48%)</li><li>•uterine atony (23%)</li><li>•Bronchospasm (15%)</li><li>•Transient Hypertension (11%)</li></ul> | <ul style="list-style-type: none"><li>•Cough (7%)</li><li>•Headache (7%)</li><li>•chest pain (2%)</li></ul> |

(Clark et al. 1995) and (Gist et al. 2009)

## References

- 1.Busardo FP, Frati P, Karch SB, Fineschi V. (2014). Epidemiological and clinical data of amniotic fluid embolism in forensic settings. *Curr Pharm Biotechnol*, 14:1189-94.
- 2.Clark SL, Hankins GD, Dudley DA, Dildy GA, Porter TF. (1995). Amniotic fluid embolism: analysis of the national registry. *Am J Obstet Gynecol*, 172:1158–67.
- 3.Conde-Agudelo, A., & Romero, R. (2009). Amniotic fluid embolism: an evidence-based review. *American journal of obstetrics and gynecology*, 201(5), 445-e1.
- 4.Gist, R. S., Stafford, I. P., Leibowitz, A. B., & Beilin, Y. (2009). Amniotic fluid embolism. *Anesthesia & Analgesia*, 108(5), 1599-1602.
- 5.Morgan, M. (1979). Amniotic fluid embolism. *Anaesthesia*, 34(1), 20-32.
- 6.Sadera G, Vasudevan B. (2015). Amniotic fluid embolism. *J Obstet Anaesth Crit Care*, 5:3-8