

# Tips on Amniotic Fluid Embolism

Kayvan Aflaki<sup>1</sup>, Sena Aflaki<sup>2</sup>, Joel G. Ray<sup>3,4</sup>

<sup>1</sup>Institute of Medical Science, University of Toronto, Toronto, Canada; <sup>2</sup>Department of Anesthesia and Pain Management, St. Michael's Hospital, Toronto, Canada; <sup>3</sup>Department of Medicine, St. Michael's Hospital, Toronto, Canada; <sup>4</sup>Department of Obstetrics and Gynaecology, St. Michael's Hospital, Toronto, Canada

**Author for correspondence:** Joel G. Ray: [Joel.Ray@unityhealth.to](mailto:Joel.Ray@unityhealth.to)

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## Abstract

Amniotic fluid embolism (AFE) is a catastrophic, sudden-onset event that must be recognized immediately. Despite the rarity of this condition, both maternal and perinatal morbidity and mortality are significant with AFE, even in cases ideally managed. In this article, we present five key statements covering the risk factors, clinical presentation, and management of AFE in a clinical setting. The purpose of these tips is to provide clinicians with information that may improve their ability to make a timely diagnosis and establish appropriate supportive treatment to patients suffering from AFE.

## Résumé

L'embolie amniotique est un événement catastrophique d'apparition soudaine qui doit être détecté immédiatement. Malgré la rareté de cette affection, la morbidité et la mortalité maternelles et périnatales sont importantes, même dans les cas où le traitement est idéal. Dans cet article, nous présentons cinq énoncés clés qui portent sur les facteurs de risque, le tableau clinique et la prise en charge de l'embolie amniotique dans un contexte clinique. Ces astuces visent à fournir aux cliniciens de l'information qui pourrait améliorer leur capacité à poser un diagnostic en temps opportun et à assurer un traitement de soutien approprié aux patientes atteintes d'une embolie amniotique.

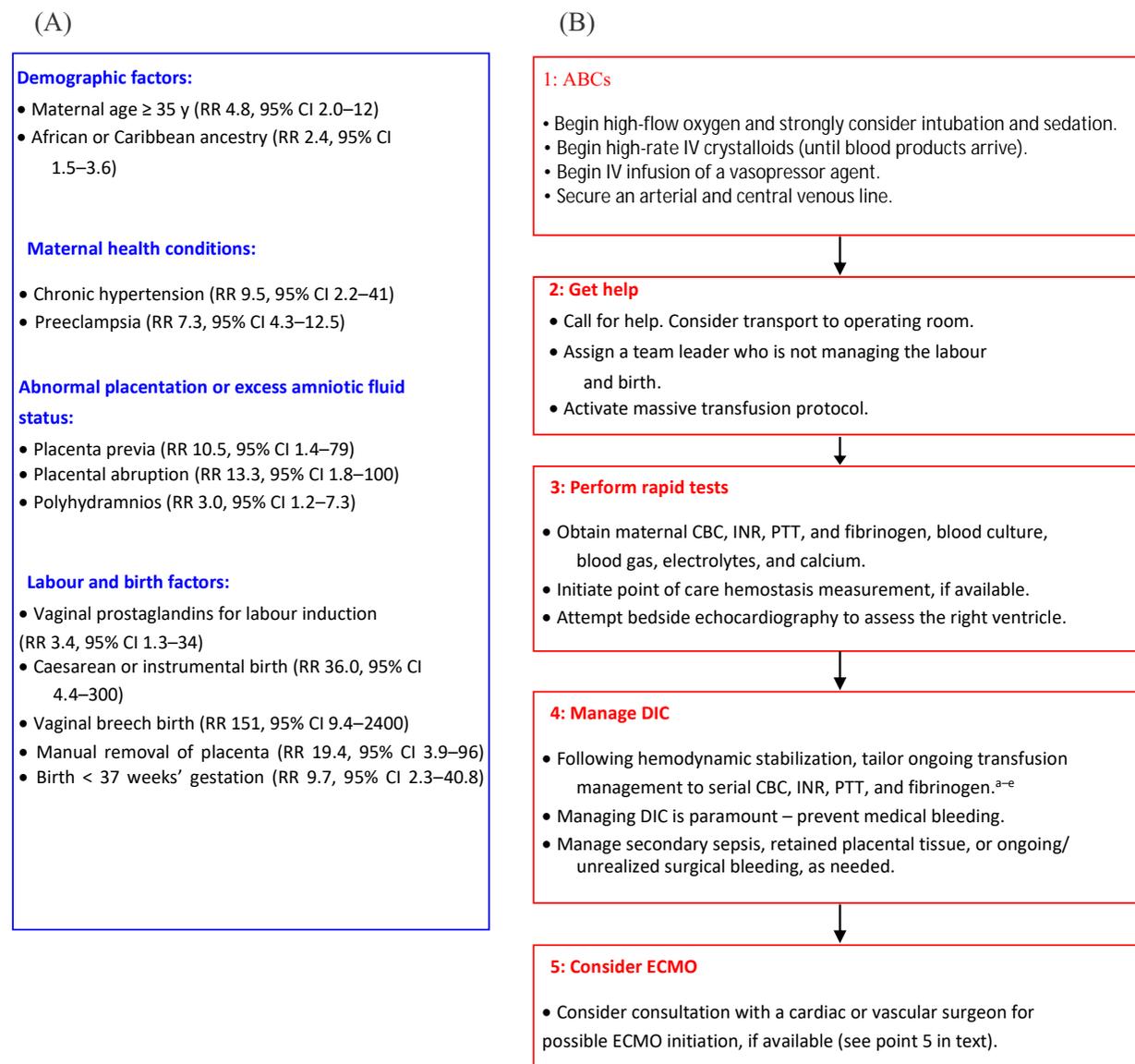
## AFE must be rapidly identified to avoid a catastrophic outcome

Amniotic fluid embolism (AFE) resembles both massive pulmonary embolism and anaphylaxis occurring simultaneously, likely from a breach of the maternal-fetal physiological barrier.<sup>(1)</sup> The four main criteria for AFE are (i) sudden-onset of cardiorespiratory arrest or systolic blood pressure <90 mm Hg, with concomitant respiratory compromise; (ii) evidence of disseminated intravascular coagulopathy (DIC), including bleeding, thrombocytopenia, elevated INR, PTT, and hypofibrinogenemia <1.5 g/L; (iii) clinical

onset during labor or within 30 min of delivery of the placenta; (iv) absence of intrapartum fever <38°C.<sup>(1)</sup> Approximately, 25% of AFE cases present asymptotically, with only respiratory compromise and shock. Although AFE cannot be accurately predicted, several risk factors are evident (Figure 1).

## AFE is Rare but Deadly

Estimates of the incidence of AFE vary widely, but it is rare. It is known fact that AFE cannot be accurately predicted, however, several risk factors are palpable (Figure 1A). Almost half of



<sup>a</sup> Tranexamic acid 2 g IV, then repeated hourly in first few hours.

<sup>b</sup> Repeat packed red blood cell transfusion to maintain haemoglobin concentration > 70 g/L.

<sup>c</sup> Repeat platelet transfusion to maintain platelet count >  $50 \times 10^9/L$ .

<sup>d</sup> Repeat fibrinogen replacement by cryoprecipitate or fibrinogen concentrate to keep blood fibrinogen level > 2.0 g/L.

<sup>e</sup> Repeat fresh frozen plasma to keep INR < 1.5 and/or PTT < 35 s.

RR relative risk; CI confidence interval; IV intravenous; CBC complete blood count; INR international normalized ratio; PTT partial thromboplastin time; ECMO extracorporeal membrane oxygenation.

Figure 1. Significant risk factors for amniotic fluid embolism are shown in blue (A) (2). Potential immediate life-saving measures for a woman suspected of having an amniotic fluid embolism are shown in red (B).

women with AFE die or experience permanent neurological injury, especially those without an obstetrician or anesthetist present at the time of the AFE event, and this befalls among those not receiving prompt correction of their coagulopathy.<sup>2</sup>

### **AFE is Characterized by a Biphasic Cardiovascular Response**

Initially, right ventricular failure leads to right ventricular dilation, which impedes left ventricular filling and results in low cardiac output.<sup>3</sup> Right ventricular failure may be evident on rapid bedside echocardiography, if available.<sup>3</sup> The second phase commences when right ventricular function improves and left ventricular failure persists. Women who survive to the second phase experience hemorrhage and massive DIC.<sup>3</sup>

Rapid management of AFE is critical, and immediate steps should be taken by anyone present, including a family physician or midwife in a team-oriented manner (Figure 1B).

Rapid and coordinated management should be led by an assigned team leader experienced with resuscitation.<sup>4</sup> DIC should be managed aggressively, including 2 g of tranexamic acid given intravenously, then repeated on an hourly basis in the first few hours, packed red blood cells to maintain a hemoglobin concentration >70 g/L, platelet transfusion to maintain platelet count >50 × 10<sup>9</sup>/L, fibrinogen replacement with fibrinogen concentrate or cryoprecipitate to keep the blood fibrinogen level >2.0 g/L, and fresh frozen plasma to keep the INR <1.5 and/or PTT <35 s.

Extracorporeal membrane oxygenation (ECMO) may be considered in cases of ongoing cardiovascular instability, despite initial resuscitative measures (Figure 1B).

Depending on available resources and feasibility, urgent consultation is required with a sub-specialty care center and a team that can determine the value of ECMO.<sup>5</sup> Case reports suggest successful use of ECMO in women with refractory AFE. As anticoagulation is required for ECMO, the bleeding risk is higher among women with ongoing DIC, or after Caesarean birth.<sup>5</sup>

### **Declaration of Interest**

The authors confirm that there are no known conflicts of interest associated with this work.

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