

# Pulmonary Embolism and Amniotic Fluid Embolism in Pregnancy

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## KEYWORDS

• Pulmonary embolus • Amniotic fluid embolus • Venous thrombosis

## KEY POINTS

- A suspected pulmonary embolism or amniotic fluid embolism (AFE) constitutes an obstetric emergency.
- There are many changes occurring during pregnancy and postpartum that play a role in the increase in clot formation.
- Early initiation of treatment is the greatest factor in survival.
- There are no diagnostic tests with demonstrated accuracy for AFE.

## INTRODUCTION

Pulmonary thromboembolism and AFE make up 2 of the most common causes of maternal death in the United States, together accounting for almost 23% of maternal death.<sup>1</sup> A recent study evaluated 95 maternal deaths of 1.4 million pregnancies over a 6-year period in the United States<sup>1</sup> and found that pulmonary thromboembolism and AFE were 2 of the most commonly seen causes of maternal death. AFE accounted for 14% of the total maternal deaths, and pulmonary thromboembolism accounted for 9% of the maternal deaths. Any discussion regarding obstetric emergencies requires a thorough understanding of these 2 entities. This article reviews the diagnosis and management of AFE and pulmonary thromboembolism in pregnancy.

## PULMONARY THROMBOEMBOLISM

Pulmonary embolism and venous thrombosis represent one of the more common life-threatening emergencies faced by obstetric providers. Improved assessment of risks

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Obstet Gynecol Clin N Am 40 (2013) 27–35

<http://dx.doi.org/10.1016/j.ogc.2012.11.005>

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and institution of appropriate thromboprophylaxis has led to improvement, but venous thromboembolism remains a leading cause of maternal mortality in the developing world, including the United States.<sup>1,2</sup> The incidence of pregnancy-related venous thromboembolism has been reported to be as high as 1.72 per 1000 deliveries, and the incidence of pulmonary embolism in pregnancy is 200 per 100,000 woman-years.<sup>3</sup> Thromboembolism usually presents unprovoked and with little warning, therefore rapid diagnosis and treatment is critical to preventing maternal deaths. An understanding of the risk factors, clinical symptoms, diagnostic testing, and treatment modalities is necessary to make a rapid diagnosis and institute timely therapy.

### ***Risk Factors***

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Pregnancy is a hypercoagulable state and is in itself a risk factor for thrombosis. The relative risk for venous thromboembolism among pregnant and postpartum women is 4.29.<sup>3</sup> Venous thromboembolism can occur at any point in pregnancy or postpartum, although half of pregnancy-related venous thromboembolism occurs in the postpartum period.<sup>4</sup> It is therefore important to maintain a heightened suspicion for thromboembolism, and prevention should be an aspect of all postpartum care.

There are many changes occurring during pregnancy and postpartum that play a role in the increase in clot formation, including

- Hypercoagulability
- Decreased mobility
- Venous stasis

Pregnancy is a state of relative hypercoagulability with an increase in levels of fibrinogen; factors VIII, IX, and X; von Willebrand factor; and plasma activator inhibitors 1 and 2.<sup>5</sup> Women may have decreased mobility in labor because of pain, epidural anesthesia, and fetal monitoring. Women undergoing cesarean delivery are especially at risk and carry twice the risk of venous thromboembolism. The American College of Obstetricians and Gynecologists recommends that all women undergoing cesarean delivery have pneumatic compression devices placed before cesarean delivery and that women with additional risk factors may require thromboprophylaxis with heparin.<sup>5</sup>

Certain medical conditions carry an increased risk of venous thromboembolism. Among these conditions, having a personal history of a known thrombophilia carries the greatest risk with an odds ratio of 52.<sup>4</sup> Other risk factors for thromboembolism include<sup>5-8</sup>

- Personal history of venous thrombosis
- Antiphospholipid antibody syndrome
- Lupus
- Heart disease
- Sickle cell disease
- Black race
- Advanced maternal age
- Diabetes
- Obesity
- Operative delivery
- Smoking
- Hypertension

Stratifying women based on risk factors may help to determine who needs thromboprophylaxis in pregnancy and in what situations. Several groups have evaluated weighted scoring systems to guide thromboprophylaxis in high-risk pregnant

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