

Amniotic Fluid Embolism with Isolated Coagulopathy: A Report of Two Cases

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ABSTRACT

Amniotic Fluid Embolism (AFE) is a catastrophic complication of pregnancy with high mortality rate. The most common clinical presentation is an abrupt onset of cardiopulmonary collapse. Here, we present an uncommon variant involving isolated disseminated intravascular coagulation that developed without antecedent cardiopulmonary disturbances. Both patients developed symptoms soon after delivery. Blood test was sent at 14 minutes postpartum for the second patient due to suspected amniotic fluid embolism. Fetal components were observed in the uterine veins of the lower uterine segments in both cases. Amniotic fluid embolism with disseminated intravascular coagulopathy typically progresses faster than disseminated intravascular coagulopathy associated with other causes and symptoms. It usually develops within two hours of delivery. Prompt recognition and treatment of this entity is crucial to survival.

Keywords: Disseminated intravascular coagulopathy, Fetal components, Maternal death, Postpartum haemorrhage

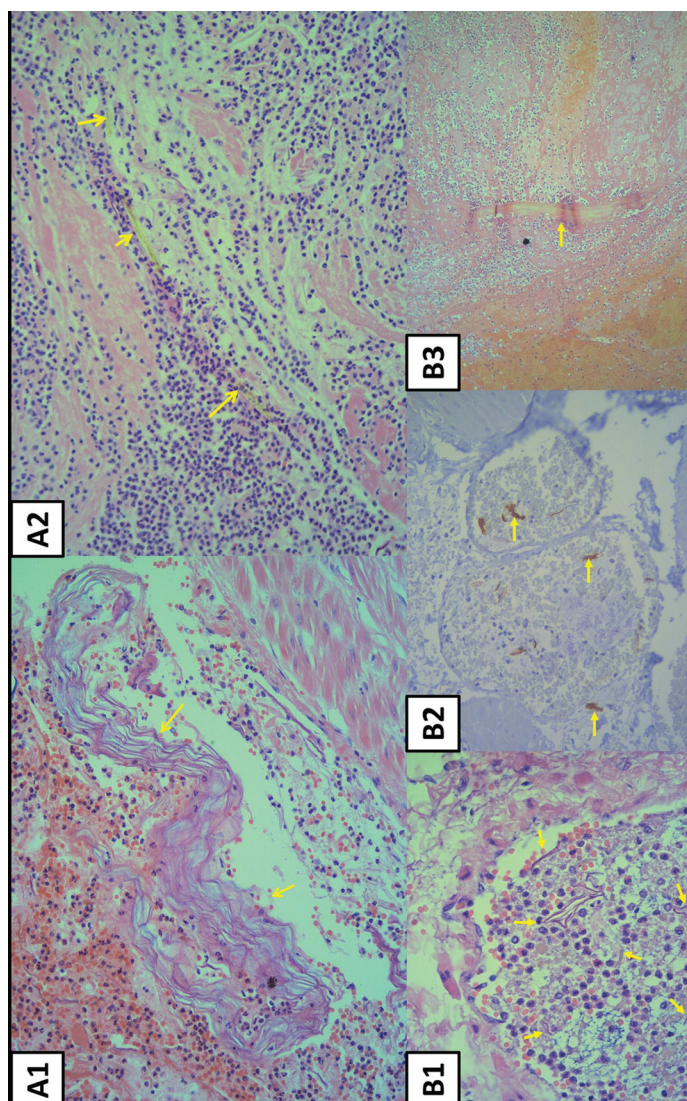
CASE REPORT

Case 1: The patient was a 29-year-old female with gravida 3, para 2, and abortus 1 who had a spontaneous full term vaginal delivery. Her prenatal care was normal and intrapartum course was smooth with no use of pitocin. Spontaneous vaginal delivery with normal neonatal outcome occurred after membrane rupture. She developed profuse vaginal bleeding 1 hour and 10 minutes after delivery. The patient was transferred to our hospital one hour and 22 minutes after the bleeding episode. She presented with massive vaginal bleeding and physical examination revealed a soft uterus and uncoagulated blood in the vagina. Her blood pressure was 80/48 mmHg, with a pulse rate of 120/minute, respiratory rate 20/minute, and body temperature 37.7°C. No respiratory distress was noted. Coagulation studies revealed a fibrinogen of 26.1 mg/dL, prothrombin time 32.9 seconds (8–12 seconds), Prothrombin International Normalised Ratio (INR) 3.57, partial thromboplastin time 41.7 seconds (23–35 seconds), Fibrinogen Degradation Product (FDP) 829.1 µg/mL (<5.0 µg/mL), D-Dimer 1162 µg/L (<324 µg/L), Hemoglobin (Hb) 7.6 g/dL, Hematocrit (Hct) 24.0%, and platelet count 101× THSD/µL. She was sent to the operative room for uterine curettage due to suspected retained placenta before the coagulation studies, but no abnormalities were found. Therefore, she received total abdominal hysterectomy because of persistent and uncoagulated bleeding. The vital signs and laboratory data became stable after hysterectomy and transfusion of 14 units of packed RBCs, 12 units of fresh frozen plasma, 17 units of cryoprecipitate, and 12 units of platelets.

The pathological findings confirmed our diagnosis of AFE and revealed multifocal thrombi with fibrinoid and inflammatory exudates, presence of keratinizing desquamated squamous cells and amorphous materials, and a rare lanugos hair-like structure within the vascular lumen of the cervix and lower uterine segment [Table/Fig-1a1, a2].

Case 2: The patient was a 35-year-old female with gravida 3, para 1, and abortus 1. She was at 39 weeks gestation and was otherwise healthy. She had taken no medication and had no known allergy. She was admitted for delivery. The labour course was uneventful without pitocin augmentation. Thin meconium staining was observed. The patient remained haemodynamically stable throughout the labour and delivered a healthy male baby.

The obstetrician noted steady and profuse noncoagulated uterine



[Table/Fig-1]: (a1) Arrows indicate vascular thrombi with laminated squames (Haematoxylin– eosin stain, original magnification ×200). (a2) Arrows indicate fibrinoid and inflammatory exudates with lanugo hair (Haematoxylin– eosin stain, original magnification ×200). (b1) Arrows indicate presence of intravascular thrombi with squames (Haematoxylin– eosin stain, original magnification ×400). (b2) Arrows indicate the highlighted squames (Immunohistochemical stain for Cytokeratin, original magnification ×200). (b3) Arrow indicates vascular thrombi with lanugo hair (Haematoxylin– eosin stain, original magnification ×100).

bleeding despite perineal laceration repair. Atony uterus was identified. The patient received one dose of methyl ergonovine maleate (0.2mg) intramuscularly and one dose of carboprost tromethamine (0.25mg) intramuscularly along with 1000 µg of misoprostol per rectum. No vaginal clots were observed at any point. Pitocin infusion was instituted at full speed after placental delivery.

A blood sample tested 14 minutes postpartum revealed a Hb of 9.9 g/dL, Hct 29.9%, Platelet 110× THSD/µL, Prothrombin time >150/10 seconds (8–12seconds), PT(INR) >10.0, and partial thromboplastin time 39.7seconds (23–35seconds). AFE and associated profound disseminated intravascular coagulation were clinically diagnosed. The patient experienced mild chest pain before insertion of central venous catheter. She was sent for emergent hysterectomy because of uncontrolled bleeding. She exsanguinated despite appropriate medical management and blood components replacement. Total fluid resuscitation, including crystalloid (6500cc), colloid (1000cc), packed RBCs (24 units), whole blood (4 units), fresh frozen plasma (18 units), cryoprecipitate (20 units), and fresh whole blood (19 units), were administered. The pathologic findings from the venous vascular lumens revealed multifocal thrombi, epithelial squames, amorphous materials, and lanugos [Table/Fig-1, b1-b3].

DISCUSSION

AFE is a devastating obstetric syndrome and occurs in 1 in 8000 to 1 in 80,000 pregnancies [1]. AFE occurs during labour in 70%, after vaginal delivery in 11%, and during cesarean section after delivery in 19% of women [2]. Two large population-based cohort studies have reported that the rate of AFE is 14.8 and 6.0 per 100,000 women in multiparous and primigravida deliveries, respectively [3,4]. The actual incidence is unclear because this syndrome is difficult to identify, and its diagnosis remains one of exclusion with possible under reporting of non fatal cases. Because AFE is uncommon, its underlying mechanism remains poorly understood; no single practitioner or institution can have sufficient experience to determine the associated risk factors, clinical course, pathophysiologic factors, or treatment.

Classic presenting symptoms of AFE include respiratory distress, altered mental status, profound hypotension, coagulopathy, and death [1]. According to the study by Clark using the United States National Registry, seizures or seizure-like activity was reported as the initial symptom in 30% of the patients, followed by dyspnea (27%), fetal bradycardia (17%), and hypotension (13%) [2]. More than 50% of the patients reported coagulopathy, which usually accompanied the aforementioned symptoms.

Although there is a general agreement that Disseminated Intravascular Coagulopathy (DIC) almost invariably accompanies amniotic fluid emboli, either clinically or subclinically, it is rarely detected as an initial and isolated symptom. Davies reported an isolated coagulopathy with maternal haemorrhage without cardiopulmonary collapse [5].

Kanayama and Tamura divided AFE syndrome into two groups based on the clinical symptoms: classical type with cardiopulmonary collapse and DIC type with atony bleeding. In patient presents with atonic bleeding, incoagulable vaginal bleeding developed after placental delivery. Uterine atony occurred immediately [6].

The typical laboratory findings were marked decrease in fibrinogen levels and prolong PT PTT levels [7].

This isolated coagulopathy of AFE must be differentiated from the diagnosis of severe abruption placenta, prolonged retention of a dead fetus, septic shock, ruptured uterus, preeclampsia, transfusion reaction, multiorgan failure, and massive trauma or blood loss. DIC associated with AFE typically progresses faster than DIC associated with other causes and symptoms usually develop

within 2 hours of delivery. Prompt recognition and treatment of this entity is crucial to survival.

The presence of clotting factors in the amniotic fluid is associated with possible activation of the clotting cascade in the pulmonary vasculature [8-10]. Additional data reported that increased levels of plasminogen activator inhibitor-1 antigen in the amniotic fluid may become active in the maternal circulation, leading to consumptive coagulopathy [8,11]. Recent studies suggest that the pathophysiology might be immune mediated. Non-IgE-mediated anaphylactoid reaction activates the complement cascade and also releases kallikrein and bradykinin, which may explain the another cause coagulation abnormalities [10,12].

In the UK, detection of amniotic components/fetal materials in pulmonary vessels is required for postmortem AFE diagnosis [13]. Although amniotic components can be detected in normal maternal circulation [14]; however, they are rarely detected in maternal lungs during the normal course of pregnancy. In our patients, many squamous cells and even lanugo hairs demonstrated in the uterine vessels. We speculated that the number of squamous cells or lanugo hairs in maternal blood of the patients with AFE may be greater than that in non-AFE patients

Despite inconclusive evidence regarding the cause of the coagulopathy in amniotic fluid emboli, activation of the coagulation system may lead to life-threatening haemorrhage clinically. Treatment of the coagulopathy consists of blood component therapy, including packed RBCs, fresh frozen plasma, platelets, and cryoprecipitate. However, the maternal mortality rate remains extremely high.

CONCLUSION

Our two patients represent unusual presentations of AFE in which an isolated coagulopathy causes severe postpartum haemorrhage, unlike other patients who present with sudden onset of dyspnea or cyanosis, unexplained shock, and unexplained convulsion, alone or combined with disseminated intravascular coagulation. This coagulopathy following AFE must be differentiated from other causes of postpartum haemorrhage including atonic uterus, placental retention, birth canal laceration, and placenta accreta. However, major haemorrhages in cases described herein were the only clinical manifestations of AFE, which can delay the diagnosis of AFE because an exhaustive search for structural causes of haemorrhage is likely. Therefore, clinicians should suspect AFE when profuse postpartum haemorrhage develops without coagulation and without cardiopulmonary compromise.

CONFLICT OF INTEREST

The authors have no conflicts of interest.

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