Case report

Amniotic Fluid Embolism Leading to Multi Organ Dysfunction: A Case Report

ABSTRACT

Aims: This case report is aimed at highlighting the difficulties and rapid progress of an amniotic fluid embolism in a multiparous woman post-delivery, outlining the importance of early detection and intervention.
Study design: Case Report.
Place and Duration of Study: Nirmal Hospital Pvt. Ltd Surat, Gujarat. Between August to October 2024
Methodology: The case was followed during the hospital stay and evaluated for two months afterward.
Case Presentation:A the 32-year-old multiparous lady arrived at the labor room 3.5 hours after giving birth, she was unconscious and experiencing tachycardia, hypotension, hypoxia, and hypovolemic shock as a result of heavy postpartum haemorrhage. She had severe anemia and coagulopathy as seen in her lab findings. She deteriorated immediately after interventions involving intravenous fluids, broad-spectrum antibiotics, and blood product transfusions. She developed seizures and had extreme cardiovascular instability, which ended up in cardiac arrest, which could not be resuscitated. She was pronounced dead on the second day of the event.
Conclusion: This case illustrates the urgent need for heightened awareness of AFE and effective protocols for early identification and management. Its clinical significance resides in its uncertainty, the severity of its manifestations, and inadequate understanding of its pathophysiology. Although AFE cannot be prevented, early detection and prompt treatment may result in improved outcomes for both parent who gives birth and the foetus. Advanced imaging methods including CT scans, echocardiograms, and novel laboratory testing could provide for more rapid detection and precise diagnosis.

Keywords: Disseminated Intravascular Coagulopathy, Amniotic Fluid Embolism, Obstetric emergency, Pregnancy complication

1. INTRODUCTION

Amniotic fluid embolism (AFE) is one of the most devastating issues associated with pregnancy [1]. It is believed that the mother's circulation collapses when amniotic fluid, fetal cells, hair, or other debris enters the pulmonary circulation. [2][3][4]. Simultaneous rupture in the uterine vasculature and fetal membranes may cause AFE by allowing amniotic fluid to enter the uterine vein and subsequently the mother's pulmonary arterial circulation [6]. AFE may cause modest organ failure, coagulopathy, cardiovascular collapse, and even death [5]. AFE has also been documented in the second trimester, despite the fact that labour and delivery seem to be the times of highest risk [7]. AFE symptoms, including acute hypoxia, hypotension, and coagulopathy, are non-specific and might mimic other obstetric emergencies such as eclampsia, pulmonary embolism, or post-partum hemorrhage. This overlap in symptoms can result in a misdiagnosis or a delayed diagnosis additionally, there are no specific laboratory tests or imaging studies that can accurately identify AFE. It is essentially a clinical diagnosis of exclusion. Therefore, it is typically underdiagnosed in the early stages [17].Women

who undergo spontaneous vaginal delivery face a higher risk of developing amniotic fluid embolism (AFE) compared to those who have a caesarean section. Research indicates that the global maternal mortality rate from AFE fluctuates although it is typically considered to be approximately 20%. [15] The mortality rate varies from 5% to 24.3% in developed nations. [16]. Also the incidence of AFE in vaginal deliveries ranges from approximately 1 in 8,000 to 1 in 30,000. In contrast, the risk of AFE in caesarean deliveries is lower, with an estimated incidence of about 1 in 15,200 to 1 in 53,800. [16] Those who developed Amniotic Fluid Embolism after birth, in 69% of such cases AFE develops within 5 minutes. [8]. However, it has been demonstrated that AFE can happen up to 36 hours after birth. In these situations, the diagnosis remains controversial [9]. In this report, we present a case of suspected AFE with seizures, lethal respiratory and circulatory failure.

2. CASE PRESENTATION

We are reporting a case of a multiparous 32 years oldG3P3L2(Gravida 3, Para 3 with 2 Living children) women, who had a full-term normal delivery with episiotomy before 3 and a half hours of shifting at our hospital on 23rd August 2024. The patient presented with drowsiness, hypotension, hypoxia, tachycardia, tachypnea and hypovolemic shock. Her expected delivery date was August 23, 2024. Immediate concern was significant postpartum vaginal bleeding for which the patient was transferred to our hospital, her condition rapidly deteriorated.

Laboratory investigations at the day of admission revealed a hemoglobin level of 7.7 g/dL, indicating significant anemia, and a total white blood cell count of 42,000 cells/mm³, suggestive of possible infection or stress response. The prothrombin time international normalized ratio (PT INR) was measured at 3.4, indicating severe bleeding, while fibrinogen levels were critically low at 80 mg/dL indicating the state of hypercoagulability. D-Dimer levels exceeded 10.2µ/ml, and Fibrinogen degradable product were 100mcg/mL pointing towards a hypercoagulable state and possible disseminated intravascular coagulation (DIC). Neurological assessment indicated reduced consciousness with Glasgow Coma Scale (GCS) score of E3M6V5. Upon examination, her vital signs indicated a heart rate of 180 beats per minute, pulse was not palpable, and blood pressure was non recordable. The respiratory rate was 30 breaths per minute, and her oxygen saturation was 99% on an oxygen mask.

The medical team started intravenous fluids including noradrenaline immediately to address hypovolemia and began administering broad-spectrum antibiotics, including Cefoperazone and sulbactum and Inj. Clindamycin, to combat potential infections. To reduce bleeding and clotting Tranexamic acid and Inj. Vitamin K were administered. Furosemide, a diuretic, was also given because the urine output was quite low. The patient was intubated and placed on invasive mechanical ventilation to ensure adequate oxygenation. The urgency of her situation was compounded by severe coagulopathy, necessitating the administration of fresh frozen plasma (FFP) and cryoprecipitate to correct her coagulopathy and address the ongoing bleeding. Immediately upon admission, a total of 6 units of fresh frozen plasma were administered, on the next day 4 further units were given and the initial 10 units of cryoprecipitate was administered, 4 more units of cryoprecipitate were given on next day.

The patient's condition continued to worsen. The patient had persistent vaginal bleeding after shifting at our hospital. Despite the administration of many units of FFP and cryoprecipitate, she remained in a state of hypotension and hypoxia, needing maximum doses of inotropes to maintain her blood pressure. The medical team consulted specialists, including a cardiologist, who performed an echocardiogram that revealed right ventricular overload and Grade I left ventricular diastolic dysfunction. The left ventricular ejection fraction (LVEF) was measured at 60%, though it was normal but the strain on the heart was considerable indicating Right ventricular overload and right ventricular failure. The cardiologist recommended further medications, including tab. Sildenafil and Selexipag, to address the right ventricular overload, alongside an infusion of Inj. Milrinone to support cardiac function. Despite these measures, the patient's general condition remained poor. Her PT fluctuated from 45 seconds to 30 seconds and INR also fluctuated, and subsequent tests revealed values of 2.9 and then 3.0, indicating persistent coagulopathy.

The patient's neurological status began to decline significantly on next day. Initially assessed at a GCS of E3M6V5, she deteriorated to E4M1VET, indicating a marked decrease in responsiveness. The medical team noted that her pupils were still reactive but increasingly sluggish. The patient suffered a fever spike with temperature readings of 100-103° Fahrenheit. The patient developed sudden generalized tonic-clonic seizures few hours before cardiac arrest, which required the intravenous infusion of levetiracetam, to stabilize her condition. The patient experienced abrupt hypertension (179/108), followed by a gradual dropping to hypotension (76/43). The situation escalated when she suddenly experienced cardiac arrest. The code blue team was activated, and advanced cardiac life support (ACLS) protocols were initiated immediately. Despite the team's best efforts, including CPR, defibrillation, and administration of adrenaline, the patient could not be revived. The patient was declared dead on August 25, 2024, at 2:15 AM. The whole clinical sequence of events is summarized in figure 1.

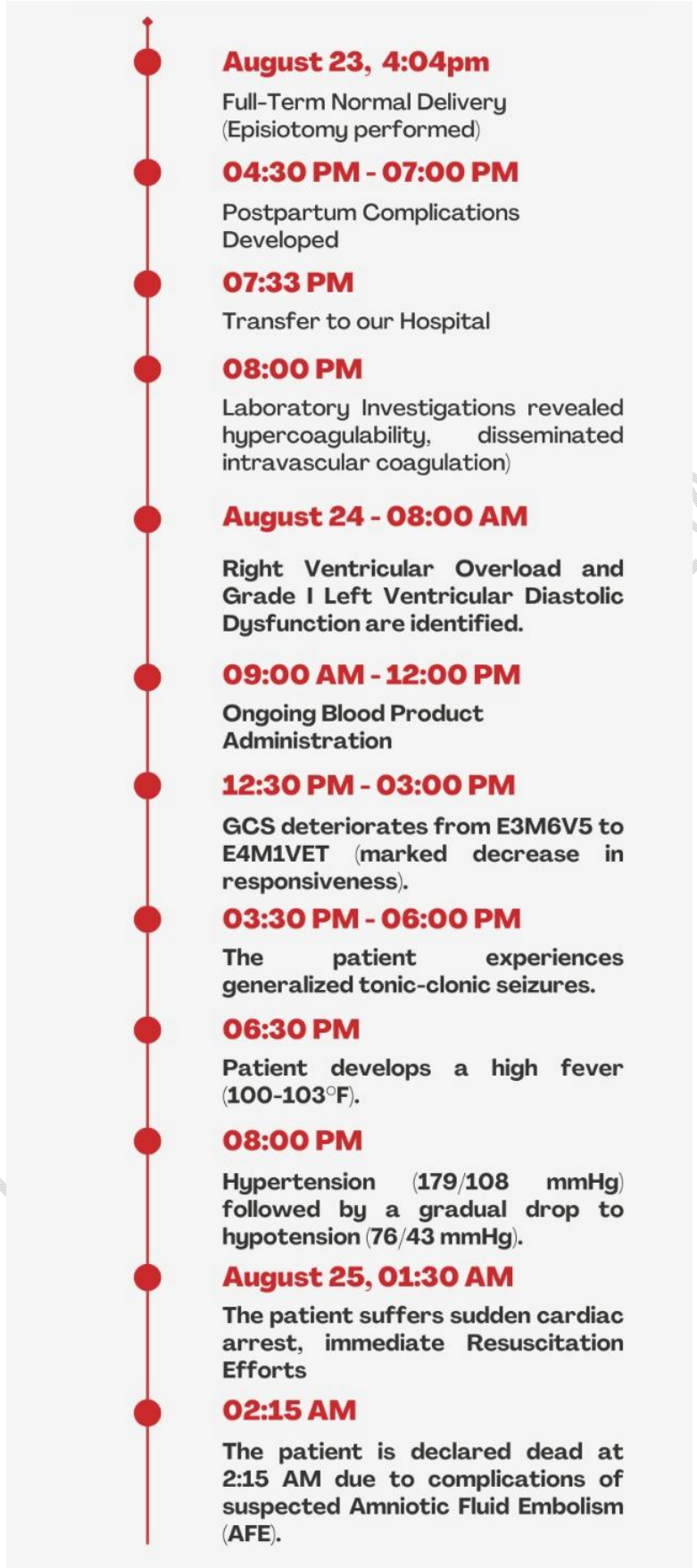

Figure 1: Timeline for sequence of events in case report from 23rd August 2024 to 25th August 2024

3. DISCUSSION

According to WHO, Postpartum hemorrhage (PPH) is a significant direct cause of maternal death globally, accounting for nearly 70,000 deaths per year [10]. The European Society of Anesthesiology and Intensive Care (ESAIC) 2022 guidelines for the management of severe pre-operative bleeding emphasize the importance of raising risk awareness and identifying severe PPH in patients undergoing obstetric procedure as soon as possible. [11] We present a case characterized by early detection of PPH, followed by rapid administration of the antifibrinolytic drug Trenexamic acid at a dose of 1 g, as suggested by ESAIC guidelines. We have diagnosed AFE using the Clark diagnostic criteria [12]. The Clark criteria were created by the Society for Maternal-Fetal Medicine and the AFE Foundation. They include the following: (1) clinical onset during labor or within 30 minutes of delivery; (2) confirmed DIC; (3) sudden cardiorespiratory arrest, or both hypotension and respiratory compromise; and (4) Having no fever (≥38.0 C) when in labor. We report a case scenario meeting all Clark criteria for AFE.

The following are the main risk factors for the development of AFE: advanced maternal age(>30years), Placenta Previa, placenta accrete, ablation placenta, preeclampsia, eclampsia, gestational diabetes, multiple pregnancies, polyhydramnios, cerebrovascular disease, heart disease and kidney diseases; multiparity, male foetus, trauma such as uterine rupture, cervical laceration, amniocentesis, cordocentesis, amnioinfusion, amniotomy, labor, labor induction, caesarean delivery, dilatation and curettage [13][14]. In this case, the risk factors for AFE were male foetus, advanced maternal age and multiple pregnancies.

Per vaginal bleeding was treated with replacement of depleted blood products provided quickly as soon as the patient arrived at our facility in the postpartum period. The implementation of advanced cardiac life support (ACLS) protocol highlights the urgency of addressing such cases.Recent case reports illustrate various treatment approaches, including advanced cardiac life support, fluid resuscitation, surgical interventions, and novel therapies like intraoperative cell salvage, C1 esterase inhibitors, A-OK treatment regimens and Extracorporeal Membrane Oxygenation which can be used in severe complications of AFE. [9] [11] [14].Despite rapid care, such as fluid resuscitation, blood product administration, and inotropic support, the patient's condition worsened; unfortunately, outcomes remain poor in the face of severe AFE.

4. CONCLUSION

This case report of suspected amniotic fluid embolism (AFE) in a multiparous woman after full-term delivery sheds light on the complexities and unpredictability of this life-threatening illness. This case highlights the significance of identifying early presentations of AFE and suggests that doctors should continue surveillance for AFE during entire period of pregnancy. Currently, AFE treatment focuses on improving patient outcomes and lowering mortality by providing high-quality basic and advanced life support, as well as treating bleeding and coagulopathy. A multidisciplinary team-based approach is recommended, along with novel therapy alternatives for AFE management. By reporting this unique case and highlighting the sequence of complications leading to multi-organ failure, we hope to improve maternal outcomes in similar scenarios by expanding the understanding of AFE and advocating for better protocols that can enable early detection and intervention.

Consent

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.)

and text-to-image generators have been used during the writing or editing of this manuscript.

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