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Case Report

Massive pulmonary embolism with cardiac arrest in pregnancy: A case report

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ABSTRACT

A 39-year-old woman developed a pulmonary embolism at 28 weeks of gestation, after a 4-week period of bedrest, and required emergencycesarean section due to a decrease in fetal heart rate. Pulseless electrical activity (PEA) developed after intravenous anesthesia. The fetus was delivered 5 min after PEA onset, during cardiopulmonary resuscitation of the mother. Intravenous recombinant tissue-plasminogen activator injection, percutaneous cardiopulmonary support, and 24-h hypothermia therapy were administered to the mother, followed by inferior vena cava filter insertion, combined with catheter thrombus fragmentation and percutaneous thrombectomy. Both the patient and her baby survived.

<**Learning objective:** Massive pulmonary embolism with pregnancy may result in death of both mother and child. In this case, after maternal cardiac arrest due to massive pulmonary embolism, the fetus was delivered by cesarean section, followed by thrombolysis treatment using recombinant tissue-plasminogen activator and percutaneous cardiac pulmonary support, pulmonary thrombectomy which was performed on day 3 was effective. Both the patient and her baby survived.>

Introduction

Pregnant women are more prone to increased coagulability and, as such, venous thromboembolism (VTE) tends to occur 10 times more frequently in pregnant women than in the general population, with the rate ranging between 0.05% and 0.3% [1]. About 20% of maternal deaths are believed to be caused by VTE in the USA. Here, we report a case of a pregnant woman who developed cardiac arrest because of pulmonary embolism (PE) and subsequently underwent cesarean section.

Case report

A 39-year-old woman was referred to our hospital, at 23 weeks of gestation, for treatment of preterm labor. During hospitalization, she was placed on bed rest, with permission to stand and walk only for personal hygiene care and defecation without additional use of compression stockings. Four weeks later she suddenly complained of shortness of breath. Her D-dimer also increased to 5.2 μg/mL. Concerning the radiation exposure to the fetus, although agreeing to contrast computed tomography (CT) of the chest, agreement was not obtained for radiation to the uterus. We diagnosed PE. In the absence of evidence of deep vein thrombus of the lower extremities on venous echography, the patient was treated with continuous unfractionated heparin infusion. Activated partial thromboplastin time (APTT) was continuously administered 1.5–2.5 times as a guide. An inferior

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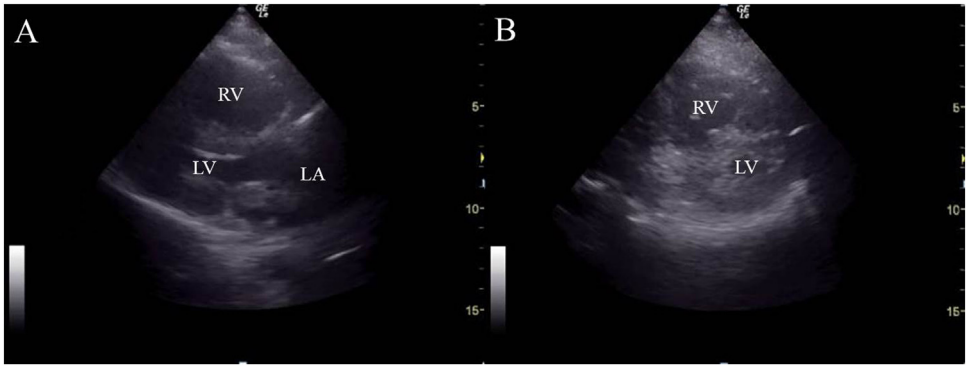

Fig. 1. Transthoracic echocardiography. (A) Parasternal view, showing a marked dilation of the right ventricle (RV) and compression of the left ventricle (LV); the left atrium (LA) is also observed. (B) On the short-axis view, a D-shaped septum is observed.

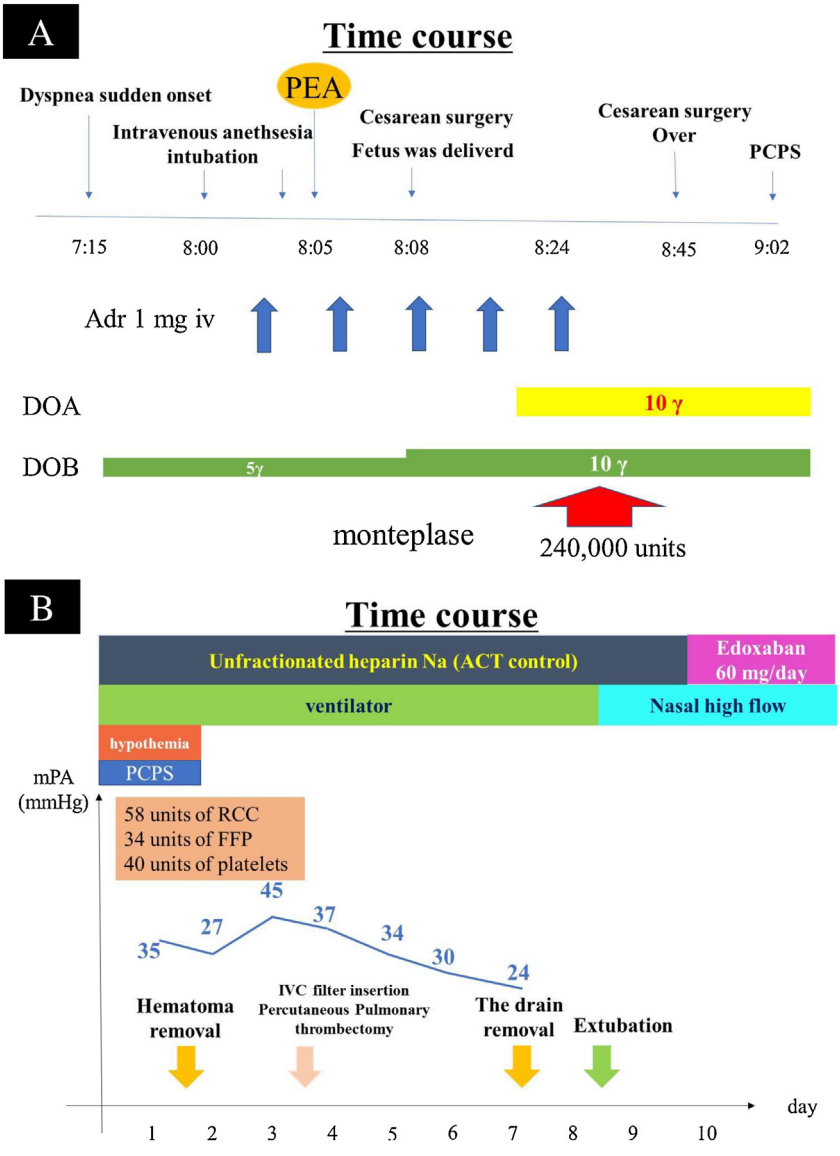

Fig. 2. (A) Time course. Sudden breathing difficulty occurred, anesthesia was introduced in the operating room after 45 min, but then it shifted to PEA. While continuing CPR, the baby was delivered and PCPS was introduced after cesarean section. (B) Time course (intensive care unit). After entering the ICU, hypothermia therapy, PCPS management, and anticoagulation therapy using the heparin were performed. As the progression of anemia was remarkable, a large amount of blood transfusion was required. Also during that time hematoma removal was required. Since the average pulmonary artery pressure increased on the third day of entry to the ICU, catheter directed therapy was added. After that, we continued a multidisciplinary treatment and extubated on day 9.
PEA, pulseless electrical activity; CPR, cardiac pulmonary resuscitation; ICU, intensive care unit; RCC, red color cell; FFP, fresh frozen plasma; PCPS, percutaneous cardiac pulmonary support; mPA, mean pulmonary artery.

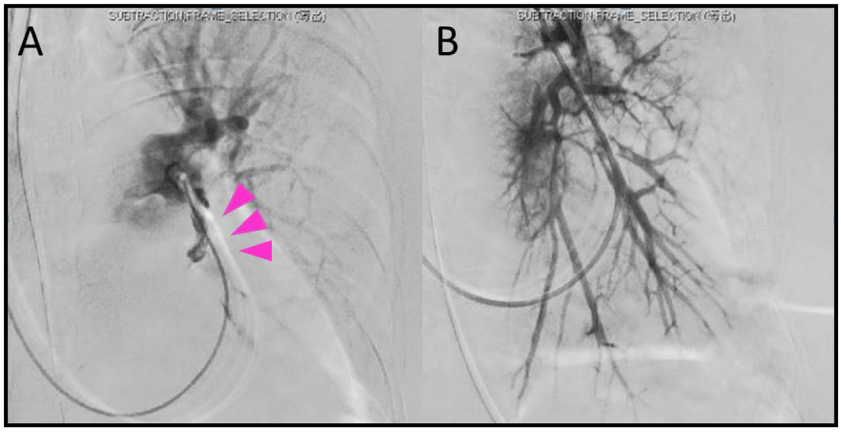

Fig. 3. Pulmonary thrombectomy, showing the (A) pre-catheter state and (B) the post-catheter state. In (A), the arrows show the occlusion of the left pulmonary artery due to a large amount of thrombus. In (B), the arrows show the improved blood through the left pulmonary artery after pulmonary thrombectomy.

vena cava (IVC) filter was not inserted. In cardiac echocardiography, tricuspid regurgitation pressure gradient was around 40 mmHg. Testing for abnormal coagulation factors was negative, including for protein C, protein S, and anti-cardiolipin antibody. However, 6 days after PE diagnosis, the patient reported symptoms of palpitation and dyspnea. After that she was in shock. Transthoracic echocardiography revealed a more distinct D-shaped septum, indicative of a dilation of the right ventricle. Based on these findings, the diagnosis of PE was confirmed (Fig. 1A, B). A continuous infusion of dobutamine 5 γ was immediately initiated for PE treatment. However, the heart rate of her fetus decreased to 80 beats per minute and, consequently, we proceeded to immediate cesarean section for delivery. We proceeded with administration of general anesthesia, using injection of propofol. The patient went into cardiac arrest, with pulseless electrical activity (PEA) noted, and the fetus was delivered 5 min later, as cardiac pulmonary resuscitation (CPR) was being performed. Recombinant tissue plasminogen activator (rt-PA; monteplase, 240,000 units) was injected 16 min after delivery, with an improvement in blood pressure to 60 mmHg. Percutaneous pulmonary cardiac support (PCPS) was also initiated (Fig. 2A), with stabilization of her hemodynamic status, although her abdominal distention worsened. We proceeded with surgical management to achieve homeostasis, including ovariectomy. Hypothermia therapy was started. The patient was transfused with a large amount of transfusion, with a return to normothermia following the 24-h period of hypothermia. On day 3, a contrast CT was performed, with thrombi noted in the pulmonary artery and left internal iliac vein, bilaterally. A filter was inserted, at this time, in the IVC, and catheter thrombus fragmentation and percutaneous pulmonary thrombectomy were performed (Fig. 2A, B). The left pulmonary artery was recanalized (Fig. 3).After extubation on day 9, after surgery, rehabilitation was initiated. The IVC filter was removed after resolution of the deep vein thrombosis. Per our hospital policy, Xa inhibitor therapy was maintained for 6 months, post-discharge. The patient presented with mild cognitive dysfunction in the immediate post-operative period, which subsequently recovered. With regard to the neonate, spontaneous breathing was established immediately after birth, although adequate feeding could not be established, and tube feeding was initiated.

The patient provided informed consent for the publication of her information and that of her child.

Discussion

We describe the clinical course and treatment of a massive PE in a pregnant woman, after a 4-week period of bedrest, that required emergency cesarean for delivery at 28 weeks of gestation. While continuing effective CPR after delivering the fetus, the thrombus was dissolved using rt-PA, followed by PCPS to maintain circulatory dynamics and hypothermia to lower the risk of brain damage during the critical period.

Once acute PE progresses to cardiac arrest, approximately 70% of patients die [1]. Even with early diagnosis of PE, the mortality rate remains high at 2%–7% [2]. In addition, in the presence of unstable hemodynamics, the mortality rate increases to more than 50% [3], with surgical or catheter embolectomy and catheter thrombolysis being difficult to perform in these patients. Recombinant tissue plasminogen activator (rt-PA) administration in these cases can prevent death. In a series of 13 cases of severe maternal PE, the use of rt-PA was effective in preventing death in all cases [4]. Among these cases, 30.8% showed non-fatal bleeding and fetal death was reported in 15.4% of cases. Urokinase can cause extensive PE thrombolysis, with subsequent bleeding being an important issue. The half-life of urokinase is about 2 h, during which, maintaining vital status during transfusion of a large amount of blood can save a patient's life. The use of surgical thrombectomy and catheter thrombolysis, as alternative treatments, is more limited [4].

In conclusion, this case was considered to be a case in which the fetus was quickly delivered, administration of monteplase and PCPS improved hemodynamics, and furthermore percutaneous pulmonary thrombectomy was combined to save a life.

Conflict of interest

None.

Funding

None.

Relationship with industry

None.

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References

[1] Stein PD, Henry JW. Prevalence of acute pulmonary embolism among patients in a general hospital and at autopsy. Chest 1995;108:978–81.
[2] Milford W, Chadha Y, Lust K. Use of a retrievable inferior vena cava filter in term pregnancy: case report and review of literature. Aust N Z J Obstet Gynaecol 2009;49:331–3.
[3] Goldhaber SZ, Visani L, De Rosa M. Acute pulmonary embolism: clinical outcomes in the international cooperative pulmonary embolism registry (ICOPER). Lancet 1999;353:1386–9.
[4] te Raa GD, Ribbert LS, Snijder RJ, Biesma DH. Treatment options in massive pulmonary embolism during pregnancy; a case-report and review of literature. Thromb Res 2009;124:1–5.