

Case Report

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A Case of Successful Cardiopulmonary Resuscitation in a Pregnant Woman with Eisenmenger's Syndrome



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Abstract

Patients with Eisenmenger's syndrome (ES) are advised to avoid pregnancy due to high maternal mortality, reaching 30 - 50%. A 37-year-old pregnant patient, at a gestational age of 14/15 weeks, was admitted to the Medical Center for abortion due to ES. Due to the complete presentation of the chorion, it was planned to perform curettage of the uterine cavity. After introduction of antibacterial drug in the perioperative period, acute decompensation of heart failure was observed, which required cardiopulmonary resuscitation and ECMO. This condition was assessed as an anaphylactic shock. It was possible to stabilize the patient after switching to ECMO. On the next day the patient was extubated and the ECMO system was explained on the 5th day. On the 29-th day the patient was discharged.

Keywords: Eisenmenger's syndrome; Anaphylactic Shock; ECMO; Cardiopulmonary Resuscitation; Pregnancy

Introduction

Unfortunately, there are still several adult patients who did not manage proper cardiac surgical care in childhood and subsequent development of severe hemodynamic disorders later in their lives, up to the formation of Eisenmenger's syndrome (ES). ES is marked by the development of a shunt of blood from the right side to the left side of the heart, resulting in defects of systemic and pulmonary circulation, which occur due to the formation of severe pulmonary arterial hypertension (PAH). Patients with ES are advised to avoid pregnancy due to high maternal mortality [1], reaching 30 - 50% [2]. In accordance with current international clinical guidelines, pregnant women with ES should be treated in the following way. During pregnancy women with ES should be observed by a multidisciplinary team, in reference centers; specific therapy for PAH should be evaluated and possibly modified. Operative abdominal delivery is recommended. In the respective literature, several clinical cases of cardiopulmonary resuscitation (CPR) in patients with ES [3-6] are described. However, only one publication demonstrates a successful case of CPR [7]. The reason for the low effectiveness of CPR is associated with the pathophysiological features of ES. During heart massage, venous blood from the right chamber enters the left chamber of the heart, following into the systemic circulation.

Case Presentation

Patient M, 37 years old, pregnant, at a gestational age of 14/15 weeks, was admitted to the Almazov centre on June 27th of, 2022 for abortion due to ES. Informed consent was obtained from the people who participated in this clinical case.

Preoperative Management

From the anamnesis: patient is aware of her heart disease - ventricular septal defect (VSD) - since the age of 14. Patient has been repeatedly examined in cardiac surgery clinics, with surgical treatment denied due to high PAH. PAH-specific therapy was initiated (Bosentan was taken irregularly, and patient didn't switch to Sildenafil therapy).

Allergies: All antibacterial drugs that she received prior to her current hospitalization were well tolerated, without any anaphylactoid reactions. The patient's weight was 52 kg, height was 149 cm. Blood pressure (BP) was 120/70 mm Hg. SpO2 was 78 - 81% at rest on atmospheric air.

The Main TTE Parameters: Left Atrium -35 mm; End-Diastolic Volume of the Left Ventricle (LV) - 51 ml; End-Systolic

Volume of the LV- 21 ml; Stroke Volume - 30 ml; Ejection Fraction of the LV - 59%. Right Ventricular (RV) (4-chamber position) - 32 mm; RV Front Wall- 10 mm; TAPSE -1,8 cm; Right Atrium-41\42 mm. Pulmonary Artery (PA) – 24 mm; PA Systolic Pressure - 139 mm Hg. There were no significant valvular disorders. D - deformation of the Interventricular Septum (IVS). There was a defect in the membranous part of the IVS up to 13 mm with a right to left shunt.

The Results of Main Biochemical Tests: ALT - 13 U/l, AST - 22 U/l, bilirubin - 11 µmol/l, creatinine - 36 µmol/l, lactate - 1.0 mmol/l, hemoglobin - 133 g/l. NT-proBNP - 99.52 pg/ml. According to the ultrasound of the pelvic organs the chorion has been detected on the anterior wall. The edge of the chorion was in the region of the internal so extended to 1/3 of the cervix. Fetus was in transverse presentation.

Preoperative PAH Specific Therapy Was Adjusted: it was recommended to take Sildenafil 20 mg TID. Surgical termination of pregnancy was recommended due to full chorion presentation. Additionally, temporary embolization of the uterine arteries was recommended to minimize blood loss. Epidural anesthesia with invasive monitoring, including catheterization of the radial artery and internal jugular vein, has been chosen.

Surgical procedure anesthesia CPR: 06/30/2022 09:40-10:20. The patient was prepared for surgical procedure in the cath-lab according to standard methods. 10:25. Antibacterial prophylaxis with Ampicillin + Sulbactam, (Ampicillin+Sulbactam 1,0g +0,5g; Krasfarma, Russia) 3000 mg was initiated. However, during infusion of 1000 mg of antibiotics, the patient's condition worsened (vomiting, agitation, loss of consciousness, hemodynamic depression up to 60/40 mm Hg, tachycardia up to 145 beats/min, SpO2 decreased to 56%). 10:25-10:45. Intensive therapy was started: orotracheal intubation and controlled mechanical ventilation and hemodynamic support including chest compressions. As anaphylaxis was suspected, Epinephrine bolus 100 µg was given IV, further followed by infusion 0.1 - 0.3 µg/kg/min, Infusion therapy and correction of acid-base balance were carried out, methylprednisolone 120 mg was administered. To reduce PVR and improve the hemodynamic profile, nitric oxide (NO) was inhaled at a dose of 60 ppm (synthesis from atmospheric air with the "Tianox" device, Russia). TTE and chest x-ray were performed, left ventricular injury, hemopericardium, pneumothorax and hemothorax were excluded.

ECMO Procedure: 10:45. Patient displayed arterial hypotension - 40/20 mm Hg. Due to the lack of effectiveness of CPR, the team decided to start veno-arterial ECMO. 10:45-11:30. Venous and arterial cannula implantations were performed, and an ECMO circuit was prepared. 11:30. ECMO-flow 3 l/min was initiated. It allowed to achieve stabilization of hemodynamics, an increase SaO2 up to 98%. 15:15. A spontaneous miscarriage

occurred while the patient was in the ICU. The patient received Carbetocin 100 mcg to prevent bleeding. No bleeding from the genital tract was observed. The infusion of unfractionated Heparinum (UFH) required for ECMO was not carried out. 07/01/2022 00:15. Infusion of UFH 500 U/h was started. The patient underwent a course of antibiotic prophylaxis: Vancomycin 1gr BID i/v, Clindamycin 300 mg TID i/v 10:00.

The patient was extubated. 07/01/22-07/04/2022. The PAH therapy was adjusted: sildenafil (20 mg TID); bosentan (125 mg BID); selexipag (was started at dose 200 µg BID); NO inhalation at dose 40 ppm. 07/08/2022. Inhalation of NO using «Tianox» device is turned off. The physical activation and rehabilitation program has been upgraded. 07/11/2022. The patient was discharged from the ICU and transferred to the cardiology department. 07/29/2022 The patient was hemodynamically and clinically stable against the background of three-component PAH-specific therapy: Sildenafil (20 mg TID), Ambrisentan (10 mg BID), Bosentan (125 mg BID), Selexipag (was titrated to the maximum tolerated dose - 1600 µg BID). The patient was discharged from the Almazov center with a moderate decrease in physical status.

Discussion

We found only one publication about case of successful CPR in a pregnant woman with ES [7]. In this case, the ECMO system was available, but was not installed, since the cardiac arrest occurred due to ventricular fibrillation, which was rapidly stopped by defibrillation.

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