

OPIS PRZYPADKU/CASE REPORT

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Clinical Case: Using ECMO to treat 34 year old pregnant woman during cardiac arrest**Michael S. Czekajlo¹, Marek Dąbrowski², Agata Dąbrowska²**¹ Department of Anesthesiology, Virginia Commonwealth University Health System, USA² Department of Rescue and Disaster Medicine, Karol Marcinkowski Poznan University of Medical Sciences, Poland**Abstract**

Case report. This clinical case shows a 34 year old woman who had developed an acute onset of dyspnea in the hospital parking lot. Bystanders reported that the patient was currently pregnant hospital employee with a history of asthma. EMS personnel supported the patient and transferred her to Emergency Department (ED). The ED team conducted the resuscitation while the Obstetric and Cardiac Surgery team was being notified of the cardiac arrest. Emergent C-section started 6 minutes into Advanced Cardiovascular Life Support after no response to initial CPR. Once the 35 week infant was delivered of the primary layer post- hysterectomy was completed and pressure applied. During this time femoral lines were placed for ECMO canulation by Cardiac Surgery. The Patient arrived in the Intensive Care Unit (ICU) on high dose of vasoactive agents, mechanical ventilation and ECMO. The patient did not regain Return of Spontaneous Circulation and she was pronounced dead. The team's contribution is measured by the outcome that the baby was successfully delivered, survived and is doing well.. *Anestezjologia i Ratownictwo 2014; 8: 168-170.*

Keywords: pregnant woman, cardiac arrest, ICU, ECMO, CPR, ER

Presentation of Case

A 34 year old woman who was in the hospital parking lot developed an acute onset of dyspnea. This was witnessed by Emergency Medical Service (EMS) providers who immediately began to provide assistance. EMS described patient as dyspneic, agitated, and combative. She was unable to speak other than say "can't breathe". Bystanders reported that the patient was a hospital employee pregnant and had asthma. EMS attempted to provide oxygen but she was too combative. She initially would not sit or lie down on a stretcher but quickly became somnolent and was put on the stretcher with oxygen and transported to the Emergency Department. On route to the Emergency Department she went into respiratory arrest and resuscitation was initiated. Upon arrival, the Emergency Department

staff was waiting for the patient in the trauma bay and the patient went into cardiac arrest. The Emergency Department team conducted the resuscitation and the Obstetric team and Cardiac Surgery teams were notified once the patient went into cardiac arrest.

Emergent C-section started 6 minutes into CPR for cardiopulmonary arrest after no response to initial CPR. Emergent C-section started 6 minutes into Advanced Cardiovascular Life Support after no response to initial CPR. Once the 35 week infant was delivered of the primary layer post- hysterectomy was completed and pressure applied. During this time femoral lines were placed for Extracorporeal Membrane Oxygenation (ECMO) canulation by Cardiac Surgery. The approximately 35 week old baby was resuscitated and transferred to the Neonatal Intensive Care Unit. Emergent ECMO was initiated

due to suspected pulmonary embolism causing respiratory arrest that lead to cardiac arrest. Tissue plasminogen activator (TPA) was then given IV. The second imbricating layer was placed and abdominal closure started. Abdominal closure completed after ECMO started.

The Patient arrived in the Intensive Care Unit (ICU) on high doses of vasoactive agents, mechanical ventilation and ECMO. A few minutes after arriving in the ICU during assessments, flow through the ECMO machine stopped. The patient and ECMO machine were assessed and it was clinically apparent that she was bleeding from her left thigh where there was an ECMO catheter. It was unclear whether the ECMO catheter had dislodged. Direct pressure was held over the bleeding site. Emergent central line access was placed in the right internal jugular vein for additional volume resuscitation and multiple doses of Advanced Life Support (ALS) drugs given. Patient did not regain Return of Spontaneous Circulation and she was pronounced dead.

Past medical history

- **Obstetric**
Gravida 2 Para 1.
- **Surgical**
Lower-uterine caesarean section (2007).
- **Medical**
Chronic hypertension.
Morbid obesity (body mass index 76.5).
Asthma.
Obstructive sleep apnea.

Differential Diagnosis

Asthma exacerbation.
Pulmonary Embolism.
CVA from Hypertensive emergency.

Pathologic Diagnosis

The immediate cause of death is edema of the brain with left uncal and bilateral cerebellar tonsillar herniation. This finding correlates with the described mental status changes observed at initial presentation. The contributing causes of death include asthma, chronic hypertension and morbid obesity. No pulmonary embolism discovered on autopsy.

Discussion of Management

Emergency Room Management

The ED, obstetric and cardiac surgery teams demonstrated rapid decision making and the essence of team collaboration. At the time they had limited information and quickly made a diagnosis of pulmonary embolism that in retrospect was incorrect but a very reasonable diagnosis based on the available history and presentation. The obstetrical team responded rapidly and performed a perimortem emergent C-section on a patient weighing over 200 kg. Their contribution is measured by the outcome that the baby was successfully delivered, survived and is doing well. The fact that the baby survived also suggests that the resuscitation efforts for the mother were of high quality. Finally, it is worth mentioning that three teams were working simultaneously to provide care to two patients and the feedback in the post arrest debriefing was that everyone felt there was mutual collaboration during this resuscitation.

ICU Management

The patient had arrived in the ICU on significant respiratory and hemodynamic support. Once flow was lost on ECMO the patient's condition declined and further efforts were futile. The major question to ask is whether ECMO should have been offered to this patient. Many centers decline ECMO to anyone with a BMI > 35 because of difficulties in providing adequate flow. There is no data on BMI and ECMO in the literature. The experience of our ICU team with over 80 ECMO patients in the past two years also suggests difficulties in managing ECMO patients with high BMI.

ECMO in the Management of Cardiac Arrest

ECMO has been available for over 40 years. Most of the literature reports its benefit in the pediatric/neonatal population for respiratory failure and congenital cardiac anomalies [1-2]. More recently data has been published using ECMO as rescue therapy for adult patients in respiratory arrest from pneumonia and cardiac arrest [3-6]. Even though the epidemiology of cardiac arrest victims has traditionally been different the data suggests a benefit whether the arrest was out of hospital or in hospital.

In Tanno's study of 66 out of hospital cardiac arrest

patients three month survival was 22.7% and 10.6% had a CPC of 1 [7]. One year data was not available to compare to other Prehospital Utstein data to compare the benefit of ECMO in this population. Data from in-hospital cardiac arrests showed survival to discharge rate of at least 30% and 1 year survival in Chen's study being 15.3% with a CPC of 1 or 2 [6].

Smedira in his retrospective review of 202 adults treated with ECMO reported a 30 day survival of 38% and 5 year survival of 24% [8]. In a recent study from Germany patients who received ECMO after cardiac arrest had a hospital discharge of 34% [9]. In this study they also concluded that survival from in hospital cardiac arrest was higher than for out of hospital cardiac arrest which is consistent with other reports.

The use of ECMO in refractory cardiac arrest is becoming utilized more frequently. Most studies are reporting survival rates with good neurological out-

come of approximately 40%. This is consistent with our experience. In the case we presented even if ECMO continued the outcome would not have been different due to the brain edema and herniation. Our experience suggests that ECMO should be used more often in advanced life support to improve the chain of survival.

Conflict of interest

None

Correspondence address:

✉ Marek Dąbrowski

Department of Rescue and Disaster Medicine
Karol Marcinkowski Poznan University of Medical
Sciences, Poland

79, Dąbrowskiego Str.; 60-529 Poznań

☎ (+48 61) 854 68 54

✉ maro.dabrowski@gmail.com

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