CORRESPONDENCE

Successful inter-hospital transfer for extracorporeal membrane oxygenation after an amniotic fluid embolism induced cardiac arrest

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To the Editor,

Amniotic fluid embolism (AFE) is a rare peripartum complication associated with high maternal and fetal mortality. The emergent role of extracorporeal membranous oxygenation (ECMO) to assist resuscitation for AFE-induced cardiac arrest remains unclear. Furthermore, there is a lack of studies describing the feasibility of prolonged inter-hospital transfer with ongoing CPR to allow for extracorporeal cardiopulmonary resuscitation (eCPR).

Herein, we describe a case involving a 35-yr-old previously healthy parturient with complete placenta previa who underwent an elective Cesarean delivery at 36 weeks gestational age. The patient provided her written consent for publication of this report. Following fetal delivery, the patient became unresponsive, cyanotic, and bradycardic. The patient's trachea was intubated while cardiopulmonary resuscitation (CPR) and advanced cardiac life support algorithms were initiated for bradycardic pulseless electrical activity (PEA) followed by asystole and then monomorphic ventricular tachycardia (VT). The patient was defibrillated with 200J from VT into continuing pulseless electrical activity (PEA), and CPR was continued until return of spontaneous circulation. A brief bedside transthoracic echocardiogram performed after the initial PEA arrest showed a severely dilated and hypokinetic right ventricle (RV) and an elevated estimated right ventricular

systolic pressure of 67 mmHg with an initially normal left ventricular (LV) function.

Fourteen minutes after the initial arrest, the patient had return of spontaneous circulation that lasted 39 min before a second PEA arrest occurred. A repeat intra-arrest transthoracic echocardiogram showed new left ventricular failure with severe global hypokinesis (ejection fraction = 10%). Arrangements were made for inter-hospital transfer to the regional ECMO centre as the time estimates for emergency inter-hospital transfer were shorter than the estimates for activating the mobile ECMO team. The patient underwent transfer with ongoing manual CPR.

On arrival to the ECMO hospital, femoral arterial, and venous cannulation was used for veno-arterial ECMO. The initial arterial blood gas on ECMO showed pH 7.13, PCO₂ 77.4 mmHg, PO₂ 38 mmHg, HCO₃ 24.8 mEq·L⁻¹, and lactate of 14 mmol·L⁻¹. The patient received approximately 2.5 hr of CPR prior to initiation of ECMO.

After cannulation, the patient was stabilized using a CentriMagTM pump (Thoratec Corporation, Pleasanton, CA, USA) at 3600 RPM with a flow rate of 4 L·min⁻¹, sweep gas rate of 4 L·min⁻¹, and an inspired oxygen concentration of 100%. Targeted temperature management of 36°C for the first 24-hr period was implemented. Her immediate post-cannulation course was complicated by cardiogenic pulmonary edema, CPR-associated pulmonary hemorrhage, acute kidney injury, shock liver, and disseminated intravascular coagulation.

Approximately 14 hr following cardiac arrest, the patient underwent a computerized tomography (CT) scan of her head, chest, abdomen, and pelvis. The imaging revealed no pulmonary embolus or other etiology for cardiopulmonary arrest; however, she met clinical diagnostic criteria for AFE.¹ On postoperative day (POD) 2, the patient was successfully weaned from ECMO. Her

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reported LV function had improved to an ejection fraction of 30–40% and her RV function normalized. On POD 8, her trachea was extubated and she was discharged from the intensive care unit on POD 13. Neurologically, she made a full cognitive recovery with a cerebral performance score of 1 and mild right hand motor weakness.²

Multiple case reports have described successful treatment of AFE-associated cardiac arrest with extracorporeal support; however, there is a lack of previous studies reporting successful inter-hospital transport of a pulseless patient with presumptive AFE for eCPR support.^{3–5} Although inter-hospital transfer of critically ill patients is common, the subset of patients with ongoing cardiac arrest typically undergo ECMO cannulation prior to transfer. Our case report implies that, in appropriately selected patients with effective CPR, inter-hospital transfer for eCPR may be a viable therapeutic option. Although AFE is rare, future studies could be more broadly directed at early detection and identification of patient characteristics associated with successful treatment of cardiac arrest with eCPR.

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