



## 'Hybrid ER' for managing pulmonary embolism requiring ECPR



The term “hybrid emergency room” (hybrid ER) is used to describe an ER equipped with an interventional radiology (IVR)-computed tomography (CT) system. Use of a hybrid ER reportedly decreases mortality in patients with severe trauma by shortening the delay until whole-body CT imaging and allowing early initiation of definitive treatment.

Meanwhile, new research from Japan demonstrates that a hybrid ER may be useful for initial management of massive pulmonary embolism (PE) requiring extracorporeal cardiopulmonary resuscitation (ECPR) and can contribute to better outcomes. The study is published in the American Journal of Emergency Medicine.

Patients with massive PE and haemodynamic instability have poor outcomes and their management remains challenging. The mortality rate is up to 50–60% in these patients and increases to 60–65% when cardiopulmonary resuscitation (CPR) is required. Interventions such as surgical embolectomy, thrombolytic therapy, and catheter-directed treatment are indicated in patients with haemodynamically unstable PE.

Moreover, the clinical benefits of veno-arterial extracorporeal membrane oxygenation (VA-ECMO) for massive PE have been reported. A hybrid ER may allow safer and more rapid cannulation and initiation of ECMO, which may be effective for massive PE requiring extracorporeal cardiopulmonary resuscitation (ECPR). However, there has been no report validating the initial treatment of medical emergencies in a hybrid ER.

The current study therefore aimed to assess the effectiveness of VA-ECMO for cardiac arrest due to PE in a hybrid ER. This retrospective descriptive study was performed at Tokyo Metropolitan Bokutoh Hospital, a tertiary emergency medical centre located in an urban setting in the eastern part of Tokyo, Japan. Patients are only brought to the hospital if they are judged to be in a critical condition by emergency medical services.

For this study, researchers reviewed the records of patients transferred to Bokutoh Hospital's hybrid ER between September 2014 and December 2017 who required ECPR for pulmonary embolism. Nine consecutive patients (median age 50 [range 30–76] years) with PE requiring ECPR were identified. Of these patients, five

(55.6%) had at least one risk factor for PE; six (66.7%) experienced an out-of-hospital cardiac arrest; and three (33.3%) had a cardiac arrest in the hybrid ER. All ECMO cannulations were performed percutaneously.

The researchers observed the following:

- Right ventricular overload was detected on electrocardiography and bedside transthoracic echocardiography in all cases.
- The median pH, lactate, PaCO<sub>2</sub>, and HCO<sub>3</sub> values on arterial blood gas analysis in the hybrid ER were 7.01 (6.68–7.26), 14 (8–22) mmol/L, 44.7 (23.8–60.5) mmHg, and 10.4 (6.7–14.1), respectively.
- Four patients (44.4%) received alteplase for thrombolysis. No patient underwent surgical embolectomy.
- The median duration of ECMO was 69 (38–126) hours.

In addition, there were two ECMO-related bleeding complications. Eight patients (88.9%) survived and one died of post-resuscitation encephalopathy after weaning from ECMO.

The researchers have cited several limitations to this study. The first is its retrospective single-centre design. Second, the investigation was based on a case series targeting a relatively limited number of patients and no historical control group was included. Nevertheless, the results suggest that a hybrid ER may contribute to an improved survival rate in patients with massive PE.

In view of the limited information on hybrid ERs in the literature, further research on their effectiveness is needed, according to the researchers.

Source: [American Journal of Emergency Medicine](#)

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