

Extracorporeal Membrane Oxygenation a Reliable Solution for Refractory Cardiopulmonary Failures: Are We Losing Opportunities?

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Majority of the critically ill patients usually have some degrees of organ dysfunction or failure. During the organs' failure period, patients usually hospitalized in ICU and the ICU itself should be considered as a professional and optimized location for continuous organ replacement therapy as a bridge to recovery or a bridge to transplant.

A suitable approach is using organ replacement therapy including ventilator therapy, continuous renal replacement therapy (CRRT), intra-aortic balloon pump (IABP) and Extracorporeal Membrane Oxygenation (ECMO) to gain some time for recovering and rescuing of dysfunctional organs or replace them with the healthy organs as transplant. During organ replacement therapy, medical – surgical teams including intensivists and other members endeavor to renew and improve the dysfunction and failed organs to reach an acceptable level for continuing normal and independent performance.

ECMO is a lifesaving [1] and supportive technique for treatment of refractory cardiac or pulmonary function to augment oxygenation, ventilation, or cardiac output [2] outside the operating room [3] and in the intensive care unit (ICU). ECMO can be initiated for critically ill patients with multiple organ failure who are at high risk of developing acute kidney injury (AKI) and fluid overload. Nowadays this technique has become more commonplace in advanced cardiac surgery centers [1].

Augmentation of traditional cardiopulmonary resuscitation with the early initiation of ECMO as the extracorporeal cardiopulmonary resuscitation (ECPR), plays an important role in the management of refractory cardiac arrest, severe electrolyte abnormalities, airway obstruction, drowning, hypothermia, overdoses, and poisonings in ICU and out of operating room [4-6].

In this regards, other organ support modalities such as CRRT and therapeutic plasma exchange can be easily added in ECMO circuit as a heparinized platform [7]. Combination

of CRRT with ECMO allows for adequate nutrition, blood product transfusion, and medication administration, while avoiding worsening of fluid overload [8], moreover, the combination is able to restore acid- base status and achieve negative fluid balance, thereby improving oxygenation [9]. The renal replacement and fluid management plays important roles to save golden time for increasing prognosis and decreasing mortality and other morbidities [1,10].

In this regards, Peek et al. [11] recommended transferring of adult patients with severe but potentially reversible respiratory failure, whose Murray score exceeds 3.0 or who have a PH of less than 7.20 on optimum conventional management, to a center with an ECMO-based management protocol to significantly improve survival without severe disability. This strategy likely remains cost- effective when quality adjusted life-years are factored in. Given potentially reversible effects of refractory organ failures, ECMO appears to be a reasonable treatment [12]; because ECMO can serve as a bridge to recovery, device implantation or organ transplantation.

As ECMO becomes more prevalent in the ICU, the researchers recommend ICU practitioners become more aware of the applications of this promising therapy; because ECMO was used in more than 73,500 patients following its introduction in 1972 and the trend is continued with ultra-speed rate; furthermore, a successful ECMO program requires a significant multidisciplinary and organizational commitment to ensure necessary resources and personnel [13]. At present, it should be conducted in centers with sufficient experience, volume, and expertise to ensure it is used safely.

Initiating ECMO in a critically ill patient requires considerations related to equipment, blood bank capabilities, cannulation configuration, availability of necessary personnel, and coordination with the critical care physicians. A successful ECMO program requires physicians, nurses, perfusionists, and respiratory therapists trained and competent in cannulation and management of the ECMO circuit to be available in sufficient numbers to provide suitable coverage; however, most Iranian hospitals had not enough facilities to conduct this treatment for their patients. Furthermore, in applying advantages of this magical treatment; Iranian hospitals need several expert consultant ECMO teams to decide and commence the treatment with specialized ECMO personnel. Meanwhile, one of the patients for whom ECMO is an option for their survival is poisoned patients [14]. ECMO can be initiated as early as possible for renewing and improving the function of failed organ in poisoned patients who have been subjected to

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