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How can ECMO help the toxicology patient?

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Toxicological emergencies can sometimes present with severe cardio-respiratory failure refractory to conventional therapies. Extracorporeal membrane oxygenation (ECMO), a temporary form of cardio-respiratory support, is an emerging therapeutic option in such instances. Broadly, there are two modes of ECMO- Veno-arterial (VA ECMO) and Veno-venous (VV ECMO). VA ECMO mode is used for circulatory support in cardiogenic shock or refractory cardiac arrest (E-CPR). In contrast, VV ECMO provides respiratory support in severe respiratory failure. Worldwide, the utilisation of both VA and VV ECMO has increased exponentially over the past two decades, including its use in toxicology patients. As ECMO has a significant burden of complications, a risk-benefit assessment needs to be done before its institution. Also, patient selection and timing of initiation are the other vital factors determining therapy's success.

The main components of the ECMO are the pump and the oxygenator. An access cannula is placed in the distal SVC, RA or IVC, which helps drain the patient's venous return using the pump. The blood is then passed through the membrane oxygenator, adding oxygen and removing carbon dioxide, and then returned to either the venous or arterial system, depending on whether the patient needs respiratory or cardiac support. The ECMO can be safely instituted by trained clinicians at the patient's bedside. Using ultrasound or fluoroscopy to guide the insertion of ECMO cannulae further enhances the safety profile of ECMO initiation.

The profound shock in toxicology patients may be due to direct myocardial depression, myocarditis, hypersensitivity reaction, or mitochondrial dysfunction. The refractory respiratory failure may be due to direct lung injury, pulmonary oedema or indirect effects due to aspiration. ECMO, in these circumstances, provides organ support while the organs are recovering and toxin metabolism/elimination occurs. Other adjunctive therapies like renal replacement, haemoperfusion and apheresis can also be performed during ECMO to facilitate toxin clearance.

ECMO support in toxicology patients is usually required for a shorter duration compared to the other diagnostic groups. Also, the patients are generally younger and have fewer co-morbidities. As a result of these factors, ECMO outcomes are usually better in toxicology diagnostic groups. Further research is needed in this area to elucidate the role of ECMO in toxicology.

This talk will give the toxicologists a broader understanding of ECMO. The talk will also provide case based scenarios to understand the role of ECMO in toxicological emergencies.