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Mechanical circulatory support in septic cardiomyopathy: sometimes less is more

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Introduction: Sepsis-induced cardiomyopathy (sepsis-CM) is a form of myocardial dysfunction that typically resolves in 7-10 days in the patients (Pts) that recover. Its underlying cause remains unknown and management is largely non-evidence-based. In Pts with septic shock, the associated sepsis-CM may be refractory and contribute to an absolute or relative low cardiac output (CO) state. The acute use of Mechanical Circulatory Support (MCS) devices is reserved for Pts with cardiogenic shock who do not respond to standard medical/critical care interventions, and have been used in those with sepsis-CM. Several devices are available, with differing levels of support, access, patient interfaces, indications/contraindications.

Clinical case: A 64yo man with a past history of asthma presented to hospital with severe pleuritic chest pain, dyspnoea and haemoptysis. His condition progressed with worsening respiratory failure requiring invasive ventilation. Investigations on admission suggested community acquired pneumonia (Influenza B). Focused cardiac ultrasound was reportedly normal. Due to worsening clinical status, he was retrieved to an ECMO centre on VV-ECMO. Upon transfer he developed severe haemodynamic instability and rising lactate, despite increased vasopressor and inotropic support; 12-lead ECG was normal; Echocardiography (TTE) showed significant global bi-ventricular (BiV) dysfunction. A diagnosis of sepsis-CM was made. Medical therapy was maximised. Renal replacement therapy for anuria and severe metabolic acidosis was initiated. Haemodynamics were optimised under TTE guidance, namely titration of inotropic support. Due to a persistent relative low CO state, MCS device was considered. VA-ECMO was rejected due to the patient's age and multi-organ failure (MOF). An Intra-aortic Balloon Pump (IABP) was instituted. By day 4 BiV function improved with supra-normal CO, inotropes de-escalated and IABP removed. TTE prior to ICU discharge depicted complete recovery of BiV function. At 13 days post-admission he was successfully weaned from VV-ECMO and transferred to his referring hospital.

Discussion: This clinical case describes an example of sepsis-CM which resolved with standard cardiothoracic critical care interventions, including VV-ECMO and IABP, but not VA-ECMO. VA-ECMO in relatively elderly Pts with MOF and coagulopathy carries a significant risk of complications, including bleeding, stroke and death. VA-ECMO in sepsis-CM has been described and in younger Pts without MOF may be an alternative therapeutic option. Although IABP provides less circulatory support in terms of CO, it was associated with a significant improvement in clinical status. IABP induces immediate changes in coronary artery flow dynamics which may be significantly altered in sepsis-CM. Although well studied in coronary Pts, it is less used in sepsis-CM and its physiological effects remain largely unexplored.

Figure: PW Doppler across the LVOT in sepsis-CM recovery over time
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