

Clinical-Medical Image

Simplified Venous-Arterio-Venous ECMO as Bailout Therapy in a Patient with Cardiogenic Shock and Pulmonary Failure

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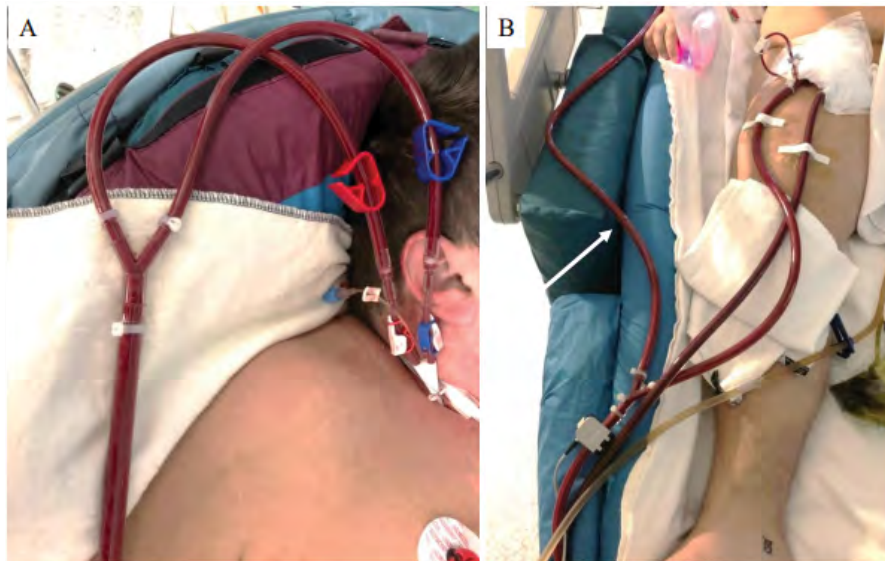


Figure 1: (A) Simplified veno-arterio-venous ECMO configuration with jugular shaldon catheter (circle) as third cannula for venous preoxygenation and increased ventricular preload. (B) The arterialized ECMO outflow is divided via a T-piece, for one arterial cannula supplying towards the central aorta and another supplying towards the pulmonary circulation (arrow).

Clinical Image

A 47-year old patient was admitted for acute ST-elevation myocardial infarction (peak creatine kinase of 8,000 U/l) caused by occlusion of left anterior descending (LAD) and concomitant chronic occlusion of right coronary artery (RCA) leading to severe cardiogenic shock. Despite successful recanalization of LAD a veno-arterial extracorporeal membrane oxygenation (ECMO) was needed to stabilize the patient. Due to concomitant severe pulmonary congestion a coaxial pump (Impella®, Abiomed, Germany) was implanted to unload left ventricle (LV) and reduce pulmonary edema. Unfortunately, this combination of both devices (ECMELLA) could not satisfactorily treat pulmonary failure (FiO₂ of 100%), since even with low coaxial pump flow rate, LV and left atrium were completely emptied due to low LV filling, right ventricular (RV) failure and prohibitive volume therapy. As bailout therapy, a jugular shaldon catheter was used as a third cannula as simplified and fast upgrade of veno-arterial ECMO to a veno-arteriovenous (VAV) ECMO system. This leads to higher venous pre-oxygenation and increased RV preload. In succession this enabled us to reduce ECMO flow with consecutive reduction of venous drainage from V. cava inferior leading to higher LV preload in favour of Impella work flow which increased to 3.5 l/min (Figure 1). This strategy enabled us to wean the veno-arteriovenous ECMO system five days later.

Severe cardiogenic shock is the major driver of mortality on cardiologic ICUs. In selected cases with concomitant heart and successive lung failure the simplified veno-arterio-venous ECMO configuration may be a promising therapeutic option. It combines the advantages of venovenous and veno-arterial ECMO, providing respiratory and circulatory support at the same time.

Keywords: Cardiogenic shock; Pulmonary failure; ECMO

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