

Dual Lumen VA-ECMO Catheter With Single Entry Port Bypassing The Right Heart And Lungs

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Abstract

Extracorporeal Membrane Oxygenation (ECMO) has become a **Critical Life-Saving intervention** for patients with severe **Cardiac and Respiratory failure & ECPR (Emergency CPR)**. However, traditional ECMO and **Right Ventricular Assist Device (RVAD)** solutions involve multiple entry points, increasing the risk of infection, bleeding, and prolonged recovery. This poster presents an **innovative Dual Lumen VA ECMO Catheter with a Single Venous Entry Port, designed to bypass the right heart and lungs, simplifying the procedure while enhancing safety and efficiency, and also functions as a RVAD.** By reducing the number of vascular access points, this device minimizes complications, accelerates recovery, and improves overall patient outcomes. **This breakthrough technology has the potential to redefine ECMO and RVAD management, making extracorporeal support safer and more effective [1].**

Methodology

The proposed Dual Lumen ECMO Catheter with a Single Entry Port is designed to address the **limitations of conventional ECMO, RVAD systems and effective treatment in Cardiogenic Shock.** Unlike traditional configurations that require multiple cannulas, this device enables Venous-Arterial ECMO (VA-ECMO) through a **single vascular (Venous) access site**, bypassing the right heart and lungs. Its unique dual-lumen structure **facilitates both oxygenation and circulation** while reducing the risks of infection, thrombosis, and vascular injury. The design also incorporates advanced material technology to enhance biocompatibility and durability. By simplifying the cannulation process, this innovation is **expected to improve procedural efficiency, reduce ICU stays, and lower overall healthcare costs.**

References :

1. Ali Ahmed Haneef, Abdelhamid Saoudi. Dual Lumen Extracorporeal Membrane Oxygenation Catheter With Single Entry Port Bypassing The Right Heart And Lungs. Patent number: US20210178047. World Intellectual Property Organization WIPO.
2. Barbaro RP, et al. Extracorporeal Membrane Oxygenation Support in COVID-19: An International Cohort Study of the Extracorporeal Life Support Organization Registry. Crit Care Med. 2020

Introduction

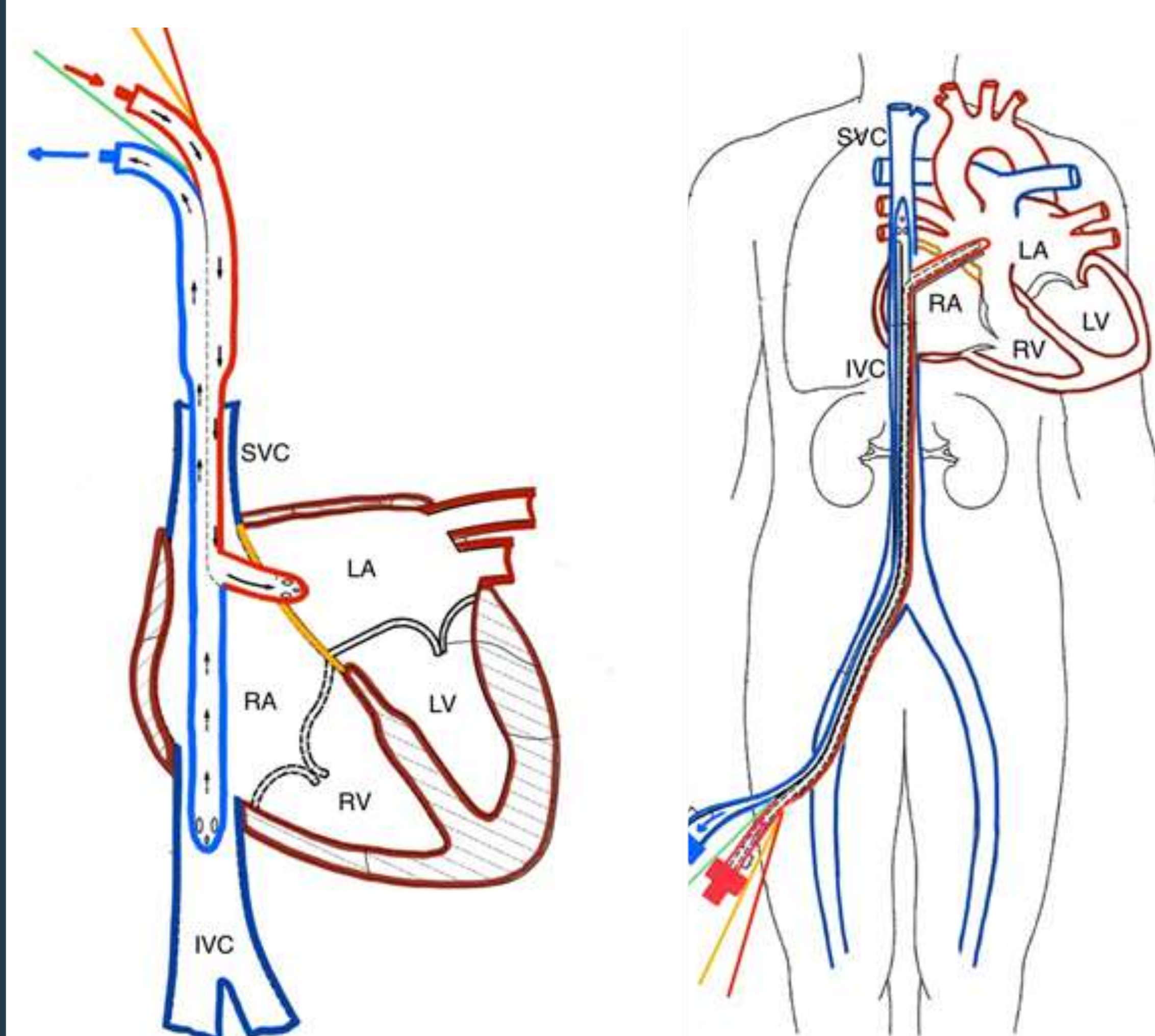
ECMO is a well-established intervention for patients experiencing severe respiratory or cardiac failure including ECPR. ECMO has been widely adopted across intensive care units worldwide, with more than **200,000** patients treated to date, according to the **Extracorporeal Life Support Organization (ELSO) Registry. [elso.org]**. Despite its benefits, conventional ECMO systems require multiple cannulation sites, leading to significant risks, including infections, vascular complications, and extended ICU stays **[jvascsurg.org]**. Furthermore, right ventricular failure (RVF) remains a critical challenge in Cardiogenic shock and Cardiac surgery, necessitating additional RVAD support. To address these challenges, novel single-entry, dual-lumen VA-ECMO catheter has been developed to streamline extracorporeal support, enhancing both safety and efficiency, offering optimized flow rates with easier placement.

Motivation

Scope of the Problem and Current Statistics

- The demand for ECMO has surged by **433%** in recent years, driven by the increasing incidence of respiratory and cardiac failure, ECPR and particularly in the wake of the **COVID-19 pandemic**.
- The mortality rate for ECMO patients remains significant, with **37% mortality reported in COVID-19 cases** and **60% mortality in ARDS patients**.
- Additionally, **30%** of Cardiac surgery patients experience **right ventricular dysfunction, leading to an increased need for RVAD support.**
- Traditional ECMO systems are associated with high complication rates, with **64%** of patients developing infections and **30-50%** experiencing bleeding complications. **These challenges underscore the urgent need for a safer, more efficient ECMO solution that reduces complications and enhances patient survival and outcome [2].**

Applications



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