

EXTRACORPOREAL MEMBRANE OXYGENATION

Overview

Extracorporeal Membrane Oxygenation (ECMO) is an extracorporeal life support modality that provides gas exchange and, when indicated, circulatory support for patients with severe respiratory and/or cardiac failure refractory to conventional therapy.

Types of ECMO



Venovenous (VV)
(Respiratory Support)



Venoarterial (VA)
(Respiratory + hemodynamic support)

Indications

- $\text{PaO}_2/\text{FiO}_2 < 100$ despite optimal ventilator settings.
- Oxygenation Index (OI) > 40 for > 2 hours.
- Refractory cardiogenic shock or severe circulatory failure.
- Massive pulmonary embolism.
- Failure to wean from cardiopulmonary bypass after cardiac surgery.

Mechanical Ventilator Setting

Plateau pressure	≤ 24 cmH ₂ O and may be lower if feasible
PEEP	> 10 cmH ₂ O
Driving pressure	≤ 14 cmH ₂ O
Tidal volume	Typically ≤ 4 mL/kg PBW and adjusted for the goal of plateau pressure (≤ 24 cmH ₂ O)
RR	≤ 10 breaths per minute

ECMO Setting

Blood Flow	Primary determinant of oxygenation ($\approx 60\text{--}80$ mL/kg/min or $3\text{--}7$ L/min in adults).
Sweep Gas Flow	Controls CO_2 removal: $1\text{--}2$ L/min ($\uparrow$ Sweep = $\downarrow$ PaCO_2).
FiO_2 (ECMO)	Usually started at 100%, then titrated to maintain adequate oxygenation.

Management

- Hypoxemia $\rightarrow$ Increase Blood Flow and/or ECMO FiO_2 .
- Hypercapnia $\rightarrow$ Increase Sweep Gas Flow.