



Veno-Venous Extracorporeal Membrane Oxygenation in Severe Hypoxemia

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Purpose/ Background:

- Acute respiratory distress syndrome (ARDS) is noncardiogenic pulmonary edema that manifests as rapidly progressive dyspnea, tachypnea, and hypoxemia.
- Extracorporeal Life Support (ECLS) such as veno-venous extracorporeal membrane oxygenation (VV-ECMO) & veno-arterial extracorporeal membrane oxygenation (VA-ECMO) can be used for patients with acute pulmonary or cardiovascular failure.
- Extracorporeal Life Support Organization (ELSO) reported 13,681 patients supported with VV ECMO from 2012-2022.

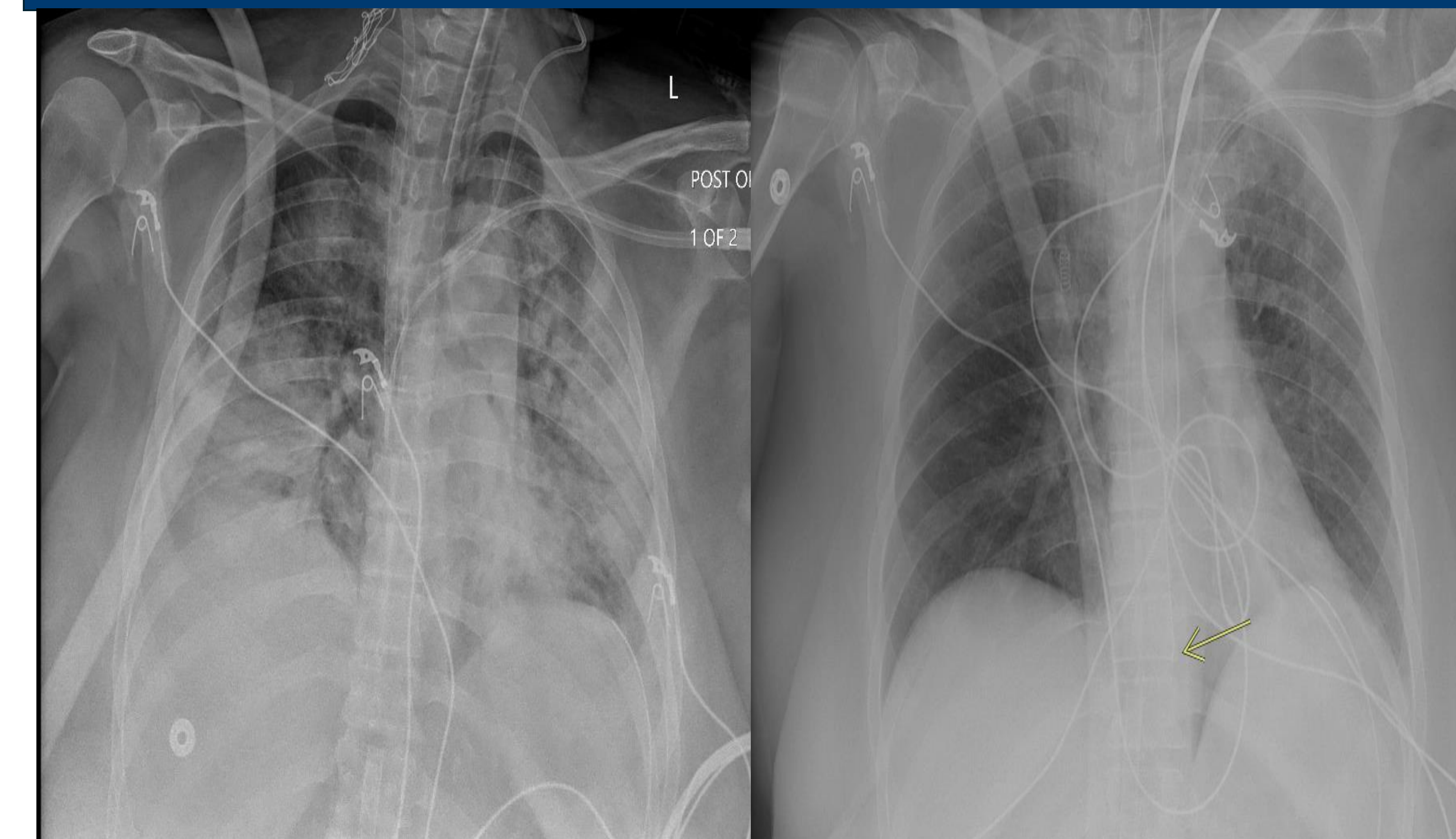
Case Presentation:

- A 53-year-old female presented to the surgical ICU for post-operative management status post elective jejunojunostomy resection with revision and multiple exploratory laparotomies.
- Worsening respiratory status of hypoxemia and respiratory acidosis required escalation of ventilator support.
- Despite attempts of lung protective settings and pulmonary vasodilation with Ilevetri, the patient's severe hypoxemia did not improve, requiring V-V ECMO.
- The sweeps ranged from 2-5 with trending arterial blood gas and daily chest x-ray.
- The patient's acute respiratory distress status improved after 6 days of ECMO displayed in stable ABGs.

Discussion:

- This case displayed the urgent escalation of care in the management of hypoxemia.
- Interventions for severe hypoxemia include endotracheal intubation with low tidal volume mechanical ventilation, early prone positioning, recruitment maneuvers, paralytics, inhaled pulmonary vasodilators, lung protective ventilation, and ECMO.
- Physiologically, lower tidal volume ventilation reduces driving pressure, mechanical power, and the risk of volutrauma on the ARDS lung₄. Options of Pressure-assist control (PC), volume-assist control (VC) or pressure regulated volume control (PRVC) can achieve improved mortality in severely hypoxemic patients.
- The goal of the recruitment maneuver is to temporarily increase pressure so that it improves alveolar gas exchange. While oxygenation does improve with recruitment maneuvers, mortality does not, with risk of further injury.
- Veno-venous extracorporeal membrane oxygenation is a tool available when previous options are not effective.
- V-V ECMO diverts oxygenation and ventilation responsibilities from the lungs providing time for pulmonary healing by decreased driving pressure, reducing ongoing lung injury, with the goal of improved mortality.
- This patient benefited and survived due to the utilization of V-V ECMO.

Imaging:



Summary/Conclusion:

Management of severe hypoxemia includes lung-protective ventilation strategies, prone positioning, pulmonary vasodilators, neuromuscular blockade, recruitment maneuvers, and ECMO, each offering benefits in oxygenation but carrying important risks.

References:

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