

Publication Brief

Influence of central hemodynamics on VV ECMO oxygen delivery in neonatal animal model

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BACKGROUND

Venovenous (VV) ECMO has become more widespread in the treatment of neonates and other patient populations with respiratory failure. Its goal is to provide respiratory support to the patient. However, recirculation of oxygenated blood in venovenous extracorporeal membrane oxygenation (VV ECMO) can decrease the oxygen delivery provided by the ECMO support and reduces the efficiency of the system and can cause severe hypoxemia.

OBJECTIVE

To investigate the influence of central hemodynamics and catheter position on the amount of recirculation and oxygen delivery in lambs during VV ECMO. Also to compare results of recirculation measured by the ELSA Monitor with those obtained using blood sampling of oxygen saturations from the central venous line (CVL Method).

METHOD

- Subject: Seven newborn lambs (mean weight 4.7kg);
- Initial hemodynamic status including cardiac output and blood volume parameters was measured with the Transonic COstatus Monitor.
- The ECMO pump was set at a prescribed flow rate of 110-120 mL/kg/min for a targeted oxygen delivery rate of 6cc/kg/min without recirculation;
- Recirculation was measured by the Transonic ELSA Monitor and the CVL methods (blood samples from the SVC, IVC, and locations before and after membrane oxygenation) at varying ECMO pump flows from 200–600 mL/min.

RESULTS

- Lambs with a higher cardiac index (>160 mL/min/kg) tended to have a higher percentage of oxygen delivery (65-94%, at prescribed flows);
- Lambs with lower cardiac index (<150mL/min/kg) tended to have a lower percentage of oxygen delivery (39-62%, at prescribed flows);
- At the prescribed pump flow of 110–120 mL 231 /min/kg, an optimal catheter position with the lowest percentage of recirculation was established;
- REecirculation percentage measurements between the ELSA Monitor and the CVL Method were in agreement.

CONCLUSION

The ELSA monitor provides an easy to use, non-invasive method to measure recirculation in VV ECMO without blood sampling. The data also suggests that cardiac function may play an important prognostic role in achieving effective VV ECMO support.

TAKE HOME

An initial tudy demonstrating the influence of central hemodynamic status during VV ECMO on the percent of oxygen delivery at prescribed pump blood flows was quantitatively investigated. Both the ELSA Monitor and the COstatus Monitor were used in the study.

REFERENCES

Said MM, Rivera O, Mikesell GT, Rais-Bahrami K, "Influence of central hemodynamics on VV ECMO oxygen delivery in neonatal animal model," J Neonatal Perinatal Med. 2017 Apr 8. (Transonic Reference # ELS11180AH)

