

Publication Brief

Recirculation in single lumen cannula venovenous extracorporeal membrane oxygenation: A non-randomized bi-centric trial

Fisser C *et al*, Dept. of Int. Med. II, & Dept. of Cardiothoracic Surg., Univ. Med. Center, Regensburg, Germany; ECMO Centre, Pediatric Perioperative Medicine & Intensive Care, Karolinska Univ. Hospital, and Dept. of Physiology and Pharmacology, Karolinska Institutet, Stockholm, Sweden.

BACKGROUND:

Recirculation is a common problem in venovenous (VV) extracorporeal membrane oxygenation (ECMO).

OBJECTIVE:

To compare recirculation fraction (Rf) between femoro-jugular and jugulo-femoral VV ECMO configurations, to identify risk factors for recirculation, and to assess their impact on hemolysis.

STUDY:

- Non-randomized prospective study included ICU patients from the Univ. Med. Ctr., Regensburg, Germany and from the Karolinska ECMO Center, Stockholm, Sweden, who received VV ECMO via femoro-jugular (n=37, 595 measurements), and jugulo-femoral (n = 18, 231 measurements) configurations.
- Ultrasound dilution technology (UDT) was used to determine Total ECMO flow (QEC), recirculated flow (QREC), and recirculation fraction $Rf = QREC/QEC$.
- Effective ECMO flow (QEFF) was defined as $QEFF = QEC * (1-Rf)$.
- Demographics, cannula specifics, and markers of hemolysis were assessed.
- Upon ICU discharge, patient survival was determined.

RESULTS:

- Rf was lower with femoro-jugular compared to jugulo-femoral configuration [5% vs. 19%, respectively] resulting in similar QEFF (2.80 L/min vs. 2.79 L/min) despite lower QEC with femoro-jugular configuration compared to jugulo-femoral (3.01 vs. 3.57) L/min, respectively.
- In multivariate regression analysis, the type of configuration, distance between the two cannula tips, ECMO flow, and heart rate were significantly associated with Rf.
- Hemolysis was similar in subjects with $Rf > 8$ vs $\leq 8\%$.
- Explorative survival data showed comparable results between the two groups: femoro-jugular (81%) and the jugulo-femoral group (72%).

CONCLUSIONS:

- VV ECMO via femoro-jugular configuration resulted in less recirculation.
- Higher Rf risk factors were: a shorter distance between the two cannula tips, higher ECMO flow, and lower heart rate.
- Rf did not affect hemolysis.

TAKE HOME:

A fundamental paper from two main ECMO centers that compares two current configurations for VV ECMO delivery: one where the venous cannula withdraws blood from the carotid a. and then returns it via the femoral a., and the second where blood is withdrawn from femoral a. and returned into the carotid a.

REFERENCES

Fisser C, Palmér O, Sallisalmi M, Paulus M, Foltan M, Philipp A, Malfertheiner MV, Lubnow M, Müller T, Broman LM. Recirculation in single lumen cannula venovenous extracorporeal membrane oxygenation: A non-randomized bi-centric trial. *Front Med (Lausanne)*. 2022 Aug 31;9:973240.

