

Effects, management and optimization of extracorporeal techniques and technologies in contemporary cardiac surgery

Citation for published version (APA):

Condello, I. (2024). *Effects, management and optimization of extracorporeal techniques and technologies in contemporary cardiac surgery*. [Doctoral Thesis, Maastricht University]. Maastricht University. <https://doi.org/10.26481/dis.20240419ic>

Document status and date:

Published: 01/01/2024

DOI:

[10.26481/dis.20240419ic](https://doi.org/10.26481/dis.20240419ic)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.umlib.nl/taverne-license

Take down policy

If you believe that this document breaches copyright please contact us at:

repository@maastrichtuniversity.nl

providing details and we will investigate your claim.

Chapter 15

Impact

We aimed to investigate the issue about the Effects, Management and Optimization of Extracorporeal Techniques and Technologies in Contemporary Cardiac Surgery. we have investigated all the aspects related to inflammation, biocompatibility, air-blood contact transversely to the various perfusion techniques (**chapter 2**), a new metabolic nadir of the DO₂ relationship has been investigated and researched on the prevention of the anaerobic metabolism inherent in ERiO₂ (**chapter 3**), looking in the context of 'ECMO to deepen the concept of Goal Directed Perfusion and to transfer the inherent skills on conventional extracorporeal circulation and MiECC (**chapter 4**). We evaluated the incidence of LCOS on MIMVR and the use of ECMO and IABP was collected (**chapter 5**). On the post cardiectomy and VV ECMO VA procedures, the duration and oxygenating performance was evaluated in relation to the continuity of the anticoagulant therapy (**chapter 6**). The phenomenon of condensation in the oxygenator gas outlet was analyzed on the oxygenating modules and correlated to the exchange performance during the procedures (**chapter 7**). CO₂ management is a useful tool for the prevention of air embolism during minimally invasive mitral valve surgery procedures. We compared two techniques, demonstrating that continuous administration is superior to one shot administration (**chapter 8**). Micro-embolic activity for unexpected predisposing factors was analyzed during the conduct of cardiopulmonary bypass (**chapter 9**). The MiECC technique was studied on the management aspects of propofol pharmacodynamics and kinetics (**chapter 10**), on metabolic preservation for goal directed perfusion in end stage coronary artery disease (**chapter 11**), and on the benefits of magnetic levitation on hemolysis prevention in minimally invasive extracorporeal circulation (**chapter 12**) and ECMO (**chapter 13**).

The techniques and approaches to extracorporeal circulation have a clinical impact in terms of organ protection, preservation from cerebrovascular damage and cognitive dysfunction. This thesis shows how integrating many aspects related to monitoring the selection of components can impact the post-operative outcome. Even the management of ECMO can be crucial we have introduced observations on the management and preservation of the long-term management of the oxygenator (**chapter 7**). Management of micro-embolic and embolic activity is crucial in cardiac surgery We have integrated the role of CO₂ administration technique for post-operative cognitive disorders (POCD) prevention with the appearance and utility of cardiopulmonary bypass technologies and monitoring in the prevention of micro-embolic activity (**chapter 9-10**). The MIECC technique has been studied in detail on the aspects of the pharmacodynamics of Propofol in relation to the content of albumin, hemodilution and contact surface (**chapter 11**), the metabolic impact on frail patients has been investigated compared to the conventional CPB (**chapter 12**), and we have evaluated the benefits of the magnetic levitation pump on the reduction of hemolysis on short-term procedures (**chapter 13**). We presented this thesis with the aim of integrating the knowledge of cardiopulmonary bypass to the ECMO procedure and vice versa. In the world of research and development of new technologies, the key role of metabolic management is increasingly gaining scientific evidence, and the role of advanced techniques is increasingly crucial in reducing the adverse effects of conventional cardiopulmonary bypass. The holistic approach presented in this thesis represents an evolution of expedients on extracorporeal technologies aimed at the organic preservation of the patient by focusing on various aspects covered in the chapters of the thesis (**chapter 2, chapter 3, chapter 4**).