



OPEN ACCESS

EDITED AND REVIEWED BY
Zhongheng Zhang,
Sir Run Run Shaw Hospital, China

*CORRESPONDENCE
Mohamed R. El Tahan
✉ mohamedrefaateltahan@yahoo.com

RECEIVED 18 June 2025
ACCEPTED 03 July 2025
PUBLISHED 18 July 2025

CITATION
El Tahan MR, Abou-Arab O and Besnier E
(2025) Editorial: Advances in cardiac
anesthesiology and cardiopulmonary bypass
for cardiac surgery and interventions.
Front. Med. 12:1649654.
doi: 10.3389/fmed.2025.1649654

COPYRIGHT
© 2025 El Tahan, Abou-Arab and Besnier. This
is an open-access article distributed under the
terms of the [Creative Commons Attribution
License \(CC BY\)](#). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that the
original publication in this journal is cited, in
accordance with accepted academic practice.
No use, distribution or reproduction is
permitted which does not comply with these
terms.

Editorial: Advances in cardiac anesthesiology and cardiopulmonary bypass for cardiac surgery and interventions

Mohamed R. El Tahan^{1,2*}, Osama Abou-Arab^{3,4} and
Emmanuel Besnier^{5,6,7,8}

¹Cardiothoracic Anaesthesia and Surgical Intensive Care, Mansoura University, Mansoura, Egypt,

²Cardiothoracic Anaesthesia, Imam Abdulrahman Bin Faisal University (formerly University of Dammam), Dammam, Saudi Arabia, ³Department of Anesthesia and Critical Care, CHU Amiens, Amiens, France, ⁴Laboratoire MP3CV, UR 7517, Université Picardie Jules Verne, Amiens, France,

⁵Département d'Anesthésie-Réanimation, CHU Charles Nicolle, Rouen, France, ⁶Faculté de Médecine et de Pharmacie, Université de Rouen, Rouen, France, ⁷INSERM U1096 - EnVI, Rouen, France,

⁸Intensive Care Committee, Société Française d'Anesthésie et de Réanimation (SFAR), Paris, France

KEYWORDS

anesthesia, cardiac, cardiopulmonary bypass, myocardial protection, dexmedetomidine, lung ultrasonography, biomarkers

Editorial on the Research Topic

[Advances in cardiac anesthesiology and cardiopulmonary bypass for cardiac surgery and interventions](#)

Introduction

Cardiac anesthesiology and perfusion medicine have undergone rapid transformation in recent years, reflecting the expanding complexity of surgical procedures and the growing need to individualize perioperative management. The interplay between anesthetic techniques, myocardial protection, extracorporeal circulation, and organ preservation has become increasingly important in defining short- and long-term outcomes in cardiac surgery.

In light of these evolving challenges and opportunities, we launched this Research Topic, “*Advances in cardiac anesthesiology and cardiopulmonary bypass for cardiac surgery and interventions*,” to provide a focused academic platform that brings together current perspectives, innovative techniques, and practical insights from around the world. The aim was to highlight perioperative strategies that optimize outcomes during cardiac surgical interventions—ranging from myocardial protection and monitoring to sedation strategies and organ-specific risk stratification.

The Research Topic received 15 submissions, and after a thorough peer review, four articles were accepted for publication. These studies reflect the diversity of research in our field and collectively provide timely contributions to clinical and research practice. Below, we summarize their key findings and outline future research directions. [Figure 1](#) shows the strengths and limitations of these four studies.

Title	Study Design	Study Groups	Interventions	Population	Primary Outcome	Secondary Outcomes	Limitations	Future Research
Myocardial protection in cardiac surgery	Narrative Review	Not applicable	Analysis of cardioplegia, volatile agents, RIPC, glycemic control, pharmacological conditioning	Not applicable	Synthesis of evidence for cardioprotective strategies during cardiac surgery	Discussion of underlying mechanisms and clinical applications	Heterogeneity in protocols, no new data, lack of meta-analysis	Multicenter RCTs standardizing conditioning strategies and optimal protocols
Sevoflurane vs. Propofol Sedation Post-Cardiac Surgery	Randomized Controlled Trial	Sevoflurane (n=40) vs. Propofol (n=40)	Continuous ICU sedation with sevoflurane vs. propofol post-CABG	Post-CABG adult patients (n=80)	Time to extubation (median 7.5h vs. 11.3h, p<0.05)	Troponin I levels, ICU stay duration, hemodynamic profile	Small sample size, single-center, no long-term follow-up	Larger trials evaluating cost-effectiveness and cardioprotection in high-risk groups
Lung Ultrasound for Pulmonary Complications	Prospective Observational Cohort Study	Single group evaluation	Bedside lung ultrasound compared to CT and chest X-ray	Cardiac surgery patients (n=66)	Detection of pulmonary complications with high agreement to CT ($\kappa > 0.8$)	Earlier diagnosis vs. auscultation and X-ray	Single-operator LUS, non-randomized, limited generalizability	Validation in multi-operator, multicenter ERACS pathways
NT-proBNP as a Marker of Organ Injury	Prospective Observational Study	NT-proBNP measured pre/post CPB	Biomarker measurement and correlation with outcomes	Adult cardiac surgery patients (n=124)	Post-op NT-proBNP ≥ 1800 pg/mL associated with delayed extubation and prolonged ICU stay	Association with hemodynamic instability and organ dysfunction markers	Single-center, no mortality or readmission data, observational	Algorithm-based thresholds for guided intervention and validation in multicenter trials

FIGURE 1
A table compares four studies on cardiac surgery advancements. Columns include Title, Study Design, Study Groups, Interventions, Population, Primary Outcome, Secondary Outcomes, Limitations, and Future Research. Rows cover topics like myocardial protection, sedation techniques, lung ultrasound for complications, and NT-proBNP as a marker of organ injury. Each study is detailed with specific methodologies, outcomes, and suggestions for future research including larger trials and validation efforts. Limitations include small sample sizes and generalizability issues.

Conclusion and future research directives

This inaugural Research Topic underscores the evolving landscape of cardiac anesthesia and perfusion medicine. Each contribution highlights a critical component of perioperative care—ranging from myocardial protection to organ-specific diagnostics and sedation optimization. Notably, the articles emphasize the transition from empirical practice to precision-guided strategies based on objective markers and early diagnostic tools.

Moving forward, we encourage the cardiac anesthesia community to prioritize the following:

- Multicenter collaborations that bridge cardiovascular anesthesiology and surgical teams,
- Pragmatic trials that assess long-term outcomes and implementation feasibility,

- Integration of non-invasive monitoring (e.g., ultrasound, biomarkers) into enhanced recovery protocols,
- Translational research that connects molecular insights with bedside interventions.

We sincerely thank all authors, peer reviewers, and editorial staff for their contributions to this Research Topic. We hope this Research Topic serves as a springboard for continued innovation in perioperative care and a stimulus for broader engagement across surgical, perfusion, and critical care disciplines.

Author contributions

ME: Writing – review & editing, Writing – original draft, Conceptualization, Data curation, Validation, Project administration. OA-A: Validation, Supervision, Writing – review & editing, Writing – original draft. EB: Validation, Writing – original draft, Writing – review & editing, Supervision.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

Generative AI statement

The author(s) declare that Gen AI was used in the creation of this manuscript. The author(s) verify and take full responsibility

for the use of generative AI in the preparation of this manuscript. Generative AI was used exclusively for language refinement, formatting assistance, and figure layout design under direct human supervision. All intellectual content, critical interpretation, and final decisions remain the responsibility of the author(s).

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.