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Editorial: Editors' showcase: cardiothoracic anesthesiology

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Editorial on the Research Topic

[Editors' showcase: cardiothoracic anesthesiology](#)

Cardiac surgery is a rapidly evolving area of modern medicine. Over the past decade, there has been a significant decline in cardiac surgery-associated mortality despite an increase in procedural complexity. Nevertheless, the rate of major complications remains high. Published evidence suggests that the choice of the anesthetic technique might potentially improve the outcomes (1). This Research Topic *Editors' Showcase: Cardiothoracic Anesthesiology* consist of high quality papers on recent advances in the anesthetic management of cardiovascular procedures from Canada, China, Switzerland, and the United Kingdom.

In their meta-analysis, [Liang et al.](#) investigated whether serratus anterior plane block combined with general anesthesia provided more effective postoperative analgesia than general anesthesia alone or general anesthesia with local infiltration anesthesia in patients undergoing thoracic or breast surgery. A total of 1,978 patients from 29 randomized controlled trials were analyzed. They showed that patients with serratus anterior plane block had lower postoperative pain scores and reduced intraoperative opioid and postoperative morphine consumption. Patients who received serratus anterior plane block also experienced lower rates of postoperative nausea and vomiting and shorter duration of hospital stay. The results presented by the authors are very promising as they give an important insight into the role of regional anesthesia techniques on perioperative outcomes. In face of an ongoing opioid pandemic in the US (2), it seems that the perioperative use of regional analgesia techniques is a cornerstone in the management of surgical patients. The use of opioids during and immediately after surgery is associated with various adverse effects, including impaired gastrointestinal motility and respiratory depression. In patients undergoing cardiac surgery, high fentanyl doses are associated with prolonged postoperative ventilation (3). Therefore, the opioid-sparing effect of the regional anesthesia technique might be an important component of the bundle of interventions to improve the outcome of patients undergoing cardiovascular or thoracic procedures.

Several limitations of the study presented by [Liang et al.](#) should be considered. Due to the high heterogeneity of the included studies, the results of the current meta-analysis should be interpreted with caution. Subgroup analysis of different procedures (e.g., lung surgeries, thoracic trauma, etc.), as well as a comparison of serratus anterior plane block with other types of regional blocks, was not performed by the authors. Information on some

important postoperative outcomes (mortality and pulmonary complications) was also not collected. Thus, there is an urgent need for future large multicenter trials to clarify the role of regional blocks in the management of surgical patients. Primary outcomes like postoperative mortality, pulmonary complications, consumption of opioids, or incidence of chronic pain are worth to be studied. The study group should be compared with a control group of patients who receive a placebo/sham to exclude possible biases.

In another study presented in the Research Topic, [Ellenberger et al.](#) described the effects of glucose-insulin-potassium (GIK) on left ventricular performance assessed by transesophageal echocardiography in four patients with acute coronary syndrome undergoing emergent coronary artery bypass grafting. The authors showed that administration of GIK before cardiopulmonary bypass resulted in immediate improvement in left ventricular systolic and diastolic dysfunction and withdrawal of hemodynamic support. All patients were successfully discharged from the hospital. In patients with acute coronary syndrome unsuitable for percutaneous coronary intervention, emergent coronary artery bypass grafting is usually considered a life-saving strategy (4). Low-cardiac-output syndrome is the most serious and devastating complication in this cohort of patients and is associated with short- and long-term mortality. Current evidence suggests that GIK infusion in patients undergoing urgent multivessel off-pump coronary artery bypass surgery significantly attenuated the degree of ensuing myocardial injury (5). One of the strengths of Ellenberger's study is that the authors were able to quantify improvements in left ventricular contractility with innovative imaging techniques (three-dimensional left ventricular ejection fraction measurements and speckle tracking analysis for left ventricular myocardial strain). The major limitation of this study, as well as other studies of such design, was the lack of a control group. It may turn out that the hemodynamic changes observed by the authors were due to the restoration of coronary blood flow rather than GIK infusion. Nevertheless, this study adds to the current evidence that GIK infusion may be beneficial in patients with cardiac diseases. Future well-designed randomized controlled trials with clinically relevant outcomes are needed to clarify the role of this intervention in patients with acute coronary syndromes.

Cardiac surgical patients are usually exposed to supranormal oxygen concentrations that lead to hyperoxia. Hyperoxia can improve oxygen delivery to the tissues as well as reduce gas microbolism during cardiopulmonary bypass (6). On the other hand, there is an increasing bulk of evidence that hyperoxia might be harmful to patients (7). There is still an ongoing debate about the optimal arterial partial pressure of oxygen (PaO₂) during cardiac surgical procedures. In different trials, PaO₂ in the hyperoxic group ranges between 150 and 500 mmHg (8). In their study, [Fischer et al.](#) assessed the impact of baseline blood gas levels on coronary reactivity to a vasodilatory stimulus induced by a short apnea in a swine model with and without significant coronary stenosis. Six anesthetized control swine and 11 swine with coronary artery stenosis were examined. At

normoxemic-normocapnic blood gas analysis, apnea increased coronary blood flow in proportion to the duration of apnea in the control and stenosed group. On the contrary, hyperoxia significantly reduced coronary blood flow and blunted coronary artery reactivity. Although this study carries several limitations inherent to all experimental studies, it gives an important insight into the pathophysiology of myocardial injury, especially during cardiac surgical procedures. It seems that avoiding hyperoxia is one of the factors (along with prevention of hyper- and hypotension, tachycardia, etc.) that can blunt the deterioration of coronary blood flow and subsequently improve myocardial metabolism.

Perioperative blood transfusion is associated with increased morbidity and mortality in cardiac surgical patients. The practice of blood transfusion may differ significantly among hospitals even within the same country (9, 10). In their study, [Gerber et al.](#) conducted a web-based survey to assess local factors in logistics and organization that may influence transfusion practice. This survey was endorsed by the European Association of Cardiothoracic Anesthesiology and Intensive Care (EACTAIC) and consisted of 34 questions on transfusion practice and three additional questions on place of work, clinical experience of the responsible physician, and main field of practice. Fifty-one completed surveys were obtained from 25 countries across Europe with most responses from hospitals in Germany, Switzerland (12% each), and the United Kingdom (10%). As the main finding, the data from this survey showed wide variability in the logistics of perioperative transfusion. The time of delivery of allogeneic blood products was the most frequently cited factor influencing transfusion behavior. The reported variability might explain part of the inconsistencies and mixed effects of interventions aiming to reduce the transfusion rate. Thus, the information obtained in this survey highlighted deviations from the most recent transfusion guidelines (11).

A strength of this study is that these practical and logistical aspects of blood transfusion were not investigated previously. Moreover, the invitation to participate in the survey was sent directly to all EACTAIC members whose patients (patients with cardiothoracic and vascular diseases) have high exposure to perioperative transfusion. The main limitation of the survey was the low response rate, which was calculated from the total number of newsletters opened in which the survey was originally embedded. It is reasonable to think that sending an invitation to participate in a survey with a direct link (not as a monthly newsletter) as well as advertising this survey at the EACTAIC meeting could have increased the response rate. Moreover, the authors didn't collect information on other factors that may influence transfusion practice ("seasonal" differences due to lack of products during certain times of the year, costs related to transfusion, information about trigger threshold, etc.).

Nevertheless, the results of this survey shed light on the necessity of the development of institutional or/and national practice advisories to improve adherence to transfusion guidelines. There is an urgent need for further research to

improve perioperative transfusion practices and, subsequently, postoperative outcomes in patients undergoing cardiac surgery.

Thus, modern advances in cardiac surgery would be impossible without extensive clinical and fundamental research in anesthesiology. Unfortunately, there is still a paucity of data showing the advantages of one technique over another in the management of cardiac surgical patients. Future efforts should be directed toward obtaining high-quality evidence in order to improve perioperative outcomes.

Author contributions

Both authors contributed to ideation and writing. All authors contributed to the article and approved the submitted version.

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