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EDITORIAL

Blood Transfusion in Cardiac Surgery: Less is More?

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Editorial related to the article: Adverse Events and Risk Factors of Blood Transfusion in Cardiovascular Surgery: A Prospective Cohort Study

Blood transfusion is one of the most common medical procedures,[1] and a major part of these are performed during cardiac surgeries. The incidence of perioperative transfusion in cardiac surgeries varies from 40 to 90%,[2] according to the complexity of the procedure and the protocols adopted in each institution.

The study by Tagliari et al.,[3] published in the International Journal of Cardiovascular Sciences, analyzed the use of blood transfusion and postoperative outcomes within 30 days in patients undergoing cardiac surgery in a Brazilian tertiary hospital between 2015 and 2017. In this prospective cohort, subjects were divided into those who received transfusion and those who did not. Patients most likely to receive blood transfusion were patients with previous cardiac surgery, longer time of cardiopulmonary bypass, chronic kidney disease recent use of oral anticoagulants and antiplatelet agents, left ventricular ejection fraction less than or equal to 30%, lower preoperative hemoglobin levels, and changes in coagulation, urea and creatinine tests. Patients in the transfused group had more severe disease than those in the non-transfused group, with more patients reoperated and taking medications that could interfere with blood coagulation, both factors associated with increased bleeding and need for transfusion. However, blood transfusion was an independent risk factor for mortality in multivariate analysis when adjusted for major confounders. Transfused patients had higher mortality, higher rates of bronchopneumonia and acute kidney injury, longer hospital stay and mechanical ventilation. The authors concluded that blood transfusion should be reconsidered in cardiac surgery, because even transfusion of a blood component unit was associated with a worse postoperative outcome. Since transfusion is one of the few modifiable factors that may worsen the prognosis of surgery, strategies to prevent transfusion should be encouraged. The main criticism about this study is that, as an observational one, had no possibility of randomization, with high chance of bias, which made it difficult to establish a causal relationship.

Finding the right balance between the risks and benefits of transfusion is a challenge that has been the subject of recent studies. Common complications of blood transfusion are described in Table 1;[4] these range from mild to severe and may even lead to death. The most common reactions, such as nonhemolytic fever and allergic fever, are self-limiting and mild in intensity. Acute hemolytic reaction is rare, but potentially fatal, and is associated with patient's misidentification. Transfusion-related acute lung injury (TRALI) is currently the leading cause of blood transfusion-related mortality. Together with transfusion-associated circulatory overload (TACO), TRALI causes respiratory dysfunction that adds morbidity to the patients' clinical condition, especially in the context of cardiac surgery. Immunomodulation and transmission of infectious agents are other potential complications of blood transfusion.

The combination of overuse of blood,[1] transfusion-related risks and limited availability of blood components stimulated the development of restrictive transfusion strategies and led to the development of patient blood management (PBM). PBM consists of a set of actions aimed at reducing the need for transfusion by encouraging detection and treatment of anemia before surgery, use of surgical techniques and several procedures focused on preservation of patient's own blood, use of medications that reduce bleeding, and discontinuation of others that may interfere with blood coagulation. PBM strategies are also aimed at reducing blood collection for

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Blood Transfusion/methods; Thoracic Surgery/complications; Risk Factors; Mortality; Perioperative Care.

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Table 1 - Frequency of acute blood transfusion reactions

Reaction	Characteristics	Frequency
Febrile non-Hemolytic Transfusion Reaction (FNHTR)	Unexplained fever with or without chills/rigors	1-3:100
Allergic	Urticaria, angioedema, dyspnea, shock	1:100-1:500 (minor) to 1:20,000-1:50,000 (severe)
Acute Hemolytic Reaction	Fever, rigors, chest/abdominal/low back pain, shock, hemoglobinuria	1:12,000 – 1:100,000
Bacterial Sepsis	Fever, chills, rigor, shock, nausea, respiratory distress	<1:10,000 – <1:250,000
Transfusion Associated Circulatory Overload (TACO)	Respiratory distress, nausea, anxiety, increased blood pressure, dyspnea, cough, onset within 6six hours of transfusion	1:100 – 1:1,000
Transfusion-related Acute Lung Injury (TRALI)	Severe dyspnea and cyanosis, respiratory failure within six hours of transfusion, absence of left atrial hypertension	<1:5,000

Adapted from Faed, J.[4]

laboratory tests, avoiding intraoperative hypothermia, and encouraging the use of point of care[6] techniques for screening and management of coagulopathies. Recent guidelines indicate the use of restrictive transfusion in many clinical and surgical conditions. The main pillars of PBM are summarized in Figure 1.[5]

In the context of cardiac surgery, Mazer et al.[7] demonstrated that, in medium to high-risk patients, restrictive transfusion strategies were not inferior to the liberal transfusion group regarding death from any cause, acute myocardial infarction, stroke, acute renal injury, and new-onset renal failure requiring dialysis

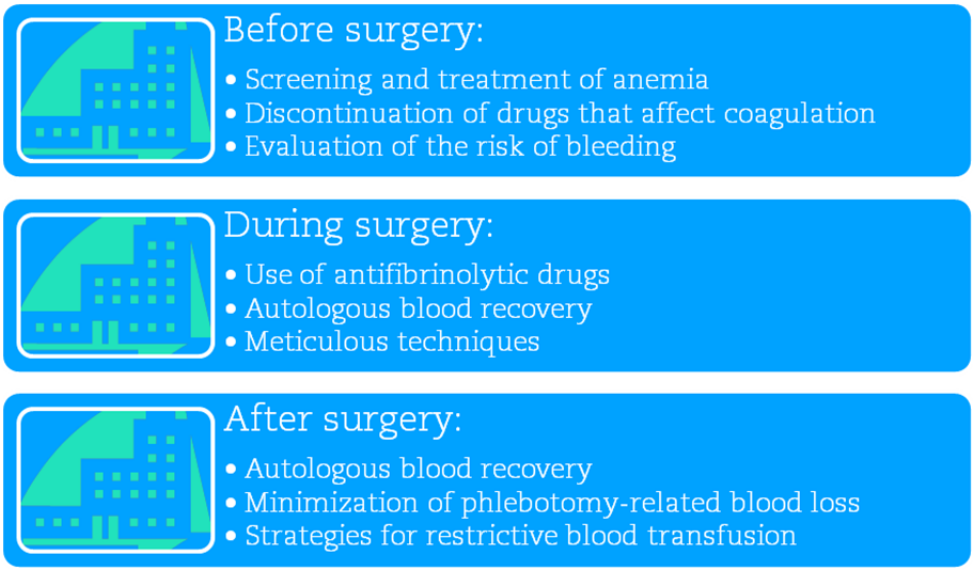

Figure 1 - Main actions in blood transfusion management.
Adapted from: Spahn D.R., Goodnough L.T.[5]

both in the immediate postoperative period[7] and within six months after surgery.[8] Likewise, Murphy e al.[9] concluded in their studies that there was no difference regarding postoperative complications and costs when using a restrictive or liberal threshold for transfusion. Also, in the TRICS III study,[7] more than half of the patients were older than 74 years old, demonstrating that restrictive transfusion protocols can also be used in the elderly population. The TRACS study,[10] conducted with a group of Brazilian patients in 2010, had already shown the non-inferiority of the restrictive transfusion strategy in patients undergoing cardiac surgery within 30 days.

Hensley et al.,[6] demonstrated that transfusion is more common in patients reoperated for cardiac surgery, despite the use of PBM. Dorneles et al.,[11] also found more infectious complications and acute kidney injury, and longer hospital stay in patients undergoing cardiac surgery who received blood transfusion. These results corroborate the findings of Tagliari et al.[3]

Unnecessary transfusion is a risk to the patient, in addition to increasing the cost of treatment and consuming limited financial resources that may not be available when needed.[6] Despite available guidelines, changes are slow in the real world. Many professionals are unaware of or do not adhere to current recommendations.[6] Guidelines can only bring benefits to patients when implemented,[2] and many transfusions are performed due to the ready availability of blood. Despite these setbacks, red blood cell transfusions have fallen worldwide, although this has not been seen in platelet and plasma concentrate transfusions.[12,13]

Considering the risks and benefits of blood transfusion, restrictive transfusion thresholds should be considered the standard for cardiac surgery, but attention should be paid to the peculiarities of each patient.

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