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Commentary: Come in from the cold

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CENTRAL MESSAGE

Transfusion following aortic surgery using hypothermia is associated with negative outcomes. Adjuncts to avoid transfusion should include rewarming the patient.

Perioperative bleeding is a recognized complication of cardiac procedures, with increased risks associated with cases performed on cardiopulmonary bypass and those requiring hypothermia. This complication is further compounded by evidence demonstrating that blood transfusions negatively impact both short- and long-term morbidity and mortality.¹⁻⁴

Sultan and colleagues⁵ have reported their institution's experience with blood product use in aortic surgery and resultant postoperative outcomes. Although this study is not the first to evaluate this issue, it is one of the largest to date, with the authors assessing 824 patients undergoing aortic surgery requiring circulatory arrest and comparing propensity-matched cohorts separated based on the need for transfusion. Ultimately, the authors found that longer procedure times and greater surgical complexity corresponded with increased blood component transfusions, with greater mortality rates demonstrated in those receiving transfusions. Although it is generally accepted that aortic procedures associated with deep hypothermic circulatory arrest (DHCA) often use more blood products, Sultan and colleagues suggest that DHCA coupled with blood component transfusion results in significantly worse outcomes.

The hemostatic system functions optimally at normothermia (ie, ~37°C), with alterations in the function of pro- and anticoagulant proteins, pro- and antifibrinolytic proteins, and platelets at progressively lower temperatures.⁶⁻⁸ Accordingly, the temperature associated with DHCA is frequently among the usual suspects blamed for coagulopathy and the resultant postoperative bleeding.

However, hypothermia-associated coagulopathy is not irreversible, and the best goal-directed therapy aimed at correcting this coagulopathy begins with rewarming the patient to a normal core temperature rather than the transfusion of blood components.^{9,10}

No universally accepted temperature to separate from cardiopulmonary bypass exists, with authors of a recent guideline cautioning against hyperthermia and acknowledging that they could not make temperature recommendations for separation due to a paucity of published evidence.¹¹ Moreover, in a previous study, one of us (A.D.) considered that the nadir temperature achieved during DHCA is not what influences bleeding; rather, bleeding was associated with the proximity to normal body temperature reached at the time the patient left the operating room.¹²

While patient blood-management programs can work in association with even complex aortic surgeries,¹³ these initiatives' success should not rely solely on altering transfusion thresholds or addressing preoperative anemia; instead, they should also include aggressive measures to mitigate bleeding in the first place. Although this often entails an additional suture or the use of a prothrombotic mechanical or flowable adjunct intraoperatively, consideration should also be given to a device readily available in every cardiac operating room and is uniquely capable of rewarming the patient, as opposed to a cooling blanket or raising the ambient temperature—the cardiopulmonary bypass machine. Sultan and colleagues have reminded us that

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transfusion is a double-edge sword, and avoidance of the need for blood and blood products includes optimizing hemostasis. Warming the patient to normothermia should be part of the algorithm.

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