Commentary

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Cardiac Anesthesia in Right-Thoracoscopic Minimally Invasive Cardiac Surgery and Intensive Care

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Description

Significant morbidity and mortality are linked to Cardiopulmonary Bypass (CPB) surgery for congenital heart defects. This risk is greatly exacerbated by perioperative coagulopathy, which causes more bleeding. Numerous factors, including hemodilution, contribute to an increased risk of bleeding in children. Because the ratio of the CPB priming volume to the child's blood volume is increased, this hemodilution is somewhat greater in infants than in adults.

An immature coagulation system, hypothermia, and extensive, complex surgery with an increased CPB duration are additional risk factors for increased perioperative bleeding in pediatric patients.

The majority of infants require blood transfusions during and after surgery due to perioperative coagulopathy and surgery. As a result, during pediatric congenital heart surgery, transfusion management has become an increasingly important part of perioperative optimization. As a result, when weaning off CPB, the majority of pediatric cardiac centers now use point-of-care tests like rotational thromboelastometry (ROTEM) or thromboelastography (TEG) 6s to detect coagulopathies earlier and improve patient outcomes. In previous studies, it was demonstrated that point-of-care test-guided transfusion management during or immediately following CPB reduced not only the volume of blood products but also the proportion of patients receiving transfusions. Despite these benefits, the threshold at which specific viscoelastic parameters can provide targeted blood products is still up for debate.

Since fibrinogen is the first coagulation factor to become depleted during cardiac surgery, a lot of effort has been put into developing an algorithm for adult cardiac surgery that uses point-of-care tests or measurements of fibrinogen concentration to help doctors figure out which patients should have fibrinogen replaced prophylactically. This endeavor has failed thus far, and administering fibrinogen frequently results in unnecessary substitution.

Enhanced Recovery Program for Cardiac Surgery

In one observational study, low fibrinogen levels immediately following CPB in children were linked to postoperative bleeding. ROTEM's cutoff levels have been published, but the TEG6s test, which is more recent, has never been used in a pediatric population. Since fibrinogen substitution occurs more frequently in younger patients, we decided to only include infants in the study to evaluate the performance of the most recent point-of-care test. Test performance is somewhat dependent on the patient selection. the TEG-06s The purpose of this study was to assess the prognostic value of TEG6s in determining when fibrinogen replacement was necessary and to describe the patient characteristics of infants receiving fibrinogen during cardiac surgery.

Visual inspection of Q–Q plots was used to assess the normality of the distribution of the data. The median and Interquartile Range (IQR) are presented for data that do not follow a normal distribution. Counts and percentages are used to represent categorical variables. For continuous variables, the Kruskal–Wallis test was used to compare groups, and for categorical variables, either the Pearson chi-squared test or the Fisher's exact test was used. A p-value of less than.05 was deemed statistically significant. Where necessary, effect size was determined using the mean difference and 95% confidence intervals (CI).

The ability of the TEG-FF-MA measurements to identify patients in need of cryoprecipitate transfusion was evaluated using a sensitivity and specificity analysis, which also included a receiver operating characteristics (ROC) analysis. Additionally, the ideal threshold for predicting an intraoperative bleeding volume of less than 10 ml/kg was determined. With a power of 80% and a significance level of 5%, a sample size calculation for the area under the ROC curve revealed that at least 62 positive cases and 31 negative controls were required, assuming a control: a case ratio of about 0.5.

Cryoprecipitate was used to transfuse 84 percent of the children. Cryoprecipitate recipients were younger, underwent more complicated surgery, and experienced greater blood losses during surgery. Cryoprecipitate was given to almost all children who had surgery that required them to be submerged. CPB-time, intraoperative blood loss, and TEG-FF-MA values were all correlated with the volume of cryoprecipitate used. Nearly all children who required fibrinogen substitution were found to have a TEG-FF-MA value of less than 10 mm, and the negative predictive value was also lower than 50%.

Cryoprecipitate transfusion has previously been linked to similar patient characteristics, such as a younger age and a longer CPB duration. Due to the retrospective design of the study, we are unable to determine whether young age itself is a risk factor for transfusion on its own or merely associated with higher RACHS-1 categories. However, the current observations support the findings of previous research, which identified young age and higher RACHS-1 categories as independent risk factors for transfusion and bleeding. A higher RACHS-1 score is linked to more complicated surgery and, as a result, a longer CPB-time. It is challenging to assess each component's contribution to the risk calculation due to the close interaction between age, surgical complexity, and CPB duration.

Risk Strati ication in ACHD Surgery

When weaning from CPB, TEG6s was routinely taken. In accordance with international guidelines, the results of TEG6s were used to guide the transfusion of blood products when there was bleeding. This practice is based on a lot of observational studies that have been done in recent years. These studies show that results from point-of-care tests like TEG6s and ROTEM are both closely correlated with actual fibrinogen concentrations and that post-CPB point-of-care tests are effective at predicting excessive bleeding during and after congenital heart surgery in children. However, there are few pediatric prospective studies evaluating transfusion guidance point-of-care tests.

Postoperative length of stay and adverse events like cardiovascular ischaemia and embolism, arrhythmia, renal dysfunction, hemorrhage, and infection were secondary endpoints. Published recommendations for perioperative outcome measures served as the basis for the definition of clinical endpoints. Troponins were taken the day before and the day after surgery to assess myocardial injury. High-sensitivity troponin I and high-sensitivity troponin T were obtained at the Regional Hospital of Southern Denmark for logistical reasons. In addition, both groups had their FOCUS results and any changes in patient management between the preoperative visit and the actual procedure recorded. Unless otherwise specified, all endpoints were restricted to patients' hospital admission, including readmission and transfers to hospitals other than Randers Regional Hospital or the Hospital of Southern Jutland, 30 days after surgery.

After the endpoints had been registered, statistical analyses were carried out without regard to group representation. Except for the results related to specific FOCUS findings, the author group with surrogate group names wrote, finalized, and approved the results section. After that, full unblinding was done.