**Intraoperative Thromboelastometry Is Associated with Reduced Transfusion Prevalence in Pediatric Cardiac Surgery**

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### Background

Cardiopulmonary bypass (CPB) induces hemostatic derangements that may contribute to bleeding and the need for transfusions during and after pediatric and adult cardiac surgery. Blood transfusions have been associated with serious side effects including sternal wound infections, transfusion-related acute lung injury, immunomodulation and increased mortality. In pediatric cardiac surgery, intraoperative and postoperative transfusions of blood and blood products are common and a prevalence of >80% has been reported. The use of intraoperative TEG/TEM has been shown to reduce transfusion requirements and costs in adult cardiac surgery.

### Study design

- **Prospective randomized clinical study**
- 100 pediatric cardiac surgery patients were included in the study. 50 patients (study group) were prospectively included and compared with 50 procedure- and age-matched control patients (control group).
- In the study group, thromboelastometry (ROTEM®, Tem International GmbH, Munich, Germany) performed during cardiopulmonary bypass, guided intraoperative transfusions.
- Intraoperative and postoperative transfusions of packed red blood cells, fresh frozen plasma (FFP), platelets, and fibrinogen concentrates, and postoperative blood loss and hemoglobin levels were compared between the 2 groups.
- 3 different ROTEM® tests were performed, INTEM, HEPTEM, FIBTEM.
- Four main scenarios based on clinical observation and TEM results were possible:
  1. Insignificant bleeding — normal TEM → no transfusions
  2. Insignificant bleeding — abnormal TEM → no transfusions
  3. Significant bleeding — normal TEM → surgical reevaluation
  4. Significant bleeding — abnormal TEM → transfusion of blood products as indicated by:
     a. HEPTEM MCF <50 mm → platelets
     b. FIBTEM MCF <9 mm → fibrinogen concentrate
     c. HEPTEM CT >240 seconds → FFP
     d. HEPTEM CFT >110 seconds → fibrinogen and/or platelets depending on MCF

Activated clotting time (ACT) was tested in all patients to control for heparin reversal. If patients had both a pathological ACT and TEM, protamine was administered first.

### Results

The proportion of patients receiving any intraoperative or postoperative transfusion of packed red blood cells, FFP, platelets, or fibrinogen concentrates was significantly lower in the study group than in the control group (32 of 50 [64%] vs 46 of 50 [92%]). Significantly fewer patients in the study group received transfusions of packed red blood cells (58% vs 78%) and plasma (14% vs 78%), whereas more patients in the study group received transfusions of platelets (38% vs 12%) and fibrinogen concentrates (16% vs 2%). Neither postoperative blood loss nor postoperative hemoglobin levels differed significantly between the study group and the control group.

### Keywords

Pediatric cardiac surgery, thromboelastometry, ROTEM®, transfusion, blood products

### Conclusions

“In conclusion, the results suggest that the routine use of intraoperative TEM to guide transfusions in pediatric cardiac surgery reduces the overall proportion of patients receiving transfusions of blood products”