Rapid and Correct Prediction of Thrombocytopenia and Hypofibrinogenemia
With Rotational Thromboelastometry in Cardiac Surgery

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Background
ROTEM® (TEM International GmbH, Munich, Germany) increasingly is used to assess during situations of acute blood loss as well as situations of controlled blood loss such as elective surgery. A major advantage of ROTEM® is that tests are performed in whole blood which allows for point-of-care testing immediately after blood collection. In contrast to conventional laboratory tests, the contribution of blood cells to clot formation also is taken into account in ROTEM® tests. In addition, ROTEM® provides valuable information about fibrinolysis. ROTEM®-guided transfusion protocols have been reported to reduce the amount of blood loss and the incidence of blood transfusion when compared with protocols guided by conventional laboratory tests. At this moment, ROTEM®-guided transfusion protocols use EXTEM A10 and FIBTEM A10 to guide transfusion of platelet and fibrinogen concentrates. In this study, the authors have prospectively collected data to determine whether ROTEM® could predict thrombocytopenia and hypofibrinogenemia in cardiac surgery using the amplitude after 5 minutes (A5).

Study design
- Prospective, clinical study
- 97 patients undergoing cardiac surgery between July 2011 until August 2012 were included.
- The correlations between EXTEM/FIBTEM A5, A10, and maximal clot formation (MCF), EXTEM/PLTEM (A5/A10, and MCF) and platelet count, and FIBTEM (A5/A10, and MCF) and fibrinogen were evaluated using the Pearson's correlation coefficient and receiver-operating characteristic curves.
- Turnaround times of ROTEM® tests and conventional laboratory tests were assessed in the central laboratory.

Results
- EXTEM A5 and FIBTEM A5 showed an excellent correlation with A10 (R: 0.99/1.00) and MCF (R: 0.97/0.99).
- The correlation between EXTEM A5 and platelet count (R: 0.74) was comparable with the correlation of A10 (R: 0.73) and MCF (R: 0.70) with platelet count.
- FIBTEM A5 predicted fibrinogen levels (R: 0.87) as well as A10 (R: 0.86) and MCF (R: 0.87).
- PLTEM A5 (R: 0.85) correlated better with platelet count than EXTEM A5 (R: 0.74; p = 0.04) and showed significantly better area under the curve values than EXTEM for predicting thrombocytopenia (A5 p = 0.012, A10 p = 0.019).
- Turnaround time for ROTEM® tests, 12 minutes, was comparable with emergency requests for platelet count, 13 minutes, and shorter than emergency requests for fibrinogen levels, 37 minutes.

Keywords
- Thrombocytopenia, hypofibrinogenemia, cardiac surgery, laboratory time, ROTEM®

Conclusions
“Implementation of PLTEM and FIBTEM A5 in ROTEM-guided transfusion protocols may improve transfusion management.” “This study, however, showed that the turnaround time could be reduced safely within 5 minutes by replacing A10 with A5 without losing any accuracy in detecting thrombocytopenia and hypofibrinogenemia.”