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Response to Letter-to-the-Editor

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We thank Dr Saner and his colleagues for their interest in our article[1] and are pleased to have an opportunity to address their concerns.[2]

We agree with the authors of the letter that the algorithm we used can lead overtransfusion of cryoprecipitate. A number of previous studies have reported an association between rotational thromboelastometry (ROTEM) and an increased use of cryoprecipitate.[3,4] Our study essentially confirmed their findings. Additionally, we demonstrate that the increased use of cryoprecipitate, as a result of the implementation of ROTEM, is associated with the increased incidence of major thromboembolic complications (MTCs). Finally, we have shown that MTC, not the ROTEM implementation, is associated with poor patient survival.

The authors of the letter question whether an increase in cryoprecipitate after implementation of ROTEM was clinically relevant. We believe this difference is a clinically relevant. First, the amount of cryoprecipitate transfusion increased from 1.0 to 2.9 units in the prepropensity-matched cohort and from 1.6 to 2.9 units in the post-propensity-matched cohort. Second, our institution uses pooled cryoprecipitate. One pooled unit consists of 10 single units (from 10 donors) and contains 1.8–2.2 g of fibrinogen. One such unit is expected to increase fibrinogen 1 g/L.[5,6] Third, our data show that patients with 3 or more units of cryoprecipitate are associated with a significantly increased risk in MTC compared with a lower transfusion group (Figure 3).[1]

Prothrombin complex concentrate and fibrinogen concentrate were not available during the study period. Therefore, they were not included in our analysis.

Blood transfusion requirements and calculated model for end-stage liver disease-sodium are generally higher at our center than at most centers in the United States. Risk factor analysis for high blood transfusion requirements is not a part of our study; therefore, it was not performed. However, it is reasonable to suspect that sicker patients with high model for end-stage liver disease-sodium scores, a high percentage of marginal donors, different practice patterns of surgeons and anesthesiologists may have all contributed to the higher blood transfusion requirements. It is important to note that transfusion of noncryoprecipitate blood products remain similar while transfusion of cryoprecipitate is significantly increased after the implementation of ROTEM, again suggesting that ROTEM favors cryoprecipitate transfusion but not transfusion of other blood products (Figure 1 and Table 2).[1]

We agree with the authors of the letter that during rapid and constant transfusion, ROTEM-based coagulation management becomes less clinically useful. However, we need to point out that the baseline ROTEM test we use to guide our management is typically performed shortly after anesthesia induction, before significant blood loss and massive transfusion.

We acknowledge that our study has many limitations. Some of the limitations have been mentioned in the Discussion section. The items mentioned in the letter-to-the-editor can be considered as additional limitations. Despite those limitations, our study includes a large number of patients and performs a robust analysis that clearly demonstrates a potential risk of using ROTEM and overtransfusion of cryoprecipitate in LT.

In conclusion, we believe that ROTEM is a valuable test and hope readers of our article are not discouraged from using ROTEM during liver transplant. Instead, clinicians should carefully consider the balance between benefits and risk of ROTEM. Furthermore, we call for more studies to evaluate the optimal ROTEM-derived transfusion algorithms in LT.

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