Neurosurgical Forum

LETTERS TO THE EDITOR

Rotational thromboelastometry–guided transfusion

TO THE EDITOR: We read with great interest the article by Naik et al.⁵ (Naik BI, Pajewski TN, Bogdonoff DL, et al: Rotational thromboelastometry–guided blood product management in major spine surgery. *J Neurosurg Spine* 23:239–249, August 2015), in which the case-control study identified hypofibrinogenemia as an important cause of the coagulopathy in major spine surgeries and indicated that rotational thromboelastometry (ROTEM)–guided transfusion would allow for early identification and treatment of hypofibrinogenemia, thereby reducing the intraoperative blood loss and transfusion-related costs. Notwithstanding the valuable aspects, we are concerned with the study design and implementation, which we hope the authors could address.

First, we are concerned that the confounding effect introduced by tranexamic acid (TXA) administration is not sufficiently controlled despite the patients in the ROTEM and Conventional groups having been divided into TXA and non-TXA subgroups, since neither the delivery approach nor the dosage of the drug was well controlled between the subgroups. As a synthetic amino acid that competitively blocks the lysine binding site on plasminogen and suppresses fibrinolysis through slowing conversion of plasminogen to plasmin,³ TXA can be administered through intravenous continuous infusion, bolus injection, or both.^{1,6} Meanwhile, the authors of several previously published articles have also identified high-dose TXA as superior to low-dose in reducing perioperative blood loss and transfusion requirements in spine surgeries.^{1,2,4} Hence, it's been well accepted that different TXA delivery regimens exert significantly different effects on blood loss and transfusions, which should have been taken into consideration in the subgroup stratification analysis. We therefore expect further clarification from the authors on this issue, since we are highly concerned that the imprecise study design might lead to inconclusive outcomes as a result.

Second, we wonder whether there was a predefined criterion for the transfusion amount of each blood component once it was indicated to be deficient by conventional point-of-care tests/ROTEM test, or whether the transfused amounts were arbitrarily determined in each case. For instance, it's been a routine in our center that 2 units of plasma will be transfused if the international normalized ratio (INR) is greater than 1.5, and this is followed by repeated tests to dynamically monitor the INR and to instruct

subsequent transfusions. We assume that inconsistent transfusion criteria implemented in the subgroups might lead to either overdose or underdose component transfusions, thereby increasing bias in the calculation of overall transfusion amounts. We therefore expect the authors to provide further clarification and comment on this issue, which will definitely assist us readers in understanding the algorithm institution and referencing it in clinical practice.

In summary, we applaud Dr. Naik and colleagues for their enlightening study and insightful opinions on ROTEM-guided blood product management strategy in major spine surgery. However, we feel that further commentary on study design and implementation would add transparency and validity to the results of this study, thereby promoting the translation of the study results to clinical practice.

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Disclosures

The authors report no conflict of interest.

Response

Drs. Hui and Zhuang have posed two pertinent questions regarding the confounding effects of TXA and the transfusion practices in our study.

For this study, all participants who received TXA received a low-dose regimen (intravenous 10-mg/kg loading dose, followed by a 1-mg/kg/hr continuous infusion). The TXA was started following induction of anesthesia and was terminated at the end of surgery. Although not reported in our original manuscript, there was no statistically significant difference in the TXA dose between the ROTEM and Conventional groups (median 1261 mg [range 1000–1579 mg] vs median 1030 mg [range 933–1477 mg], respectively; $p = 0.44$). Therefore, the difference in allogeneic product administration is unlikely related to variations in the TXA dose between the groups.

As alluded to in Figs. 1 and 2 of our study, a predefined institutional transfusion practice guideline was used for the Conventional and ROTEM groups. The amount of allogeneic blood product transfused was left to the discretion of

the attending anesthesiologist. It is important to note that a small group of anesthesiologists was responsible for the management of all these cases, which would potentially eliminate variations in clinical practice.

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Published online June 3, 2016; DOI: 10.3171/2016.1.SPINE169.

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