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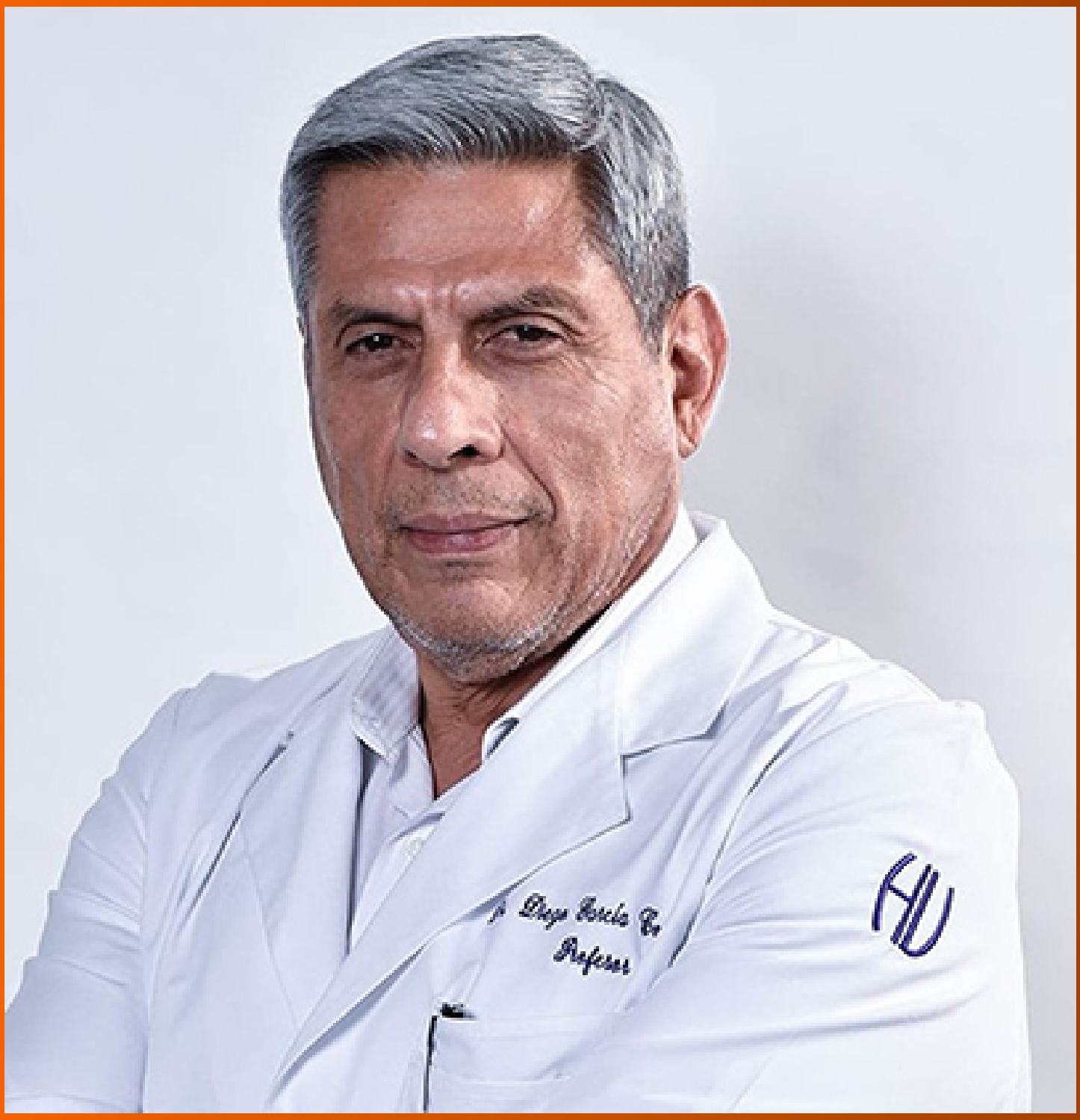

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LETTER TO THE EDITOR

Paying attention to the value of thrombelastography and the impact of postreperfusion syndrome on outcomes of liver transplantation

Yu-Li Wu, Lu Che, Yi-Qi Weng

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Abstract

Only limited information is available about the connection between massive blood transfusion and postoperative survival rates in pediatric liver transplantation. The aim of Gordon's study was to examine the potential impact of perioperative transfusion on postoperative complications and death in young children receiving pediatric living-donor liver transplantation (PLDLT). The authors concluded that transfusion of a red blood cell volume higher than 27.5 mL/kg during the perioperative period is associated with a significant increase in short- and long-term postoperative morbidity and mortality after PLDLT. However, viscoelastic coagulation monitoring was not utilized in the study; instead, only conventional coagulation monitoring was conducted. Overall, the choice of blood coagulation monitoring method during blood transfusion can have a significant impact on patient prognosis. Several studies have shown that the viscoelastic coagulation testing such as thrombelastography (TEG) is highly sensitive and accurate for diagnosing coagulation dysfunction. Indeed, a TEG-guided blood transfusion strategy can improve prognosis. Moreover, postreperfusion syndrome is one of the most common complications of liver transplantation and an important factor affecting the prognosis of patients and should also be included in regression analysis.

Key Words: Liver transplantation; Child; Blood transfusion; Thrombelastography; Reperfusion Injury; Prognosis

Core Tip: The influence of blood transfusion strategies based on different coagulation testing methods on the outcomes of pediatric liver transplantation cannot be ignored. Additionally, postreperfusion syndrome during liver transplantation can have an important impact on the prognosis of pediatric patients and should be accounted for when studying risk factors for postoperative mortality.

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TO THE EDITOR

We read with interest the recent article by Gordon *et al*[1] titled "Perioperative blood transfusion decreases long-term survival in pediatric living donor liver transplantation (LDLT)". The original study sought to ascertain whether blood transfusions are related to early and late postoperative complications and mortality in children undergoing LDLT. The authors concluded that in pediatric LDLT, perioperative red blood cell transfusions exceeding 27.5 mL/kg are a direct cause of reduced patient and graft survival as well as an independent risk factor for death. We are grateful for the contribution of the authors, who performed a long-term postoperative follow-up and collected a large amount of data, providing important information that avoiding or reducing blood transfusions improves postoperative survival in children with liver transplantation, which can help to inform clinical decision-making. However, we believe that the following aspects need to be discussed.

In the study, viscoelastic coagulation monitoring was not used, and only conventional coagulation monitoring was carried out, and we think that this may have a certain impact on the results. The conventional coagulation test (CCT) includes the international normalized ratio (INR), prothrombin time, activated partial prothrombin time, thrombin time, and platelet count, among others. The viscoelastic coagulation test is used to measure and analyze the viscoelastic properties of blood clot formation. It involves measuring and converting the viscoelasticity produced by the interaction between fibrin strands and platelets during the blood coagulation process into digital data, which are then graphically plotted for analysis. Currently, there are two types of equipment available for conducting viscoelastic coagulation tests: classical thrombelastography (TEG) and rotational thromboelastometry. The coagulation system is responsible for maintaining the balance between clot formation and dissolution in the blood, and monitoring the coagulation process during a blood transfusion is crucial to ensure proper blood clotting and minimize the risk of complications such as bleeding or clotting disorders. Studies have shown that TEG during liver transplantation can effectively monitor the hypercoagulable state of patients and the subsequent risk of embolism; in contrast, the ability of the INR to monitor the hypercoagulable state and predict the risk of embolism is poor[2]. A randomized controlled trial showed that in patients with liver cirrhosis and severe coagulation dysfunction before invasive surgery, the TEG-guided transfusion strategy significantly reduced the use of blood products and did not increase bleeding complications compared with the standard strategy (blood transfusion guided by the INR and platelet count)[3]. In another randomized clinical trial, Bonnet *et al*[4] found that a transfusion algorithm based on thromboelastometry coagulation assessment reduced the total number of blood product units transfused during liver transplantation, especially the amount of fresh frozen plasma transfused. Therefore, the value of the CCT in liver transplantation is questionable; it is time-consuming and cannot fully reflect the complex changes in coagulation in patients with liver disease over time. Viscoelastic coagulation tests can provide comprehensive information from coagulation initiation to fibrinolysis, clot strength, and stability; they are more sensitive and accurate than the CCT in the diagnosis of coagulation disorders and can help to prevent complications and improve patient outcomes.

Like any other test, TEG has certain limitations. It measures blood coagulation outside the body, rather than the coagulation of blood while it is flowing within the vasculature; therefore, TEG does not reflect the function of the endothelium in coagulation[5]. In addition, the TEG testing equipment is costly and requires more professional training for operators to use it effectively. The factors mentioned above may limit the prevalence of TEG usage. However, the viscoelastic coagulation assay was recommended in the recent clinical guidelines by the European Society of Anesthesiology to reduce the rate of blood product transfusion during liver transplantation[6]. This guideline pointed out that the preoperative viscoelastic coagulation assay might help to predict blood loss and blood transfusion during liver transplantation[6].

In addition, the Gordon *et al*[1] study did not include all events that had an impact on prognosis in regression analysis, such as postreperfusion syndrome (PRS). PRS is defined as a significant decrease of over 30% in the mean arterial pressure compared with that at the end of the anhepatic phase, and this decrease has to last at least 1 minute and occur in the first 5 min after liver graft reperfusion[7]. Decreased body temperature in children before reperfusion and prolonged graft cold ischemia time are independent risk factors for PRS in pediatric liver transplantation[7]. Metabolic acidosis, hyperkalemia, hypocalcemia, and the release of many proinflammatory cytokines into the systemic circulation by the transplanted liver releasing after reperfusion are possible mechanisms for PRS[8]. PRS is one of the most common complications during liver transplantation and can lead to delayed recovery of graft function, prolonged hospitalization, and increased mortality and seriously affect quality of life in the postoperative period[7,9]. Therefore, we believe that PRS

may have an important impact on the prognosis of children and should be included in regression analysis.

In summary, considering the advantages of viscoelastic coagulation monitoring, we should pay attention to the value of using TEG in liver transplantation. Additionally, PRS can have an important impact on the prognosis of pediatric patients who undergo liver transplantation and should be considered when exploring risk factors for postoperative mortality.

FOOTNOTES

Author contributions: Wu YL and Che L wrote this letter; Weng YQ revised the letter; All authors have read and agreed to the publication of the manuscript.

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