ROTEM More Sensitive for Fragile Liver Transplant Patients

New Orleans—Although thromboelastography (TEG) and rotational thromboelastometry (ROTEM) both are accepted means for measuring coagulation parameters, the two have rarely been compared in liver transplantation surgery. A recent study has concluded that although the two modalities provide comparable results, ROTEM corresponded better with partial thromboplastin time (PTT) and was more sensitive in identifying fibrinolysis.

“The complex hemostatic changes that occur during liver transplantation are well documented, and patients undergoing liver transplantation are at increased risk of bleeding,” said Ezeldeen Abuelkasem, MD, a member of the research team and a resident at the University of Pittsburgh Medical Center. “The standard laboratory-based tests—including platelet counts, fibrinogen level, PTT, PT [prothrombin time] and INR [international normalized ratio]—are limited in their clinical value, since obtaining these lab results often takes time. More importantly, these standard laboratory-based tests do not reflect the entire coagulation process.”

Given these limitations, both TEG and ROTEM have become widely adopted as point-of-care coagulation devices in liver transplantation. TEG offers kaolin TEG, rapid TEG, heparinase TEG and functional fibrinogen TEG. ROTEM, on the other hand, provides five traditional channels, including the INTEM, EXTEM, HEPTEM, FIBTEM and APTEM assays. Yet despite the popularity of these devices, little research has clinically compared the two in this often fragile patient population.

To that end, Dr. Abuelkasem and his colleagues studied the two modalities in 19 consecutive isolated liver transplantation patients (median age, 55 years; 11 men; median Model for End-stage Liver Disease score, 19; six live donors). Both TEG and ROTEM were performed simultaneously, at induction of general anesthesia (baseline) and 30 minutes after graft reperfusion from an existing arterial catheter.

Corresponding coagulation indices between TEG and ROTEM—maximum amplitude (MA) versus maximum clot firmness (MCF); reaction time (RT) versus clotting time (CT)—were compared as a percent change from baseline at 30 minutes after graft reperfusion. The incidence of clot lysis (lysis-30 greater than 8% in TEG and maximum lysis greater than 15% in ROTEM) was also compared. The MA in functional fibrinogen TEG and the MCF in FIBTEM were compared using plasma fibrinogen levels measured at each point as the reference value.

As Dr. Abuelkasem reported at the 2014 annual meeting of the American Society of Anesthesiologists (abstract A4006), the only significant difference found between the modalities among the corresponding coagulation indices was between the RT of kaolin TEG and the CT of INTEM. Indeed, the percentage change from baseline was 7.9% for TEG, compared with 48.6% for ROTEM (P=0.0002). When these numbers were reanalyzed with respect to percent changes of PTT, RT was significantly different from PTT (P=0.0001), whereas CT was not (P=0.43).

“So how about fibrinolysis?” Dr. Abuelkasem asked. “We did 136 measurements in total for fibrinolysis. And out of those 136 measurements, we identified fibrinolysis at 23 points using ROTEM.” Among these 23 measurements, however, only 11 (47.8%) were detected in kaolin TEG.

“So we conclude that both TEG and ROTEM provide comparable results in coagulation evaluation during liver transplantation,” he added. “The TEG and ROTEM indices corresponded well with standard lab tests, except for the RT time of kaolin TEG to PTT. Finally, fibrinolysis was more easily detected with ROTEM.” Both the MA of functional fibrinogen TEG and the MCF of ROTEM showed strong correlation with the plasma fibrinogen level.

—Michael Vlessides

Dr. Abuelkasem had no relevant financial relationships to disclose.