Thromboelastometry

Point-of-care (POC) techniques such as rotational thromboelastometry are able to identify markers of coagulopathy which are not reflected by standard assessment of hemostasis (e.g., hyperfibrinolysis).

Thromboelastometry (TEM), previously named rotational thromboelastography (ROTEG) or rotational thromboelastometry (ROTEM), is another version of TEG in which it is the sensor shaft, rather than the cup, that rotates.

Rotational thromboelastometry (ROTEM) is a functional viscoelastometric method for real-time hemostasis testing.

It can differentiate various coagulation abnormalities. For example, increased coagulation activity can be detected as a wider amplitude of tracing (maximal clot firmness [MCF]).

ROTEM analyses were performed at 12, 24, 48, and 72 hours after the onset of aSAH and compared with the preoperative analyses from the control group. A total of 17 patients with aSAH treated in the intensive care unit and 16 control patients were enrolled.

At 72 hours, EXTEM-MCF was significantly greater in patients with aSAH compared with the baseline values of the control group (68.0 mm [interquartile range (IQR), 66.0-71.0] versus 64.5 mm [IQR, 59.5-66.8]; P = 0.024). This was mainly due to increased fibrin formation and fibrin polymerization. The same comparison in the FIBTEM-MCF analysis yielded similar results (aSAH group, 23.0 mm [IQR, 19.0-25.0] vs. control group, 15.4 mm [IQR, 12.5-17.8], respectively; P = 0.001).

Blood coagulation is activated at 72 hours after aSAH onset, which can be detected by ROTEM EXTEM-MCF analysis. Also, the FIBTEM-MCF was elevated, implying that the relative contribution of fibrin formation and fibrin polymerization is essential. [1)].

In a study, Naik et al. sought to characterize the coagulation abnormalities encountered in spine surgery and determine whether a ROTEM-guided, protocol-based approach to transfusion reduced blood loss and blood product use and cost. METHODS A hospital database was used to identify patients who had undergone adult deformity correction spine surgery with ROTEM-guided therapy. All patients who received ROTEM-guided therapy (ROTEM group) were matched with historical cohorts whose coagulation status had not been evaluated with ROTEM but who were treated using a conventional clinical and point-of-care laboratory approach to transfusion (Conventional group). Both groups were subdivided into 2 groups based on whether they had received intraoperative tranexamic acid (TXA), the only coagulation-modifying medication administered intraoperatively during the study period. In the ROTEM group, 26 patients received TXA (ROTEM-TXA group) and 24 did not (ROTEM-nonTXA group). Demographic, surgical, laboratory, and perioperative transfusion data were recorded. Data were analyzed by rank permutation test, adapted for the 1:2 ROTEM-to-Conven-tional matching structure, with $p < 0.05$ considered significant. RESULTS Comparison of the 2 groups in which TXA was used showed significantly less fresh-frozen plasma (FFP) use in the ROTEM-TXA group than in the Conventional-TXA group (median 0 units [range 0-4 units] vs 2.5 units [range 0-13 units], $p < 0.0002$) but significantly more cryoprecipitate use (median 1 unit [range 0-4 units] in the ROTEM-TXA group vs 0 units [range 0-2 units] in the Conventional-TXA group, $p < 0.05$), with a nonsignificant reduction in

blood loss (median 2.6 L [range 0.9-5.4 L] in the ROTEM-TXA group vs 2.9 L [0.7-7.0 L] in the Conventional-TXA group, p = 0.21). In the 2 groups in which TXA was not used, the ROTEM-nonTXA group showed significantly less blood loss than the Conventional-nonTXA group (median 1 L [range 0.2-6.0 L] vs 1.5 L [range 1.0-4.5 L], p = 0.0005), with a trend toward less transfusion of packed red blood cells (pRBC) (median 0 units [range 0-4 units] vs 1 unit [range 0-9 units], p = 0.09]. Cryoprecipitate use was increased and FFP use decreased in response to ROTEM analysis identifying hypofibrinogen-emia as a major contributor to ongoing coagulopathy.

In major spine surgery, ROTEM-guided transfusion allows for standardization of transfusion practices and early identification and treatment of hypofibrinogenemia. Hypofibrinogenemia is an important cause of the coagulopathy encountered during these procedures and aggressive management of this complication is associated with less intraoperative blood loss, reduced transfusion requirements, and decreased transfusion-related cost [2].

In patients with acute brain injury, POC test results have been associated with important outcome parameters such as mortality and need for neurosurgical intervention. POC devices have also been used to rapidly identify and quantify the effects of antithrombotic medication. In cases of life-threatening intracranial hemorrhage, this information can be valuable when deciding over administration of prohemostatic substances or immediate neurosurgical intervention. In elective neurosurgical procedures, POC devices can provide important information when unexpected bleeding occurs or in cases of prolonged operative time with subsequent blood loss. Initial experiences with POC devices in neurosurgical care have shown promising results but further studies are needed to characterize their full potential and limitations [3].

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