Preface

Emerging Use of Viscoelastography in Thrombosis and Hemostasis: A Challenge to Conventional Coagulation Tests? Part I: The Use of Thromboelastography and Thromboelastometry in the Assessment of Hemostatic Function

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The clotting of blood in vitro involves the activation of clotting factors and platelets. Retraction of the clot then takes place followed by breakdown of the clot by fibrinolysis. All of these steps can be followed by studying the tensile strength of the clot by thromboelastography (TEG) and rotational thromboelastometry (ROTEM), both methods identified under the umbrella term "viscoelastography." This methodology was first described by Helmut Hartert as "thrombus stressography" in 1948.[1] Further technologic advance has led to the development of several new devices. TEG and ROTEM represent the two most commonly used methods. In the former, a sample of citrated blood is placed in an oscillating cup containing kaolin. Calcium is added to start the clotting process. A plot of the reaction is shown in ►**Fig. 1**. The initial reaction time is designated as R-time with normal values ranging from 4 to 8 minutes. This measures the function of clotting factors and is thus affected by anticoagulants. The time to reach a clot strength of 20 mm is the K-time and ranges from 1 to 3 minutes. The α-angle, ranging from 55 to 78 degrees, is the slope of the tracing that represents the rate of clot formation. The maximal amplitude (MA) of the tracing represents the greatest clot strength ranging from 50 to 60 mm. As fibrinolysis takes place, the MA decreases. The percentage of the MA at 30 minutes is the lysis index and ranges from 0 to 15%. The first part of the tracing (R-time, K-time, α-angle, and MA) is a function of the quantity and quality of the clotting factors and of platelets, and the second part those of fibrinolysis. In the rapid version of TEG, clotting is further accelerated by addition of tissue factor. In thromboelastometry, also known as ROTEM, the cup containing the test sample is stationary while the torque of the clot is picked up by a rotating pin.

In this issue of *Seminars in Thrombosis and Hemostasis*, the utility of both TEG and ROTEM is presented by many experts in this field. In the first article, TEG and ROTEM are compared with conventional coagulation tests.[2] Then its use in the management of blood product replacement in the bleeding patient is discussed.[3] The advantages and disadvantages of these methods are discussed. Viscoelastographic measures can be done at point of care with rapid turnaround time. Such advantage is fully utilized in the management of trauma patients, as discussed previously by Moore and colleagues, and in the current issue by Meizoso et al.[4,5] Another potential application of this methodology is in the monitoring of anticoagulant therapy.[6] This is especially useful in patients with marked variation in the coagulation status such as in complicated cases in the emergency department. This is

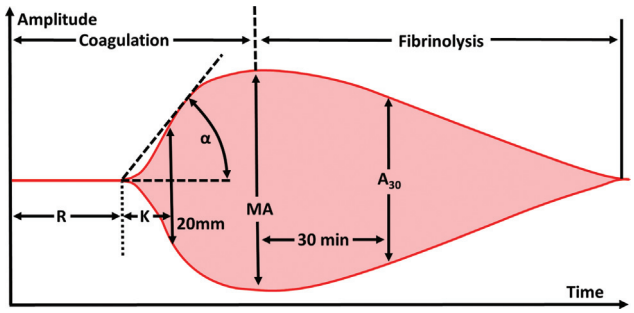

Fig. 1 A plot of the reaction for thromboelastography. MA, maximal amplitude.

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followed in this issue by the use of viscoelastographic tests in patients on mechanical circulatory support devices such as for extracorporeal membrane oxygenation.[7] The next two articles deal with the use of viscoelastography in neurological practice. They are used in subarachnoid hemorrhage and intracranial hemorrhage[8] as well as in acute ischemic stroke.[9] In addition, these methods are used in the management of COVID-19 patients.[10,11]

As its use becomes more popular, improvement in both the technique and knowledge of viscoelastography is indeed a challenge for continued and future research.

Conflict of Interest
None declared.

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