

EDITORIAL VIEW

Perioperative coagulation monitoring: a new dimension

Mohammad Hamid

*Associate Professor, Department of Cardiac Anesthesia,
Aga Khan University, Stadium Road, Karachi 74800, (Pakistan)*

Correspondence: Dr Mohammad Hamid, Associate Professor, Department of Cardiac Anesthesia, PWII Floor, Aga Khan University, Stadium Road, Box 3500, Karachi 74800, (Pakistan); Phone: +92 300 2412205; E-mail: mohammad.hamid@aku.edu

ABSTRACT

Perioperative coagulation monitoring is essential to identify surgical patients who are likely to bleed and to guide hemostatic therapy accordingly. In addition, surgery induces hypercoagulable state and its monitoring may play a role in reducing the incidence of thrombotic or thrombo-embolic events. There is a wide spread use of antiplatelet drugs by cardiologists and the monitoring and management of platelet dysfunction also becomes a vital task for anesthesiologist. Routine preoperative coagulation investigations are static tests which looked at the various parts of coagulation cascade in isolation. These tests have several limitations including reporting delays and inability to detect platelet dysfunction. Point of care testing (POC), with the use of viscoelastic testing has emerged as an alternative option for patient management during surgery. This editorial highlights the new concepts in coagulation and monitoring strategies.

Key words: Coagulation; Point-of-Care; Platelets; Monitoring; Perioperative

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The concept of coagulation process and its monitoring during perioperative period has changed over the last decade. Previous coagulation cascade model has been replaced by cell based model of thrombin generation,¹ in which hemostasis occurs in different cell surfaces in three overlapping steps. First phase occurs on tissue factor bearing cells followed by amplification phase where platelets and co-factors are activated in order to prepare for large-scale thrombin generation. The third phase is called propagation phase, characterized by formation of large amounts of thrombin on the surface of activated platelets. This cell based model of hemostasis cannot be assessed by routine coagulation tests.

Perioperative coagulation monitoring starts with proper preoperative history, physical examination and laboratory tests. History must be taken well in advance for further testing and therapeutic measures. Apart from other bleeding related relevant questions, drug history must include questions

about any antiplatelet or anticoagulant medications. There is a widespread use of antiplatelet drugs by cardiologists and the monitoring and management of platelet dysfunction also becomes a vital task for the anesthesiologist.

Coagulation monitoring not only has a role in predicting postoperative bleeding but it is also essential to detect the intraoperative causes of bleeding and to guide hemostatic therapy. In addition, surgery induces a hypercoagulable state and its monitoring may play a role in reducing the incidence of thrombotic or thrombo-embolic events. For this reason both pro and anticoagulant factors need to be assessed repeatedly.

Routine preoperative coagulation investigations (PT, aPTT, bleeding time, platelet count and fibrinogen level) are static tests which assess the various parts of coagulation cascade in isolation. During intraoperative period these tests are poor predictors of bleeding as they are being performed in the laboratory utilizing patient's plasma at

standard temperature of 37 °C rather than whole blood tests at patient's own body temperature. These tests have been proven to be of little value and have no role in assessing fibrinolysis and platelet function during surgery.

Point of care (POC) testing, has emerged as an option for patient management during perioperative care. These tests are performed at bedside usually by a non-laboratory person (an anesthesiologist in the operating room). POC tests include simple anticoagulation monitoring devices (ACT), tests to assess primary hemostasis and platelet function (PFA-100/200, modified platelet aggregometry) and viscoelastic coagulation monitoring (TEG, ROTEM, Sonoclot). POC tests are more expensive but are associated with better outcome,² when compared with routine laboratory tests. POC tests speed up the diagnosis of coagulopathies during intraoperative period which led to specific goal directed hemostatic therapy and help in minimizing

exposure to allogenic blood products.³ Platelet function analyzer and TEG are also very helpful in deciding the timing of surgery in patients who are on dual antiplatelet therapy.⁴

Viscoelastic tests (TEG/ROTEM) are dynamic tests, which looked at the global functional assessment of coagulation/fibrinolysis. These tests not only assess platelet function but can also be used for quantification of heparin effect during cardiac surgery. Hypercoagulability can also be easily diagnosed by viscoelastic POC tests. It may help in reducing the incidence of deep venous thrombosis, pulmonary embolism and myocardial infarction in postoperative period.

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