

Intraoperative coagulation monitoring: expanding the point of care (POC) philosophy

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Haemostasis consists of a complex sequence of regulatory events in response to tissue injury (surgery or trauma): two major processes, coagulation and fibrinolysis, are finely tuned to arrest bleeding, to repair the vascular lesion and to restore the patency of the vascular bed⁽¹⁾. Massive intraoperative haemorrhage is usually characterized by technical surgical or vascular problems and derangements in the haemostatic profile⁽²⁾. While technical refinements and active surgical interventions or embolization might correct the surgical or vascular component of bleeding, the hemostatic derangements may be extremely difficult to be recognized and to be taken under control. In case of massive intraoperative bleeding, defined as a loss of one blood volume in 24 hours or the loss of 50% blood volume in less than 3 hours⁽²⁾, mandatory are the diagnose of the underlying disorder(s), the assessment of the possible contributing risk factors and the definition of the possible strategies to counteract the haemorrhage. Several interrelated mechanisms are responsible for the impaired intraoperative hemostatic profile: among them are coagulation factors and platelets consumed in clot formation, dilution of coagulation factors during massive fluid resuscitation and major metabolic changes (eg, hypothermia, acidosis, hypotension). Significant progresses have recently been made in the diagnosis of the perioperative haemostatic changes, while a variety of very active new drugs are now available for complex and effective manipulations of the haemostatic defects. In case of massive surgical or non-surgical haemorrhage however, the use of both blood components and / or drugs has to be guided and gauged by a dedicated instrumentation⁽³⁾. Reliability, simplicity, minimal operator attention and size (the device has to be compact in size and seated close to the work station) are critical to successfully implement POC (point of care) strategy in this field. The ideal tool for the intraoperative haemostatic evaluation should be able to give rapid, accurate, reproducible and useful results; to suggest possible therapeutic choices (blood component therapy, drugs, combination therapy); to show in real time the results of the manipulation⁽³⁾. Instead of monitoring a single global “static” conventional coagulation parameter (prothrombin time, aPTT, platelet count etc), as many available POC coagulation devices are now able to perform, a more comprehensive way to “dinamically” assess the haemostatic profile is provided by thromboelastography (TEG, *Haemoscope*, USA; thromboelastometry, ROTEM, *Pentapharm*, Germany)^(3,4). The viscoelastic properties of the clot performed on whole blood are assessed from clot formation to clot lysis or retraction. The new devices, recently reintroduced in the clinical practice with new and expanded intraoperative diagnostic facilities and now accepted also by the haematologists, may provide accurate and reliable information of the underlying haemostatic changes occurring during surgery: this should allow a more rationale diagnostic approach and a treatment hopefully directed towards the underlying mechanisms of the intraoperative bleeding⁽⁴⁾. The diagnosis and treatment of massive intraoperative bleeding, a major clinical challenge for surgeons and anesthesiologists, could now recognise a new attractive perspective^(3,4). The new insights into the complex interactions between coagulation, systemic inflammatory response and sepsis and the extremely urgent need for early and reliable biomarkers of sepsis and its outcome make the critical care setting (ICUs, SICUs) the very next challenging step for the POC haemostatic devices development⁽⁵⁾.

Bibliography

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