HAEMOSTATIC EMERGENCIES IN PREGNANCY AND DELIVERY

Thorsten Haas

During normal pregnancy the haemostatic balance changes in the direction of hypercoagulability, based on an increase of near all coagulation factors (with exception of Factor XI) including fibrinogen and through activation of platelets. In parallel free protein S and fibrinolytic capacity are diminished. Those changes may be a result of increased estrogen levels. Major changes take place during the third trimester and normalized four to six weeks after delivery.

Nevertheless, during pregnancy and delivery, both, the risks of bleeding and of thromboembolic complications are increased. Eclampsia, HELLP-Syndrom, placental abruption, amniotic fluid embolism and several other conditions can induce disseminated intravascular coagulation (DIC) and subsequently multiorgan failure. Therefore it was essential to detect haemostatic derangements timely. In this context standard global coagulation test provide little information, results are available only after unacceptable delay and furthermore provide no definite information on ongoing DIC and hyperfibrinolysis. In contrast, thrombelastographic measurements allow detecting hypercoagulability, hyperfibrinolysis, deficiencies of coagulation factors, as well as the differentiation of a deficiency of fibrinogen from that of platelets. The automatic pipetting system is easy to use and results area available immediately, thus appropriate therapy can be initiated without delay. Furthermore in the occurrence of postoperative bleeding thrombelastographic measurements can be used to decide whether surgical revision is necessary or whether coagulopathy needs to be corrected firstly.

Postpartum hemorrhage is defined as a blood loss greater than 500 ml after vaginal delivery, and greater than 1000 ml after a cesarean delivery. Given that such estimates of blood loss are subjective approximations at best, the American College of Obstetrics and Gynecology recently advocated defining postpartum hemorrhage as either a 10% change in haematocrit between admission and the postpartum period, or a need for erythrocyte transfusion. Using this definition, vaginal deliveries have a 3.9% incidence of haemorrhage and cesarean deliveries a 6.4% incidence. Whenever excessive blood loss is expected, it is imperative that an adequate infusion device is available and that blood components are prepared.

Most common aetiologies for postpartum hemorrhage consist of uterine atony, retained placental fragments and lower genital tract laceration. Less common causes include uterine rupture, placenta accrete and coagulopathy. Uterine atony is still the leading cause of primary postpartum haemorrhage, also the leading cause of maternal mortality in USAand the main indication of emergency peripartum hysterectomy.

The successful use of recombinant factor VIIa was subject of several case reports about peripartum haemorrhage management. However, every attempt should be made firstly to temporarily achieve fibrinogen concentrations of 100mg/dL and platelet counts of 30 G/L, because these are pivotal in the coagulation-promoting action of rFVIIa.

Certain coagulopathic conditions are the consequence of pathology that is unique to pregnancy. Although these are very rare causes of postpartum haemorrhage, they should be considered, especially in the absence of more common aetiologies. Such conditions include coagulopathy due to DIC associated with eclampsia, abruption placenta, amniotic fluid embolism, severe infections, and dead foetus syndrome.

Obstetrical DIC is usually a very acute, serious complication of pregnancy. However, diagnosis of DIC in obstetrics may be difficult. There are several reliable laboratory markers for the presence of DIC, including measurements of thrombin-antithrombin complex (TAT), and fibrin degradation products (FDP, D-Dimer). Unfortunately, these tests are not helpful for clinical practice because they are not available in clinical routine and also too time consuming. Generally in the early course of DIC treatment of bleeding is of primary concern while in the late course thrombembolic complications are the dominating problem. ROTEM® measurements allow to monitor these patients very closely through the entire course and enable directed therapy, which have been shown to lead to a reduction of blood components transfused. In most of the patients showing considerable blood loss and volume demand fibrinogen deficiency will develop firstly, followed by a deficiency in other procoagulant haemostatic factors and finally platelet deficiency need to be corrected. However this general observed derangements of the hemostatic system are influenced by inter-individual differences in haemostatic competence. Therefore repeated ROTEM® measurements of the individual patients are needed.

In addition sever blood loss might also be due to hyperfibrinolysis, which is also detectable by thrombelastographic monitoring and needs to be corrected by the administration of aprotinin, followed by correction of fibrinogen deficiency.

Activated protein C (APC) is a serine protease derived from vitamin K-dependent zymogen, protein C, via activation by thrombin/thrombomodulin complex. APC can inhibit thrombin generation, accelerate fibrinolytic activity and thus might be a useful therapy in the late course of DIC.

Heparin therapy is rarely indicated in obstetrical DIC because these patients usually have a large postoperative wound and severe bleeding may occur following heparin therapy.

Because prolongation of exposure to the triggering factors will aggravate DIC, it is most important to eliminate the etiologic factor as rapidly as possible.

In conclusion, thrombembolic as well as severe bleeding might complicate pregnancy and delivery. Immediate diagnosis and therapy are needed in order to manage these patients safely. Global coagulation test provide only limited information after unacceptable delay while ROTEM® measurements can be done at bedside, allow differential diagnosis and thus early and appropriate treatment.