

A new application for thrombelastography in pregnant women at term

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The leading cause for maternal mortality in the developed world is venous thromboembolism (VTE).¹ VTE occurs in 10 per 100,000 women of childbearing age and affects more than 100 per 100,000 pregnancies. The main risk factors for peripartur VTE are a history of VTE, inherited thrombophilia, obesity, surgery, prolonged immobilization, and others like age and smoking.² Women undergoing caesarean delivery have a much higher risk of VTE than women undergoing vaginal delivery.²

Although these data are well known anesthesiologists primarily fear the opposite: severe peripartur hemorrhage, an often catastrophic bleeding disorder associated with extended hyperfibrinolysis and consequently low fibrinogen levels. As a consequence it is not surprising that most articles from anesthesiologists about peripartur coagulatory disorders are dealing with severe bleeding and not with hypercoagulatory states resulting in VTE. This discrepancy might also be aggravated by the fact that commonly used laboratory tests do not reliably indicate a hypercoagulatory state during pregnancy in many situations. As most coagulation factors increase in normal pregnancy, the prothrombin time (PT) and the activated partial thromboplastin time (aPTT) should be shortened. However, in daily clinical practice this is not necessarily the case, since frequently detected antiphospholipid antibodies can artificially increase these values and mimic the laboratory values of a patient

with a bleeding disorder despite the fact that this patient is prothrombotic. As a consequence commonly used laboratory tests are frequently considered unsuitable for describing the coagulatory state of pregnant women in many situations.

It has been demonstrated for bleeding disorders, that modern point of care tests like the "TEG" or the "ROTEM" can detect coagulatory dysfunctions more reliably and valid than conventional laboratory tests. Using these devices it is possible to provide additional information on the kinetics of clot formation, on clot strength, on the interactions between the coagulation components, on platelet function, and especially on the occurrence of fibrinolysis.³ Therefore, it is consistent to reappraise the same methods for hypercoagulatory states. However, data available for this clinical situation are rare.^{4,5} This is even more true for pregnant women where only small studies and case series have been published yet.⁶

Della Rocca *et al.* fill this gap with their current publication in *Minerva Anestesiologica*.⁷ They demonstrate that pregnant women at term are in a hypercoagulatory state, that can be measured by means of thrombelastography, and that this is even possible in citrated blood samples, simplifying clinical application of their approach. Although this publication presents TEG data that could be used as reference information for the hemostatic management of pregnant women at term some problems should be kept in mind.

Comment on p. 1357.

Thrombelastography has never been developed to detect and quantify hypercoagulatory states. As a consequence, although it is intuitive to interpret the TEG-changes observed by Della Rocca *et al.* as indicators of hypercoagulation, this point of view needs to be further validated in additional investigations.⁸ Older studies by Kashuk *et al.* describe that TEG parameters are able to describe hypercoagulation and indeed to predict thromboembolic events in surgical patients, but whether this is also true in pregnant women has to be elucidated.⁹ In contrast to this one might speculate that identical standard laboratory tests in pregnant and non-pregnant women (with all their shortcomings) rather indicate comparable coagulatory states in these populations. Furthermore, it is especially unknown, whether the changes in TEG parameters observed are correlated to an increase in the number of thrombotic events or just reflect changes of blood coagulation during pregnancy not correlated to changes in outcome.

Additionally, it has to be pointed out, that usage of citrated blood enables broad clinical application of TEG-parameters in daily clinical practice; however, this approach is not undisputed in the literature.¹⁰

Despite these limitations the study published by Della Rocca *et al.* demonstrates the importance to broaden the view upon coagulatory disorders during pregnancy. Using standard coagulatory tests will essentially neglect important physiological changes during pregnancy that might or might not influence outcome. At this time point it seems to be difficult to use these

data to guide anticoagulatory therapy or to determine the best time point for neuroaxial blockade, however the results obtained in this publication might lay the foundation for further studies reaching these ambitious goals.

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