

Bedside Haemostasis Measurement and Risk of Neuraxial Block in Preeclampsia

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Introduction

- Preeclampsia (PE) can cause abnormalities of haemostasis that increase the risk of a spinal haematoma when a neuraxial block is performed.
- This risk is traditionally stratified using a patient's platelet count (Plt) and PT/APTT (coag).
- According to national guidance[1], Plt <100x10^9/l increases the risk of an iatrogenic spinal haematoma, with further increases if PT/APTT are prolonged or if HELLP syndrome (Haemolysis, Elevated Liver enzymes, Low Platelets) is present.
- Guidance advises that laboratory tests should be from within 6 hours[1] and therefore if these results are not available, a general anaesthetic (GA) may be required or neuraxial analgesia can be delayed.
- A GA can carry additional risks in women with preeclampsia and a delay in epidural analgesia due to the wait for laboratory results can hinder hypertension management, as highlighted in a recent M-BRACE report.[2]
- The aim of this study was to assess whether more rapid bedside haemostasis tests (rotational thromboelasometry; ROTEM, and ROTEM platelet aggregometry; RP) can provide an equivalent risk assessment compared to laboratory tests in women with preeclampsia.

Methods

- Following ethical approval, pregnant women with and without (controls) a clinical diagnosis of PE were recruited; clinical indicators of disease severity were recorded.
- Patients on aspirin/anticoagulant treatment or with a coagulation disorder were excluded.
- Plt and coag laboratory tests were taken with paired ROTEM and RP assays for comparison.
- ROTEM parameters were: EXTEM clotting time (CT), EXTEM amplitude at 5 minutes (EXTEM A5) and FIBTEM amplitude at 5 minutes (FIBTEM A5).
- Clot elasticity (Ce Plt) was subsequently derived[3] to measure the platelet contribution to clotting.
- RP parameters were: maximum slope (MS), amplitude at 6 min (A6) and area under curve (AUC) for each platelet reagent: ADP (adenosine diphosphate), ARA (arachidonic acid) and TRAP (thrombin activating peptide).
- Results were compared between the control and PE groups using Mann Whitney analysis, and predictive values were calculated using contingency testing (Fishers exact test).

Results

- 57 (controls) / 71 (PE) participants were recruited with 61 (86%) having severe PE including 4 with HELLP.
- Plt count was significantly lower in the PE group (**median**, **IQR** (**range**); **185**, **155-238** (**61-443x10^9/l**)) vs controls (**227**, **183-268** (**126-364x10^9/l**)) (**p=0.005**).
- 6 (8%) women with PE had Plt <100x10^9/l with 3 of them having Plt <75x10^9/l indicating an increased risk of a neuraxial block related spinal haematoma.
- All control participants had Plt >100x10^9/l.
- PT and APTT were not prolonged in any participants; APTT was however shortened in 35% of PE participants and 18% of controls.
- There were no significant differences in ROTEM, RP or coag parameters between the control and PE groups.
- Subgroup analysis demonstrated that PE participants with Plt<100x10^9/l had a lower **ADP AUC** (median 50 vs. 107, p 0.0075), **EXTEM A5** (44 vs 54, p 0.0001) and **Ce Plt** (54 vs. 95, p<0.0001) compared to PE women with Plt >100x10^9/l.
- Negative (NPV) and positive predictive values (PPV) for identifying women with Plt<100x10^9/l were as follows for **ADP AUC<60**, **EXTEM A5<47mm** and **Ce Plt <70** respectively; NPV (95% CI): 0.98 (0.92-0.99), 0.98 (0.91- 1.0) and 1.0 (0.94-1.0); PPV (95% CI): 0.45 (0.21-0.72), 0.36 (0.15-0.65) and 0.43 (0.21-0.67).

Discussion

- This study has compared standard laboratory tests with ROTEM and platelet aggregometry in women with PE to assess their neuraxial haematoma risk.
- In our study group (where 86% of women had severe PE), 8% had laboratory tests indicating an increased risk of a spinal haematoma on the basis of platelet count <100x10^9/l.
- The remaining 92% of women with PE may have benefited from the use of a rapid bedside haemostasis test to avoid an unnecessary GA in the event of emergency caesarean section or to prevent a delay for a neuraxial block whilst awaiting lab results.
- High **NPV** of the platelet aggregometry **ADP AUC**, **ROTEM EXTEM A5** and **Ce Plt** calculation suggest that these tests may have potential to rule out Plt <100x10^9/l at the bedside.
- Studies in a larger number of women would be needed to determine the safety of this approach however if undertaken, may inform a change in practice that could increase both patient safety and satisfaction

References

1. Working Party: Association of Anaesthetists of Great Britain & Ireland; Obstetric Anaesthetists Association; Regional Anaesthesia UK. Regional anaesthesia and patients with abnormalities of coagulation. Anaesthesia, 2013; 68: 966-72
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3. Solomon C, Ranucci M, Hochleitner G et al. Assessing the methodology for calculating platelet contribution to clot strength (platelet component) in thromboelastometry and thrombelastography. Anesthesia & Analgesia, 2015; 121:8 68–78.