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12AP04-4

In-vitro testing of the effect of unfractionated heparin, and low molecular weight heparin on new generation thromboelastogram (TEG6s) and conventional coagulation assays

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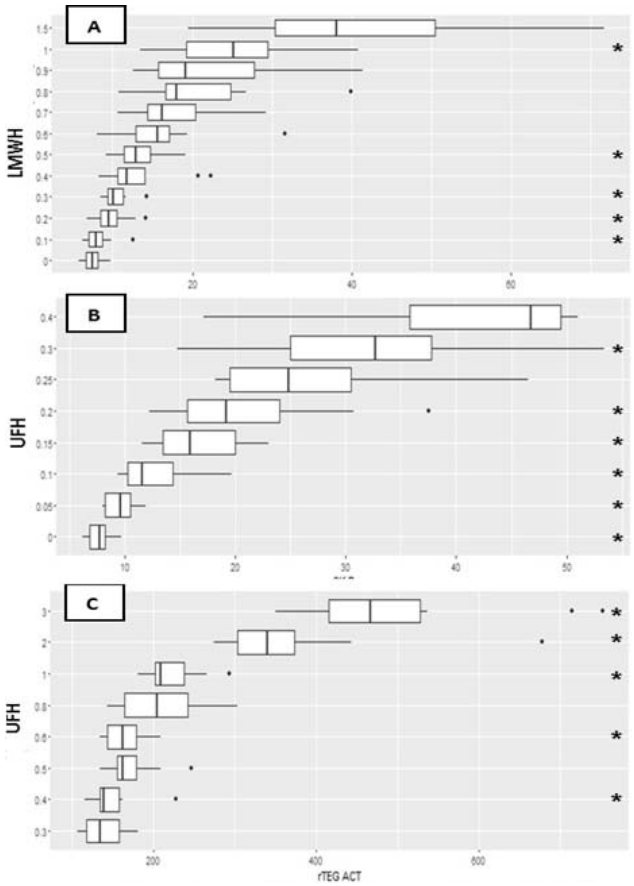
Background and Goal of Study: Unfractionated (UFH) and Low molecular weight (LMWH) heparin are used as anticoagulants for prevention and treatment of thromboembolism. The anti-Xa test has become the gold standard in measuring anticoagulant efficacy, and for the monitoring required to achieve target therapeutic range. Assays like the standard kaolin (CK), and the kaolin with heparinase (CKH) in thromboelastogram (TEG) have long been used to detect the presence of heparin. In this study we evaluate utility of TEG at various concentrations of UFH, and LMWH. We also assess the sensitivity of TEG in monitoring heparin levels outside the therapeutic ranges.
Materials and Methods: Twenty (10 each) healthy donors were enrolled. Each sample of citrated blood (3.2ml) was incubated with heparin at various amounts for final levels of UFH (0-5 IU/ml), or LMWH (0-10 IU/ml), prepared by diluting 0.9% of saline. The spiked blood was run through CK, CKH, and r-TEG (kaolin with tissue factor) and anti-Xa assays (Quest Diagnostics). R (reaction time) from CK, and CKH assays and ACT from r-TEG (activated clotting time) is time from test initiation to clot formation. Elongation of CK R and r-TEG ACT with heparin dosage was analyzed with paired t-test ($p < 0.05$ was significant). The utility of TEG in therapeutic ranges of UFH, and LMWH (defined by Anti-Xa) was assessed using a logistic regression models using ratio of CKH to CK R as predictor variable.



*[Fig 1. Box plots showing (A) CK R with LMWH (0-1.5 U/ml), (B) CK R and (C) rTeg ACT at various concentrations of UFH, 0-0.4 U/ml and 0.3-3 U/ml respectively. *indicates significance from successive higher dosage level.]*

Results and Discussion: Statistically significant elongation in CK.R was observed in both increasing UFH and LMWH dilutions at lower heparin levels (Fig1). We observed significant increase in r-TEG ACT at higher dilutions of UFH. Hence with CK R, and r-TEG ACT we can monitor UFH over a wide range of dilutions (0-3 IU/ml) but they were less sensitive to higher LMWH levels. Ratio of CKH to CK R significantly predicted ($p<0.001$) heparin outside the therapy levels.
Conclusion(s): TEG6s may be considered a reliable tool in measuring heparin levels (wide range of UFH, and lower quantities of LMWH dosage). In clinical settings requiring monitoring of heparin levels to target therapeutic ranges, TEG may be used as accurate and early indicators.

12AP04-5

The diagnosis and correction of hemocoagulation disorders in operative delivery

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Background and Goal of Study: Despite significant progress in obstetric care, the problem of bleeding during labour remains unfinished. Annually in the world 125,000 women die from obstetric haemorrhage.
Materials and Methods: The results of surgical treatment of 84 patients after cesarean section during the period from 2014 to 2016 entered the study. Condition of haemostasis was monitored by 12 standard biochemical tests, as well as the new instrumental method - low-frequency piezoelectric haemoviscoelastography preoperative, intra-operative and every day during 10 days after surgery.A randomized, double-blind study was performed .Patients were divided into two groups: the first group (n=43) received preoperative (30 minutes before operation) tranexamic acid 10-15 mg/kg (depends on severity of hemocougulation disorders); the second group (n=41) didn't receive medication, which has influence on blood coagulation.
Results and Discussion: All patients included in the study before the surgery had moderate hyper-coagulation and increased index of fibrinolysis: increasing of the intensity of clot coagulation (ICC) to 11.4% compared to normal rates; the intensity of the retraction and clot lysis (IRCL) was 1.45 ± 0.44 in both groups. After operation in patients (group 1) - ICC decreased 9.7% ($P<0.05$), and IRCL decreased 27.6% ($P<0.05$) compared with preoperative study. In group 2, ICC decreased 8.8% ($P<0.05$), and IRCL increased 11.4% ($P<0.05$) compared with preoperative study. At the end of the operation, the condition of haemostasis in both groups came almost to the same value - moderate hypocoagulation, depressed fibrinolysis. In both groups there were no trombotic complications. Intraoperative blood loss in the first group was 340 ± 23,2 and in the second was 488 ± 33,4.
Conclusion(s): Using tranexamic acid before surgery significantly reduces intra-operative blood loss by 40%, without thrombotic complications. Using low frequency piezoelectric haemoviscoelastography enables quickly identify disorders of haemostasis in patients after cesarean section before, during and after the surgery.

12AP04-6

Evaluation of fibrinogen level in trauma using new generation thromboelastogram (TEG6s) and Clauss assays

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Background and Goal of Study: Hemorrhage remains one of the leading causes of death in trauma induced coagulopathy (TIC). Fibrinogen (Fbg) is key to hemostasis which declines rapidly in these patients. Fast, and accurate determination of Fbg is essential for intervention with blood products, antifibrinolytics and Fbg concentrates. Von Clauss method is commonly used, but its delay in measuring Fbg can affect early identification of coagulopathy. The maximum clot strength (MA) from Functional Fbg (FF) assay in TEG have been used to derive Fbg level. Our objectives are to investigate the performance of predicate (TEG5000), and TEG6s with Clauss assay, and to measure the ability of TEG assay in detecting low Fbg levels in massively transfused trauma patients.
Materials and Methods: 305 trauma patients (age: 45±18, ISS:17±10, GCS: 12±4) were enrolled. Blood was drawn for testing in the TEG systems, and Clauss (Quest Diagnostic). Using linear regression model we evaluated the correlation between MA, and Clauss. ROC analysis was performed at pre-