

Utility of Thromboelastography Derived Maximum Amplitude and R-Time (MA-R) Ratio as a Predictor of Mortality in Trauma Patients

Authors : Arulselvi Subramanian, Albert Venencia, Sanjeev Bhoi

Abstract : Coagulopathy of trauma is an early endogenous coagulation abnormality that occurs shortly resulting in high mortality. In emergency trauma situations, viscoelastic tests may be better in identifying the various phenotypes of coagulopathy and demonstrate the contribution of platelet function to coagulation. We aimed to determine thrombin generation and clot strength, by estimating a ratio of Maximum amplitude and R-time (MA-R ratio) for identifying trauma coagulopathy and predicting subsequent mortality. Methods: We conducted a prospective cohort analysis of acutely injured trauma patients of the adult age groups (18- 50 years), admitted within 24hrs of injury, for one year at a Level I trauma center and followed up on 3rd day and 5th day of injury. Patients with h/o coagulation abnormalities, liver disease, renal impairment, with h/o intake of drugs were excluded. Thromboelastography was done and a ratio was calculated by dividing the MA by the R-time (MA-R). Patients were further stratified into sub groups based on the calculated MA-R quartiles. First sampling was done within 24 hours of injury; follow up on 3rd and 5th day of injury. Mortality was the primary outcome. Results: 100 acutely injured patients [average, 36.6 ± 14.3 years; 94% male; injury severity score 12.2(9-32)] were included in the study. Median (min-max) on admission MA-R ratio was 15.01(0.4-88.4) which declined 11.7(2.2-61.8) on day three and slightly rose on day 5 13.1(0.06-68). There were no significant differences between sub groups in regard to age, or gender. In the lowest MA-R ratios subgroup; MA-R1 (<8.90 ; n = 27), injury severity score was significantly elevated. MA-R2 (8.91-15.0; n = 23), MA-R3 (15.01-19.30; n = 24) and MA-R4 (>19.3 ; n = 26) had no difference between their admission laboratory investigations, however slight decline was observed in hemoglobin, red blood cell count and platelet counts compared to the other subgroups. Also significantly prolonged R time, shortened alpha angle and MA were seen in MA-R1. Elevated incidence of mortality also significantly correlated with on admission low MA-R ratios (p 0.003). Temporal changes in the MA-R ratio did not correlated with mortality. Conclusion: The MA-R ratio provides a snapshot of early clot function, focusing specifically on thrombin burst and clot strength. In our observation, patients with the lowest MA-R time ratio (MA-R1) had significantly increased mortality compared with all other groups (45.5% MA-R1 compared with $<25\%$ in MA-R2 to MA-R3, and 9.1% in MA-R4; p < 0.003). Maximum amplitude and R-time may prove highly useful to predict at-risk patients early, when other physiologic indicators are absent.

Keywords : coagulopathy, trauma, thromboelastography, mortality

Conference Title : ICCCLM 2018 : International Conference on Clinical Chemistry and Laboratory Medicine

Conference Location : London, United Kingdom

Conference Dates : May 14-15, 2018