Research on Trauma Induced Coagulopathy

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Introduction: Trauma is the leading cause of death in patients under the age of 45 worldwide. Most of these deaths due to trauma are caused by major bleeding. A complication of major bleeding and increasing factor of mortality is the trauma induced coagulopathy (TIC) (1,2). Not only in civilian, but especially in combat situations major hemorrhage is one of the main reasons why soldiers are killed in action (KIA). Due to this, various prehospital transfusion concepts were introduced in civilian and military prehospital trauma care procedures of multiple countries. But until now there are neither sufficient tools available to identify patients out-of-hospital (OOH) who could profit from administration of a blood product because the best method for detection of TIC is the thrombelastrometry (3), nor which would be the best blood product to use in prehospital trauma care. In 2015 we conducted the PREDICT-Study (**P**rehospital **E**valuation and **D**etection of **I**nduced **C**oagulopthy in **T**rauma-Study) (4).

Methods: Beginning in August 2015 we included trauma patients who were treated by the team of HEMS Christoph 22, Ulm/Germany. Out-of-hospital and again in the emergency room (ER) we drew blood for thrombelastometry (TEM) with Rotem® for evaluating CT, CFT, CF, A10, MCF in Intem, Extem, Fibtem and Aptem, as well as plasmatic coagulation parameters (aPTT, INR, Quick), blood count and blood gas analysis. In addition to this we collected over 70 parameters per patient like trauma mechanism, injuries, administered fluids, vital signs, blood product transfusion in the first 24 hours, etc. The Study is registered under DRKS00009559 (German Registry of Clinical Trails) and has a positive vote of the ethic committee of the University of Ulm (346/14).

Preliminary Results: From August 2015 to February 2017 130 patients were included. Of 82 patients we had complete OOH data at Feb 2017. The mean ISS of all 82 patients was 19.7 and the NISS 24.6. In 30.5 % of the patients there were pathological findings in Extem and / or Fibtem, 13.4 % had a TIC with abnormalities in Extem and Fibtem and 4.9 % of all 82 patients had already on scene a hyperfibrinolysis. In addition to changes in Extem and Aptem in the OOH blood probe we found in the patients with TIC a significant correlation with base deficit in wilcoxon´s two pair test (p=0.0356), but no significance in correlation with prehospital lactate levels (p=0.8102). The group of patients with TIC and hyperfibrinolysis was at the time of preliminary data evaluation too small to do sufficient statistics.

Wilcoxon-Two-Sample-Test

p-value	Changes in Extem or Fibtem	TIC	Hyperfibrinolysis	ISS ≥ 16
Patients	25	11	4	46
BD	0.0135	0.0356	---	0.1096
Lactate	0.4432	0.8102	---	0.3453

Table 1: P-value of base deficit and lactate in wilcoxon´s two sample test (4)
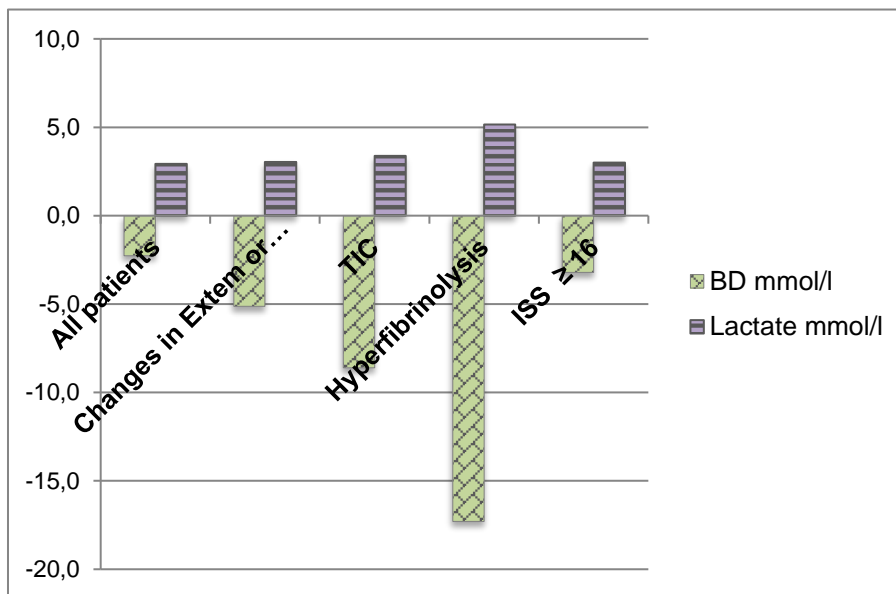

Table 2: On scene base deficit and lactate values of all patients and different subgroups (4)

Conclusion: We could show that TIC already exists on scene in severe trauma. For detection of those patients the measurement of base deficit could be a trustable early detection parameter for trauma induced coagulopathy whereas lactate is not valuable for the detection of early coagulopathy in trauma. For **D**etermination and **E**valuation of **T**hresholds in **E**arly **C**oagulopathy in **T**rauma we soon will start another OOH study named TIC-**DETECT**.

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