

Coagulation and Fibrinolytic Markers as Predictors of ARDS

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Introduction. Acute respiratory distress syndrome (ARDS) still has a mortality rate of 30–50% due to late diagnosis. Many aspects concerning the early diagnostic markers of ARDS are still obscure. The crosstalk between lung inflammation and coagulation / fibrinolytic pathways has been described. Inflammation modulates blood coagulation by C-reactive protein which stimulates cells to produce tissue factor (TF) and plasminogen activator inhibitor-1 (PAI-1). Early detected changes in coagulation / fibrinolytic state could predict development of ARDS in mechanically ventilated patients.

Aim. The main objective of the study is to find what are the sensitivity and the specificity of markers of coagulation / fibrinolysis as early prognostic and diagnostic tools for ARDS.

Material and Methods. Plasma samples were prospectively collected from 24 patients with ARDS risk diagnosis requiring mechanical ventilation at least for 24 hours (h). Plasma biomarkers of coagulation / fibrinolysis (TF, t-PA, PAI-1) were measured with ELISA at three different time periods: upon inclusion – T₀, on the third – T₃ and the seventh day – T₇. Biomarker levels were compared between those with and without developing ARDS during the first 7 days after inclusion based on Berlin definition.

Results. After ethical approval, 24 critically ill patients with a mean age 54 ± 17 years (7 (29%) sepsis, 11 (46%) pneumonia, 3 (21%) pancreatitis, 1 (4%) with massive transfusions) on mechanical ventilation at least for 24 h due to respiratory failure were studied. ARDS developed for 14 patients (6 (25%) mild, 4 (17%) moderate, 4 (17%) severe). Mean values of the studied markers were consistent between patients with and without developing ARDS, excepting TF at T₃ and PAI-1 at T₃, 198 ± 116 vs. 89 ± 31 pg/ml; p = 0.009 and 141 ± 93 vs. 45 ± 30 ng/ml; p = 0.005. Moreover, comparing not survivors (n = 6) vs. survivors significantly higher values were noticed for TF at T₃ – 234 ± 124 vs. 126 ± 85; p = 0.025 in all studied patients and for t-PA at T₂ in ARDS group – 516 ± 160 vs. 295 ± 85 ng/ml; p = 0.01, respectively. TF at T₃ demonstrated the highest predictive value for developing ARDS with AUC 0.8; p = 0.02.

Conclusions. Activation of coagulation and fibrinolytic systems induced by inflammatory cytokines occurs early in patients on mechanical ventilation. TF and PAI-1 could be useful as early diagnostic markers, additionally, TF and t-PA as prognostic tools for the development of ARDS.