Role of Cytokines and Coagulation Factor PAI-1 in Patients with Developing Acute Respiratory Distress Syndrome

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Introduction. The crucial role in developing ARDS plays inflammatory process. Many aspects concerning the early diagnostic markers of ARDS are still obscure. The crosstalk between lung inflammation and coagulation/fibrinolytic pathways is described. Inflammation modulates blood coagulation by C-reactive protein which stimulates cells to produce tissue plasminogen activator inhibitor-1 (PAI-1). Cytokines as well as fibrinolysis biomarkers can be useful to predict mortality in critically ill patients at risk of developing ARDS.

Aim, Material and Methods. The main aim of the study was to investigate the dynamic changes in the activity of interleukin IL-15, macrophage inflammatory protein 1a (MIP-1a) and fibrinolysis marker PAI-1 in ARDS patients. This prospective study was conducted in the ICU of Pauls Stradins Clinical University Hospital during the year of 2015. Patients with acute severe pneumonia, pancreatitis, sepsis were included. Patients were monitored for seven days. The ARDS was diagnosed according to the Berlin definition criteria. Blood samples we took at the first T1 and fourth T4 after inclusion.

Results. After ethical approval, 40 critically ill patients with a mean age 56 ± 18 years (12 (30%) sepsis, 18 (45%) pneumonia, 10 (25%) pancreatitis) on mechanical ventilation at least for 24 hours due to respiratory failure were studied. ARDS developed in 16 patients (7 (44%) mild, 5 (31%) moderate, 4 (25%) severe). Mean values of IL-15 were consistent between patients with and without developing ARDS (2.6 ± 0.26 pg/ml; p = 0.004 vs. 2.34 ± 0.32 pg/ml; p = 0.002) with no significant dynamic changes between day 1 and day 4.

MIP-1a was significantly higher in patients with ARDS at T1 20.3 ± 3.46 pg/ml; p = 0.009 vs. 7.08 ± 0.89 pg/ml; p = 0.004, respectively. Moreover, comparing not survivors (n = 7) vs. survivors, significantly higher values were noticed for MIP-1a at T1 – 23.13 ± 1.21 pg/ml; p = 0.01 vs. 17.63 ± 2.67 pg/ml; p = 0.007, respectively.

PAI-1 showed a significant difference in patients with ARDS if compared with those without ARDS at T4 (89 ± 31 pg/ml; p = 0.009 and 45 ± 30 ng/ml; p = 0.005).

Conclusions.

1. There are dynamic changes in the level of MIP-1A and PAI-1 in patients with ARDS.
2. Increased level of MIP-1a on the first day after inclusion related with the poor outcome in ARDS patients.