Influence of aminosteroid and glucocorticoid treatment on inflammation and immune function during cardiopulmonary bypass

Volk T, Schmutzler M, Engelhardt L, Docke W D, Volk H D, Konertz W, Kox W J

Objective
During cardiopulmonary bypass, inflammation and immunosuppression is present. We measured circulating mediators and monocyte-based functions and tested the hypothesis that these variables are influenced by methylprednisolone (MP) or tirilazad mesylate (TM) treatment. DESIGN: Randomized, controlled, double-blind prospective trial.

Setting
A university hospital.

Patients
Thirty-nine patients scheduled for conventional coronary surgery with three-vessel disease.

Interventions
Preoperative application of MP (15 mg/kg) or TM (10 mg/kg) compared with placebo (PL).

Measurements and Main Results
Circulating proinflammatory markers including interleukin (IL)-6, IL-8, monocyte chemoattractant protein 1, and C-reactive protein were all decreased by MP treatment but not by TM treatment. Whereas rapid increases in circulating anti-inflammatory IL-10 were superinduced by MP but not TM, plasma levels of IL-1RA and transforming growth factor beta were not altered by either treatment. Decreased ex vivo lipopolysaccharide-stimulated secretion of tumor necrosis factor alpha was prolonged after MP treatment but not after TM treatment. Perioperative stimulated secretion of IL-12 and interferon gamma was diminished in all groups, whereas ex vivo IL-1RA secretion tended to increase in all groups. Depression of monocyte surface expression of HLA-DR was significantly greater in patients treated with MP, whereas CD14 expression did not change.

Conclusions
These data confirm that, during cardiopulmonary bypass, pro- and anti-inflammatory systems are activated at the same time, whereas monocyte-based immune functions are depressed. Treatment with MP abrogates proinflammatory mediators and induces a shift toward anti-inflammation at the cost of further functional monocyte deficits, whereas treatment with TM apparently has neither anti-inflammatory nor immunosuppressive actions in this setting.

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