Effects of different steroid treatment on reperfusion-associated production of reactive oxygen species and arrhythmias during coronary surgery


Background
During conventional cardiac surgery ischemia and reperfusion may cause excessive production of reactive oxygen species leading to tissue damage including early arrhythmias. We therefore assessed the kinetics of markers of radical stress including oxidized and reduced glutathione (GSSG/GSH), oxidized proteins (PCG) and malondialdehyde (MDA), and tested the hypothesis that different steroid treatments inhibit these markers and early reperfusion-associated supraventricular and ventricular extrasystolic beats.

Methods
In a randomized, controlled, blinded, prospective trial 36 patients received a preoperative infusion of methylprednisolone (MP, 15mg kg\(^{-1}\), n=12), tirilazad mesylate (TM, 10mg kg\(^{-1}\), n=12) or placebo (PL, NaCl, n=12). Coronary sinus and arterial blood was drawn at baseline and 2, 5, 15, 30, 60 and 240 min after aortic declamping. Holter-ECG analysis was used to identify arrhythmias.

Results
Cardiac GSSG release occurred very early (< 15 min) and was not significantly attenuated by either drug treatment. Cardiac PCG production showed biphasic increases, lasted ≥ 4h and was significantly reduced only by TM. Cardiac MDA release was short (< 30min) and significantly reduced by MP and TM. Neither treatment had a significant influence on the early occurrence of ventricular or supraventricular arrhythmias. The number of patients needing cardioversions or defibrillations also were not different.

Conclusions
The results indicate that cardiac production of reactive oxygen species occurs after reperfusion in humans and is not inhibited by steroid treatment. Steroid treatment effectively reduces lipid peroxidation during cardiac surgery but has no influence on arrhythmias.

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