Temporary Coronary Venous Pressure Elevation through PICSO in Patients with Chronic Heart Failure

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Objectives: Pressure-controlled intermittent coronary sinus occlusion (PICSO) has been shown to alter cellular signaling pathways. To assess the possibility of SAFE (survivor activating factor enhancement) - pathway induction, interleukin-6 (IL-6) levels were measured in patients with chronic heart failure with PICSO treatment.

Methods: 32 patients undergoing cardiac resynchronization therapy (CRT) by device implantation (diagnosis: predominantly ischemic and dilated cardiomyopathy) were included into a prospective non randomized study, (8 interventional / 24 control group). PICSO was performed for 20 minutes by introducing a balloon catheter into the coronary sinus and after positioning of the left ventricular electrode. Hemodynamic data were obtained through the LIDCO System and PICSO catheter (coronary sinus pressure (CSP)). Coronary venous blood samples were taken and IL-6 and NT-proBNP measured before and after PICSO. Mean patients follow up was 34 months.

Results: IL-6 secretion increased significantly after PICSO in comparison to controls (p=0.006). There was no significant linear correlation between the percentage increase of IL-6 and hemodynamic data including the maximal developed coronary venous pressure during PICSO. In long term follow up, we assessed a mortality risk reduction by 80 percent (RR = 0.199, CI (95%) = 0.002-1.642, p = 0.302). Also a trend towards a survival benefit was observed. This benefit particularly included severly diseased patients with NT-proBNP levels above 1500 pg/ml (p=0.080).

Conclusion: These results indicate the initiation of mechanotransduction and are in accordance with prior experimental analyses showing enhanced expression of vascular endothelial growth factor and heme oxygenase 1. Hence, this intervention could be the link to molecular corresponding factors that improve survival, reduce the risk for reinfarction and decrease adverse cardiac events after myocardial infarction as observed in previous trials.