Assessment of fibrosis in heart failure and atrial fibrillation using TIMP-1 serum levels

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Background: Tissue inhibitor of metalloproteinase-1 (TIMP-1) levels are strongly associated with cardiac extracellular matrix accumulation and atrial fibrosis. The aim of this study was 1) to compare the TIMP-1 plasma levels in heart failure (HF) and atrial fibrillation (AF) patients and 2) to search for a local production in the heart.

Methods: This study included 13 patients with HF who underwent CRT implantation (CRT-group), 13 patients with persistent AF who underwent left atrial catheter ablation (AF-group) and 13 patients without structural heart disease or AF, who underwent electrophysiological study (control group). Blood was collected at the begin of the procedures from the coronary sinus (CS), superior vena cava (SVC) and aorta (Ao). Level of TIMP-1 in the CS (TIMP-1-CS), RA (TIMP-1-SVC) and aorta (TIMP-Ao) was measured.

Results: Patients characteristics: CRT-group: mean age 74y, 8 male, LV-EF 32%, 3 with a history of atrial fibrillation. AF-group: mean age 68y, 9 male, LV-EF 55%. Control-group: mean age 54y, 9 male, LV-EF 65%.

The levels of TIMP-1 in the SVC was in the CRT group significantly higher 213 ± 70 ng/ml vs 160 ± 23 ng/ml in controls (p = 0.03). The level of TIMP-1 in the AF-group (191 ± 73 ng/ml) was not significantly different from the control group (p = 0.195) (Figure 1). At the various collection sites (CS, SVC and aorta), no significant differences between the 3 groups were noted.

Discussion: TIMP-1 serum levels in HF patients are significantly elevated compared to a control group without structural heart disease. No significant differences in levels of TIMP-1 were seen between AF patients and the control group. This is an expression of the advanced disease in the HF patients. The source of serum TIMP-1 are unclear as differences in the level of TIMP-1 between CS, SVC and aorta were not detectable.

Figure 1