Electrical remodeling in patients with iatrogenic left bundle branch block is detrimental

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INTRODUCTION A computer simulation that assumes a negative feedback of local mechanical load on calcium influx, predicted a decrease in repolarization dispersion in combination with worsening calcium handling and left ventricular pump function during longer lasting left bundle branch block (LBBB) (Kuijpers et al., Am.J.Physiol. 2014). Such analysis in patients is hampered by the fact that LBBB commonly starts silently. However, LBBB is induced in approximately one third of all transcatheter aortic valve implantation (TAVI) procedures. We investigated electrophysiological changes in patients with TAVI-induced LBBB and its impact on survival.

METHODS This retrospective study comprises 56 patients with initially narrow QRS complex who developed persistent LBBB upon TAVI. The 12-lead electrocardiograms (ECGs) taken before TAVI, within 24 hours (acute LBBB) and 1-12 months after TAVI (chronic LBBB) were analyzed. These ECGs were digitized and subsequently used to reconstruct vectorcardiograms using the Kors method. Survival of the patients was studied during a 30 months follow-up time.

RESULTS The entire cohort was divided using an optimal cut-off value for the T-wave area change between acute and chronic LBBB by means of ROC-curve analysis, resulting in a Remodeling (R) and a No-remodeling (NR) group. In the Remodeling group QRS and T-wave area decreased by 4 ± 29% and 50 ± 11%, respectively, whereas in the No-remodeling group the QRS area increased by 16 ± 32% while the T-wave area decreased by 7 ± 21%. Baseline heart rate and QRS duration were comparable between groups and did not change significantly over time while the QT interval decreased in both groups. The mortality rate in the Remodeling group was almost twice as high as in the No-remodeling group (60% vs. 32%; p = 0.036), most of the difference being related to excess cardiac death (Figure 1). The mortality rate of the No-remodeling group was comparable to the mortality rate of 40 TAVI patients who did not develop LBBB (35%, p = 0.81).

DISCUSSION This unique study in patients with TAVI-induced LBBB shows that a decrease in QRS and especially T-wave area over time is associated with an increased risk of death. This data supports the predictions of the computer simulation that electrical remodeling is associated with an increased risk of death and that T-wave analysis may be used to assess worsening cardiac function in these patients.

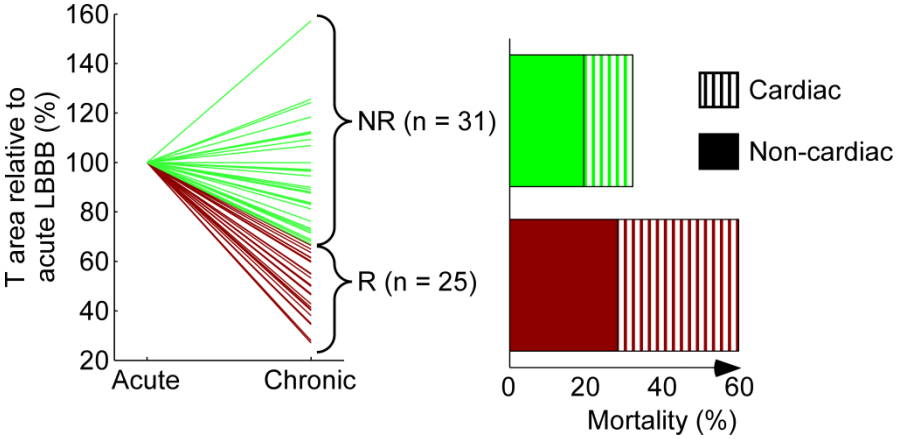

Figure 1. Relative change in T-wave area compared to the acute situation (left), leading to a Remodeling (R) and a No-remodeling (NR) group. The corresponding mortality rate is shown on the right.