Non-invasive prediction of cardiac resynchronization therapy outcome

Focus on the role of atrial fibrillation, device–diagnostics and ECG based dyssynchrony measures

Background
Cardiac resynchronization therapy (CRT) is a well-established treatment that reduces mortality and morbidity in patients with heart failure (HF) and signs of dyssynchrony. However, 1/3 of patients do not benefit from CRT and guidelines ask for better CRT-indications and improved risk-stratification. Atrial fibrillation (AF) is common among these patients and associated to a worse prognosis but the importance of device-detected AF is unknown and it is not established why AF diminishes prognosis.

Method
We retrospectively study patients that received CRT between 1999-2012 in Lund. Baseline characteristics are acquired from national registers and medical records, and device-data from CRT-device interrogations. Kaplan-Meier curves and Cox-regression analyzes is performed to assess the prognostic and/or predictive value of pre-defined baseline and/or follow-up characteristics. The study’s main purpose is to assess the prognostic impact and clinical importance of pre-procedural and device-detected AF and to improve risk-stratification, mainly by studying device-diagnostic data and pre-specified ECG-parameters.

Preliminary results
From an analysis regarding the importance of “ventricular high-rate episodes” we found that such device-detected episodes during early CRT-treatment predicted a worse survival but not to a higher risk of malignant arrhythmias. We have also found that a higher burden of device-detected AF during early CRT-treatment independently predicts worse outcome and been able to confirm previous results that pre-procedural AF is associated to, but does not independently predict a worse outcome. Additionally we have concluded that biventricular pacing of ≤98% of all ventricular beats independently predicts worse outcome in patients with AF.

Value
Our project can contribute to a better knowledge regarding CRT-treatment in patients with AF in particular. It can provide further insights to why these patients have worse prognosis and thus suggest methods to optimize their treatment. From device-data we have a great opportunity to see what patients develops AF and to analyze the yet unknown importance of device-detected AF. We can also examine if certain ECG-morphologies can be predictive of a higher risk of post-implant arrhythmias or death to improve risk-stratification and prognosis.

Publications