Background

Longitudinal Dissociation: (A) His bundle with normal conduction, (B) Proximal His bundle disease, (C) HBP conducted distal to the diseased area creating an electrical bypass.

The predominant intraventricular conduction abnormalities in patients with heart failure requiring CRT are AV block and BBB. HBP can often correct BBB, narrowing the QRS complex to normal. This response can be explained by the concept of longitudinal dissociation of the His bundle, which postulates that the His bundle trunk is organized into discrete, longitudinally arranged and histologically isolated fibers predestined to their respective bundle branches. A pacing distal to the diseased tissue within the proximal His bundle creates an electrical bypass able to produce physiological narrowing of QRS.

Methods

The study was a 12 month cross-over study in which patients with CRT indications were randomized at implant to either HBP or BiV pacing for 6 months with a subsequent crossover to the other pacing modality. Clinical endpoints including NYHA classification, 6-minute hall walk test, EF and quality of life parameters as well as echocardiographic measurements were obtained at baseline and at each 6 month follow up. The cross-over study design enabled each subject to serve as his own control. Student’s T-test was used for paired comparisons and descriptive statistics was used to analyze echo data and compare clinical outcomes.

Results

The clinical outcomes data for the 12 patients who completed the entire protocol: Both HBP and BiV were significantly improved with respect to baseline measurements for 6 min hall walk test, EF, QOL and NYHA class with greater trend towards improvement in respect to the first three parameters in the HBP group. The difference between HBP and BiV were not statistically significant.

Discussion

This study was the first to address HBP as an alternative approach to CRT by comparing HBP and BiV in a prospective fashion using a cross-over study design. An impressive 72% of patients showed QRS narrowing in response to HBP Additionally, mean EF, quality of life score, NYHA class and 6-minute hall walk have improved in both HBP and BiV with no statistically significant superiority of one pacing modality over another. Our study suggests that HBP is a promising alternative to the conventional BiVP and deserves further study. In the meantime, it would be reasonable to consider DPH for CRT patients in whom standard BiVP failed to elicited a response.

Limitations and Future Work

A. A larger sample size would be required to detect significant differences between HBP and BiV.
B. High attrition rates were partly due to complexity of the analysis at the initial implant phase.
C. The pacing systems used in the study were not specific for His bundle anatomy making implantation more challenging.

Selected Citations