[2005][391] Use of Computerized Audioelectric Parameters To Detect Altered Hemodynamics during Cardiac Resynchronization Therapy Optimization

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Introduction: Optimization of pacemaker settings for cardiac resynchronization therapy (CRT) remains challenging and problematic. With varying degrees of success, several modalities including echocardiographic imaging have been used to customize the programmed parameters for individual patients. A noninvasive and computerized method using heart sounds and simultaneous 12-lead ECG now exists that measures electromechanical cardiac intervals and acoustic parameters.
Hypothesis: Compared to a control population, heart failure patients undergoing CRT optimization will demonstrate altered hemodynamics that can be detected using these electromechanical and acoustic parameters.
Methods: In a sample of 26 CRT patients (16 males, mean age 70.3 years, range 46-82) undergoing echocardiography-guided optimization, continuous 12-lead ECG and simultaneous audioelectric cardiographic recordings (Audicor, Inovise Medical, Inc.) using acoustical sensors attached to the V3 and V4 leads were collected. The continuous recordings were partitioned into 10-second recordings that reflected a wide range of different CRT device parameter settings within the 26 patients. We compared these patients to groups of 198 normal subjects and 66 chronic HF patients, respectively, who had received 10-second recordings. The presence of an S3 was used as one indicator of compromised LV hemodynamics.
All P values are compared to Normals, *p<0.05, **p<0.001
Conclusion: Cardiac electromechanical intervals are affected significantly by the presence of heart failure and CRT programmed parameters and can be used to distinguish abnormal from more normal systolic durations, diastolic durations, and passive and active filling intervals. Audioelectric parameters, particularly S3 presence and %EMAT, may lead us to a simple and fast approach to optimization of CRT devices.

N = number of 10 s recordings	NormalsN=198	Chronic HFN=66	CRT S3N=564	CRT No S3N=3599
S3 Prevalence	9.2%	30.8% **	100%**	0%**
QRS duration	99±18	120±33	186±26**	160±39**
%EMAT (Qonset to S1)/RR	10.7±2.4	14.1±4.3	17.1±4.2**	15.8±3.9**
%Systolic Time (S1 to S2)/RR	38.6±4.1	36.8±6.8*	40.0±6.7*	40.7±5.3**
%Diastolic Time (S2 to S1)/RR	61.4±4.1	63.2±6.8	60.1±6.8**	59.4±5.2**
%Pre-Atrial Filling Time (S2 to Ponset)/RR	32.2±7.9	30.2±13.5	25.6±13.6**	25.2±9.3**

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