

# Echo Guided vs. Adaptive Cardiac Resynchronization Optimization for Heart Failure in 2017

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## Editorial

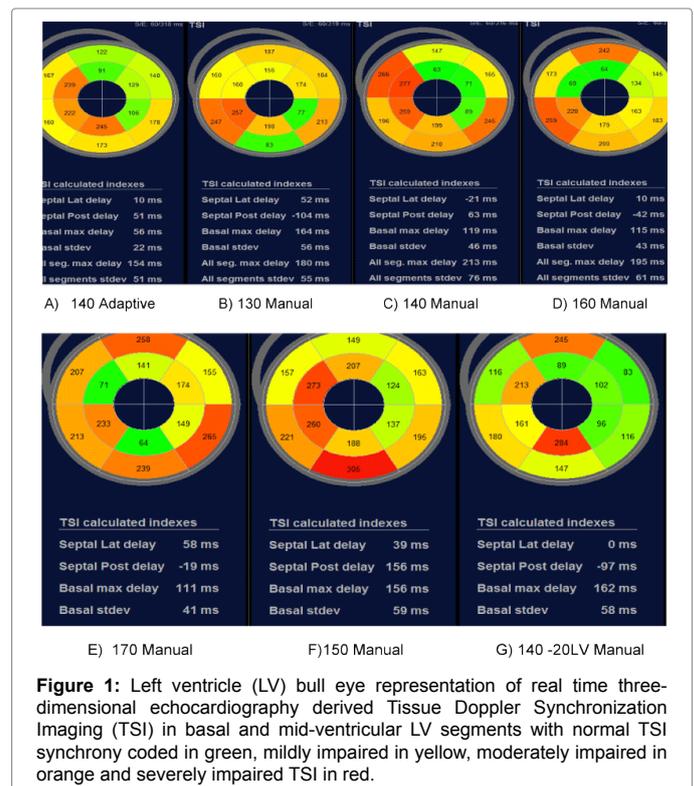
Patients with cardiac disease and reduced left ventricular function are at increased risk for arrhythmia-related sudden death and heart failure. The placement of an implantable cardioverter-defibrillator (ICD) improves survival and reduces the risk of sudden death in appropriately selected patients with cardiac disease; however, life-prolonging defibrillator therapy is associated with an increased risk of first and recurrent heart-failure events [1]. Cardiac-resynchronization therapy (CRT) with biventricular pacing is an effective adjunctive therapy to pharmacologic management in reducing the rate of hospitalization in symptomatic patients with advanced heart-failure symptoms (New York Heart Association [NYHA] class II to IV), and ejection fraction of 35% or less, and an intraventricular conduction delay of 150 ms or more [2].

### The following case exemplifies echo guidance for device therapy in 2017

A 53 year old white male with past medical history of hypertension and non-ischemic dilated cardiomyopathy presents with two block dyspnea on exertion after 3 months on GDMT (Guideline Directed Medical Therapy). Physical exam showed blood pressure 140/82 mmHg, pulse 78 bpm, Height 172 cm, weight 102 kg, Cardiac exam was regular rate, sinus rhythm, normal S1, S2 and no murmurs, Lungs were clear to auscultation bilaterally. EKG showed normal sinus rhythm (NSR) 75 bpm, PR interval 172 msec, QRS duration was 172 msec with complete left bundle branch block. Transthoracic echocardiogram showed left atrial enlargement (LAE), left ventricular enlargement (LVE) and ejection fraction (EF of 25 %) with restrictive left ventricular (LV) filling, consistent with dilated cardiomyopathy. This New York Heart Association (NYHA) class II, C Patient was referred for cardiac resynchronization therapy (CRT). In 30% of patients undergoing CRT there is no improvement in cardiac function [3]; however, an optimization of the AV time interval may improve the therapeutic response of device therapy in heart failure patients. ECHO guided device optimization has been used to improve response to device therapy especially when the atrial ventricular contraction is optimized (AV time interval) rather than the interventricular contraction (VV time interval) [4]. A Medtronic Viva XT was implanted with adaptive CRT, this adaptive CRT measures the AV and the VV time interval every minute. The devices will preferential LV pace if it senses native RV pacing which will avoid hemodynamically detrimental RV pacing. The AV time interval was changed by 10 milliseconds (ms) every 30-second and then the ECHO parameters remeasured. 3D strain imaging was done and the following global strain imaging (GLS) bulls eye were obtained.

Even though adaptive CRT optimize the device to 140 ms AV time, echo guided manual measurement improved on this automated settings with LV pacing set 20 ms before the RV (LV first -20 ms) revealing the most LV wall segments with normal (green) strain values (Figure 1).

Optimization of atrioventricular delay (AVD) and interventricular delay (VVD) in patients with a biventricular (Biv) pacemaker has been



**Figure 1:** Left ventricle (LV) bull eye representation of real time three-dimensional echocardiography derived Tissue Doppler Synchronization Imaging (TSI) in basal and mid-ventricular LV segments with normal TSI synchrony coded in green, mildly impaired in yellow, moderately impaired in orange and severely impaired TSI in red.

associated with improvement in cardiac output acutely, a reduction in heart failure symptoms, and improved exercise capacity [5]. Echo guidance may have a future role even when automated AV time intervals are obtained with adaptive CRT utilizing novel imaging processing techniques as real time 3D echo TSI or global longitudinal LV strain [6].

## References

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