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### Electromechanical Wave Imaging: An Echocardiography Based Technique For 3D Cardiac Resynchronization Therapy Quantification

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#### Abstract:

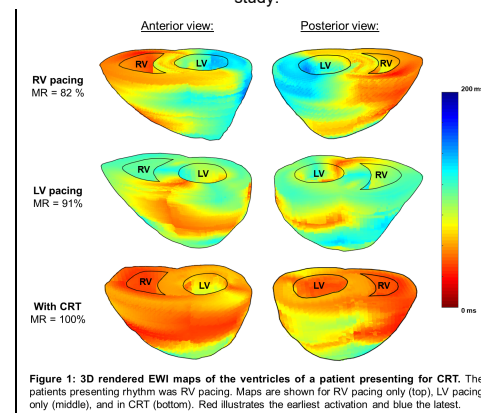
**Background:** The current standard of care for cardiac resynchronization therapy (CRT) optimization is assessment of QRS complex narrowing on ECG. This technique is limited and provides incomplete assessment of the posterior wall of the left ventricle. Electromechanical Wave Imaging (EWI) is a novel ultrasound imaging technique using high frame rates that can both visualize and quantify myocardial resynchronization (%MR) in 3D.

**Objective:** This study seeks to show the feasibility of assessing %MR quantitatively before and after CRT using EWI.

**Methods:** Thirteen patients underwent EWI before and after CRT on the day of device implantation. All patients presented with left bundle branch block or RV paced rhythm and decreased LV ejection fraction (LVEF). 3D ventricular EWI activation maps were rendered with and without CRT (Figure 1). %MR was defined as percent of LV myocardium activated within 120ms of QRS onset. %MR was calculated with and without CRT. QRS duration was assessed with ECG before and after CRT.

**Results:** Mean age was  $74.3 \pm 3.9$  years and 77% were male. Mean LVEF was  $24.3 \pm 2.1\%$ . Presenting rhythm was sinus with left bundle branch block in 6 and RV pacing in 7. There was significantly greater change with %MR (mean %MR was  $58.5 \pm 5.4\%$  without CRT vs  $92.2 \pm 3.2\%$  with CRT,  $p < .0001$ ) than with QRS duration (mean QRS was  $174.0 \pm 8.9$ ms without CRT vs  $148.8 \pm 8.4$ ms with CRT,  $p = .0043$ ).

**Conclusion:** EWI can provide 3D visualization of CRT and is superior to QRS duration in quantifying immediate cardiac resynchronization. EWI based prediction of long term CRT benefit should be evaluated with a prospective study.



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#### Author Disclosure Information:

**C.S. Grubb:** None. **L. Melki (co-first):** None. **D.Y. Wang:** None. **J. Peacock:** None. **J.M. Dizon:** None. **V. Iyer:** None. **C.A. Sorbera:** None. **A.B. Biviano:** None. **H. Garan:** None. **E. Konofagou:** None. **E. Wan:** None. **Category (Complete):** 63) Surgical & Other

**Keywords (Complete):** R -> Resynchronization Therapy ; E -> Echocardiography, transthoracic

**Additional Information (Complete):**

**Presentation Preference:** Oral or Poster

**At the conclusion of this presentation, attendees will be able to: (Maximum character limit 250)**

**\*Learning Objective:** : Visualize the amount of immediate myocardial resynchronization with CRT using Electromechanical Wave Imaging.

**Abstract Awards (Complete):**

**Status:** Complete

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