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Measurement of Left Ventricular Wall Motion Asynchrony in Patients with Left Bundle Branch Block Using Tissue Doppler Echocardiography

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Left ventricular (LV) pacing therapy has been proposed as a promising new method to benefit patients with left bundle branch block (LBBB) and heart failure (HF) by improving the synchrony of wall movement. However, a means to select patients who may benefit from this therapy has not been well developed. To test the hypothesis that tissue Doppler echocardiography may provide a noninvasive means to quantify LV synchrony, 17 patients with LBBB and 10 normal control subjects were studied. Eleven LBBB patients had clinical heart failure and ejection fractions < 40%. 2-D tissue Doppler cine-loops from the mid-LV short axis plane were digitally recorded (GE/Vingmed System V). Time-velocity plots from 4 anterior sites and 4 posterior sites were compared using a customized computer. Phase analysis was determined as a measure of wall synchrony. For each of paired sites, sequences of tissue-Doppler data sets (sampling period = 12 ms) were correlated over one cardiac cycle, yielding a motion-correlation between -1 (out of phase) and 1 (in phase). Group mean phase was -0.75 for LBBB patients, which was significantly different from normal control; group mean phase 0.43 (p<0.001). Tissue Doppler phase analyses from anterior and posterior-lateral sites were the best discriminator of asynchrony from paired data sets. Regional wall motion phase correlated with QRS duration from simultaneous digitized ECG signals (r = 0.73). **In conclusion**, tissue Doppler measures of regional wall velocity appear to be a promising means to quantify LV asynchrony and may play a role in the selection of HF patients for pacing therapy.