

Left Ventricular Mechanics During AV Synchronous Right Ventricular Pacing in Children after EP Studies

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Introduction:

Different studies have used pacing of patients after EP studies as a model for normal hearts' pacing evaluation. This study assessed the acute effects of RV apical pacing on LV mechanics by speckle tracking techniques in pediatric patients with narrow complex tachycardia (NCT) and Wolff-Parkinson-White syndrome (WPW) after an EP study and ablation.

Methods:

26 patient ages 6-18 years, 14 patients had NCT and 12 patients had WPW. The echo study included standard parasternal short axis and apical 2 and 4 chamber views. Thereafter, post-processing by speckle tracking methods was performed to calculate LV circumferential and longitudinal strain as well as LV rotation and torsion. Each patient was studied at the end of the procedure in sinus rhythm with narrow QRS and then with at atrial and RV pacing with cycle length of 550 msec and AV delay of 80 msec.

Results:

The LV torsion was 15.3 ± 8 deg in the NCT group & 8.2 ± 2 deg in the WPW group. $P=0.04$. The significant segmental peak rotation difference was at the level of the MV, -10.2 ± 3.7 deg in the NCT group and -6.4 ± 2.3 degrees in the WPW group, $p=0.01$, there was no difference at the apical peak rotation. The average circumferential strain showed significant reduction, $-20.4 \pm 6.0\%$ in the NCT group and $-16.7 \pm 4.8\%$ in the WPW group. The significant change was at the level of the papillary muscles $-19.9 \pm 3.9\%$ vs $-14.3 \pm 2.1\%$. There was no change in the longitudinal strain. During pacing there was torsion reduction in the NCT group from 15.3 ± 8.4 to 12.2 ± 6.9 $p=0.07$ and longitudinal strain reduction from -16.9 ± 3.9 to -14.4 ± 3.7 , $p=0.03$. In the WPW group, post ablation pacing caused unexpected increase in the torsion from 8.2 ± 2.2 to 11.7 ± 4.0 , deg $p=0.04$ & increase of the average circumferential strain from $-16.7 \pm 4.8\%$ to $-18.7 \pm 5.2\%$. $p=0.004$. Unlike the NCT group pacing did not cause any reduction of longitudinal strain in the WPW group.

Conclusions:

The LV mechanics of WPW patients after ablation are different and reduced than patients with NCT. Post EP study patients in general as a model for normal heart pacing should be revised. The WPW patients should be further studied for the evaluation of possible torsion normalization. The pacing of NCT patients causes significant reduction in the longitudinal strain and torsion reduction thus RV pacing in normal heart does reduce LV performance.