

Parameters of biventricular dyssynchrony in patients with repaired and unrepaired Ebstein's anomaly – assessment by tissue tracking cardiovascular magnetic resonance

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INTRODUCTION

Different factors, such as left ventricular (LV) non-compaction (LVNC) and atrialization of right ventricle (RV) may influence synchrony in patients with Ebstein anomaly (EA). We studied parameters of ventricular synchrony by using feature tracking (FT) CMR.

METHODS

Biventricular function was prospectively assessed by cine CMR using the SSFP sequence in 20 patients with EA (6 after TV repair). Median age was 44.5 (17-64) years. Mean TV displacement was 41 ± 36 mm; LVNC present in 12 patients (60%). Image temporal resolution was < 25 msec. Short-axis (SAX) and long-axis 4 chamber (LAX) images were analyzed by FT (Medis Version 3.3) to assess global and regional time to peak (TTP) in both ventricles. Wall delay (WD) was defined as the TTP difference between the septum and the lateral segments (free wall) on SAX and LAX images.

RESULTS

LV SAX showed a significant WD in basal (69 ± 84 ms; $p < 0.01$) and mid-ventricular segments (42 ± 48 ms; $p < 0.01$) but not at the apex (-4 ± 57 ms; n.s). Mean septal TTP decreased from basis to apex (370 ± 108 ms vs 334 ± 60 ms; $p = 0.04$ vs 293 ± 69 ms; $p < 0.01$). Global and free wall TTP did not differ among segments.

LV LAX had similar TTP values in the septum and free wall (326 ± 86 ms vs 312 ± 66 ms). RV free wall TTP was significantly delayed compared to the septum (383 ± 114 ms vs 338 ± 123 ms; $p = 0.04$;) and LV free wall (312 ± 67 ms; $p < 0.01$).

Mean RV EF% was 39 ± 10 and LV EF% 53 ± 10 . TV displacement correlated with WD in the LV mid-ventricular segments ($r = 0.57$, $p < 0.01$), but not in other biventricular segments. LV EF% correlated with basal LV SAX WD ($r = -0.53$, $p = 0.014$), but not with global or regional TTP. RV EF% correlated weakly only with global RV TTP ($r = -0.46$, $p = 0.04$). LVNC did not affect synchrony parameters.

CONCLUSIONS

Significant global and segmental differences in TTP are present in both ventricles of EA patients. LV shows intraventricular dyssynchrony in septal basal and mid-ventricular segments that correlates with the severity of TV displacement. WD is greater in RV free wall than septum and LV free wall, indicating interventricular dyssynchrony.