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Left ventricular apical pacing in children – feasibility and long-term effect on ventricular function

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Aim: Left ventricular (LV) pacing has been reported to preserve LV function in chronically paced children with atrio-ventricular (AV) block. We sought to evaluate long-term results of LV apical pacing (LVAP) in patients with both structurally normal heart and congenital heart disease.

Patients and methods: 36 patients with complete spontaneous (N=22, group A) and surgical AV block (N=14, group B, systemic LV in all) received an epicardial VVIR (N=19) or DDDR (N=17) pacemaker at the median age of 1.69 (IQR 0.04–4.39) years. Bipolar ventricular pacing leads (Medtronic 4968) were placed at the LV apex using a subxiphoid approach (N=18) or sternotomy (N=18). After median follow-up of 2.9 (IQR 1.9–6.2) years echocardiography and exercise stress testing was performed. Data were compared to age-matched normal controls (N=25, group C).

Results: Pacemaker implantation was uneventful, there was no death and all patients were on LVAP at the end of follow-up. Probability (3 and 6 years after implantation) of absence of pacemaker-related surgical revision (elective generator replacement excluded) was 89.0 and 89.0 %, resp. Probability of freedom from battery depletion was 91.4 % and 77.8 %, resp. Ventricular thresholds at given pulse duration did not change between discharge and last follow-up: mean 0.71 (SD 0.22) V and 0.84 (0.37) V, p NS. There was no significant difference in LV end-diastolic volume index (LVESVi) and ejection fraction (LVEF) between groups A, B and C: LVESVi = mean 49 (SD 13), 50 (16) and 50 (10) mL/m² BSA, LVEF = median 65, 64 and 65 %, p NS for both. Inter- and intra-LV synchrony was preserved in groups A and B. Maximum oxygen uptake was, however, lower in group A = mean 33.5 (SD 5.8) and B = 33.9 (6.1) ml/kg/min as compared to group C = 40.8 (6.6) ml/kg/min, p=0.009. In group A (free from structural heart disease) LVEF and the Z-score of LV end diastolic diameter did not change significantly during pacing.

Conclusions: LVAP carries complete preservation of LV function and synchrony. Pacing-related complications are rare and probability of continued LVAP is excellent despite patient growth.