919
Predictors of left ventricular remodelling and failure in right ventricular pacing in the young
J. Janousek 1, R.A. Gebauer 2, V. Tomek 2, J. Marek 2, V. Chaloupecky 2, T. Matejk a2, B. Hucin 2
1Horomerce, Czech Republic; 2University Hospital Motol, Kardiocentrum, Prague, Czech Republic

Background: Permanent right ventricular (RV) pacing may lead to significant left ventricular (LV) remodelling and failure. Risk factors for such adverse outcome in a pediatric population have not be identified yet.

Methods: Consecutive pts with either non-surgical (N=50, group A) or surgical (N=41, group B) complete AV block (CABV) who underwent pacemaker implantation between 1984-2003 at a mean age of 7.7±5.7 yrs were evaluated by echocardiography prior and after the procedure and after a mean follow-up of 6.6±4.4 yrs. All pts had 100% ventricular pacing from either RV apex (N=56), RV septum (N=17) or epicardial RV outflow tract (RVOT) (N=18).

Results: LV enddiastolic diameter (LVEDD) decreased in group A (from a median of 115 to 103% of normal, p=0.005) and did not change in group B (from a median of 103 to 107% of normal, p=NS) during follow-up. LV shortening fraction (SF) decreased in both group A (from a mean of 0.41 to 0.34, p<0.001) and group B (from a mean of 0.38 to 0.31, p<0.001). In groups A and B combined, percentage of pts with LV dilatation (LVEDD>normal+2SD) and dysfunction (SF<0.26) increased from 0% prior to implantation to 2.0% immediately after the procedure and to 13.2% (symptomatic as NYHA II-IV in 8.8%) at last follow-up (p=0.001). Lower age at implantation (p=0.009), RVOT pacing (p=0.003), DDD pacing (p=0.008), longer QRS duration (p=0.032) and lower early postimplantation SF (p=0.037) were univariate predictors of LV dilatation and dysfunction. Etiology of CABV and pacing duration did not show any significance.

Conclusions: RV based pacing leads to a significant decrease in global LV systolic function irrespective of CABV etiology. Age at implantation <2 years and QRS duration ≥160 ms are significant multivariate risk factors for LV remodelling and failure.

920
Outcome of cardiac pacing in congenital heart disease patients - thirty years and over 1300 patient-years of experience
A.A. Khan 1, G.P. Diller 1, R. Sutton 2, M.A. Girolami 2, M. Mullen 2
1Royal Brompton Hospital, Adult Congenital Heart Disease Program, London, United Kingdom; 2Royal Brompton Hospital, Adult Congenital Heart Disease Program, London, United Kingdom

Background: Congenital heart disease patients frequently require pacemakers. We aimed to evaluate the impact of surgical technique, device and lead type selection on long-term outcome.

Methods and Results: Between 1974 and 2004 a total of 169 patients (85 male) with congenital heart disease received 305 pacemakers (58% double chamber) and 351 leads. Mean age at first implantation was 26±18 years. The leading indication for pacemaker implantation was a high-degree atrioventricular block (66%), followed by sinus node disease (20%); underlying diagnoses were: systemic right ventricle (19%), atrial septal defect (14%), tetralogy of Fallot (12%), complex anatomy (11%), ventricular septal defect (10%) and atrio-ventricular septal defect (8%). During follow-up (median 5.7 years, range 25 days to 30 years) 9 patients died (6.7 per 1000 patient-years) and a total of 124 pacemaker and 104 lead replacements were required. Reasons for pacemaker replacement were battery depletion (56%), upgrade to a dual chamber system (23%), infection (13%) and various (8%). The 1-, 5- and 10-year pacemaker survival was 93%, 76% and 37% without significant difference between single and dual chamber systems.

Pacing thresholds and impedance were higher in epicardial compared to endocardial leads at implantation (1.5±1.5 V vs. 0.9±0.7 V, p<0.0001; 541±155 Ohm vs. 526±194 Ohm, p=0.10) and after 1 year (1.3±0.6 V vs. 0.9±0.6 V, p=0.01; 428±102 Ohm vs. 604±170 Ohm, p<0.0001). No significant difference in sensitivity was found between endocardial and epicardial leads. There was trend towards improved lead survival in patients receiving endocardial leads, with a 1- and 5-year lead survival of 96% and 93% for endocardial leads and 89% and 80% for epicardial leads, respectively (p=0.18). Subcutaneous implantation was performed in the majority of patients (83%), and pacemaker survival was not significantly different between the subcutaneous and the submuscular approach.

Conclusions: Pacemaker therapy is feasible and associated with a low overall mortality but a high number of re-interventions during long-term follow-up in patients with congenital heart disease. We found higher pacing thresholds in epicardial leads, but only a trend towards improved lead survival compared to endocardial leads. Subcutaneous pacemaker implantation, despite being a simpler surgical procedure was not associated with a higher rate of re-interventions during long-term follow-up.

921
Capture management in children with epicardial pacing leads
A. Håppen 1, T. Clausson 1, H. Ekblad 1, M. Leskinen 1, J-M. Happonen 2
1Helsinki, Finland; 2Medtronic, Inc., Stockholm, Sweden; 3Turku University Hospital, Pediatric Cardiology, Turku, Finland; 4Oulu University Hospital, Pediatric Cardiology, Oulu, Finland; 5Hospital for Children and Adolescents, Pediatric Cardiology, Helsinki, Finland

The aim of the study was to evaluate the safety and reliability of the Medtronic Capture Management (CM) automatic ventricular pacing threshold measurement and output adjustment in children with epicardial pacing leads. CM has not been recommended for use with epicardial leads due to a lack of pertinent data.

During a 2-year study period 34 children, 18 girls and 16 boys, (mean age 6.1 years, range 0 days-17.7 years) were prospectively enrolled. The follow-up consisted of 347 patient months, with an average of 10 months (range 1-21 months) per patient. Of the patients 50% had a congenital heart defect with AV-block or sinus node dysfunction, 41% an AV-conduction defect in a structurally normal heart, 9% had miscellaneous pacing indications. The leads were bipolar (Medtronic 4968) in 30 patients and unipolar (Medtronic 4966 or 10366) in 5 patients. The CM measurements were compared with in-office pacing threshold measurements. CM was successful and reliable in 30 of 35 leads (86%). The mean threshold with CM was 1.16 V (95% CI 1.07 to 1.26 V, 104 measurements) and with standard measurement 1.18 V (95% CI 1.09 to 1.28 V, 123 measurements). There was a good agreement between the two methods as assessed with the Bland-Altman method (lower limit of agreement -0.24 V, 95% CI -0.32 to -0.16 V; upper limit of agreement 0.28 V, 95% CI 0.20 to 0.36 V). The reason for CM failure was evoked response undersense in two cases and high intrinsic rate in one case. In two cases high pacing thresholds prevented accurate CM measurement. These high thresholds were properly recognized and high output would have been programmed. Programming CM adaptive would have saved mean 6.4 months (range 0-20.4 months) of battery life in our patients based on longevity calculations.

CM is consistent with standard ventricular pacing threshold measurements in children with epicardial leads. We recommend a period of monitoring CM performance before programming it adaptive in order to find the few patients in whom it does not work. The CM feature can provide increased pacing safety and extended battery life in children with epicardial leads.