Methods: Twenty consecutive subjects underwent electro-physiological study due to arrhythmia were enrolled. The regional cardiac synchronicity assessed by Two-Dimensional Tissue-Tracking (2DTT) machine (EUI-8500, HITACHI Medical Corporation), and the coronary flow in the left anterior descending artery (LAD) measured by a Doppler guide wire were compared between RVOT pacing and RVA pacing at 100 bpm.

Results: RVOT pacing during RVOT pacing than RVA pacing (124±15 m/s vs 162±15 m/s, p<0.01) and there were no significant difference in aortic blood pressure between RVOT pacing and RVA pacing. Intraventricular contraction delay between septal and lateral wall assessed by 2DTT machine during RVOT pacing was shorter than that during RVA pacing (99±9 m/s vs 142±11 m/s, p<0.01). Averaged peak velocity (APV) of coronary flow during RVOT pacing was greater than that during RVA pacing in hyperemia (54.2±18 cm/sec vs 47.1±17 cm/sec, p<0.05) and rest (24±10 cm/sec vs 21±10 cm/sec, p<0.05), but there were no significant difference in coronary flow reserve between RVOT pacing and RVA pacing (2.5±0.8 vs 2.4±0.6). LV stroke volume assessed by echocardiography during RVOT pacing was greater than that during RVA pacing (42.9±7.3 ml vs 38.8±7.2 ml, p<0.05). Besides, microvascular resistance index (which was calculated as the blood pressure at hyperemia divided by the hyperemic APV) during RVOT pacing was lower than that during RVA pacing (2.0±0.8 vs 2.4±1.1, p<0.05).

Conclusions: RVOT pacing could improve dysynchrony and coronary flow during RVOT pacing could be greater than during RVA pacing. The increase of coronary blood flow might be related to the increase of LV output and the decrease of microvascular resistance by improvement of LV dysynchrony.

HEART FAILURE – RESYNCHRONISATION

912 How many patients with long-term right ventricular apical pacing are eligible to upgrading to biventricular pacing?

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Deleterious effects of right ventricular apical (RVA) pacing favoured by abnormal LV activation sequence are reported. Biventricular pacing (BVP) may be a method to reverse these effects. The aim of the study was to evaluate how often the systolic dysynchrony and indications to BVP are present in patients with permanent RVA pacing and to find out which baseline parameters suggest the need of upgrading to BVP system.

Methods: We screened 152 consecutive RVA-paced patients admitted to our department for elective pacemaker replacement from June to November 2005 for eligibility for BVP (heart failure NYHA class III or IV despite optimal medical treatment, LVEF ≤ 35% and echo-evaluated systolic dyssynchrony). Fifty five (43%) of them were pacemaker (PM) dependant, (age 43-88 yrs, first implantation 9.9±1.4 yrs ago, PM type: 30 VVI/VVI-R, 30 DDD/DDDR, 1 VDD). Of those, intra-LV dyssynchrony defined as the presence of overlap between the end of lateral wall contraction and onset of LV filling (overlap contraction-filling) was observed in 35 (54%) pts. Interventricular dyssynchrony defined as the difference between left and right pre-ejection intervals exceeding 40 ms was present in 40 (62%) pts. LVEF >35% combined with NYHA III or IV and dysynchrony was present in 9 pts (14%). Clinical profile of these patients reveals intraventricular conduction disorders (7 pts), LVF ≤ 50% (7 pts) and non-physiological mode of pacing (6 pts) at first implantation and chronic atrial fibrillation (7 pts) at replacement. Among 87 non-PM-dependent patients 2 (2.3%) met the criteria for BVP.

Conclusion: Indications for upgrading to BVP at elective replacement were present in 14% of pts with long-term permanent RVA pacing and in only 2.3% non-PM-dependent pts.

LV FUNCTION – OTHER

913 Heart rate regularity through by permanent ventricular pacing in patients with chronic atrial fibrillation unfavorably affects the ventricular function compared to irregular intrinsic conduction

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Background: In atrial fibrillation (AF), the irregular ventricular response itself contributes to the unfavorable effects of the arrhythmia. One possible option to achieve rate regularization is by means of overdrive right ventricular pacing. However, any benefits may be counteracted by the adverse effects of the pacing-induced ventricular dysynchrony.

Objective: We investigated the impact of rate regularization through permanent pacing on the net cardiac function in patients with chronic AF and normal left ventricular systolic function assigned to stable rate control pharmacologic strategy.

Methods: We examined 21 patients (mean age 73.9±9 years) with chronic AF and narrow QRS complexes, who were implanted with a conventional VVIR pacemaker for bradyarrhythmia support. Cardiac function was determined by conventional Doppler, tissue Doppler (TD) and color M-Mode (CMM) echocardiographic studies, and B-type natriuretic peptide (BNP) measurements. Baseline echocardiographic data and BNP [log mean 95% CI] levels were obtained during underlying AF (mean heart rate 58±5 beats/minute) with the pacemaker programmed to ventricular back-up pacing. After programming the pacemaker to continuous ventricular pacing at a rate of 70 beats/min (VP-70), ensuring >90% permanent ventricular pacing at rest, the baseline data were compared with corresponding measurements, acutely, after 2 hours, and in mid-term, following a minimum two-week pacing period.

Results: On average, percent ventricular pacing over the two week VP-70 period was 74±8% (range, 65% to 89%) VP-70, compared to irregular AF, reduced cardiac index (p<0.05), increased isovolumetric relaxation time (p<0.05), and induced TD-derived decreases of peak systolic mitral velocity and diastolic right ventricular velocity (both p<0.05). The Doppler-derived E/Ea and E’/Ap ratios indicative of left ventricular filling pressures did not change significantly. The BNP levels following mid-term VP-70 increased by 22% (147 [102-210] pg/ml vs 179 [135-236] pg/ml, p=0.01).

Conclusions: Heart rate regularization in patients with AF and normal left ventricular systolic function achieved through VP-70 is associated with overall inferior echocardiographic features and higher BNP levels compared to those during intrinsic irregular conduction.

MYOCARDIAL VELOCITY IMAGING (DMI) – LV FUNCTION

914 Apical transversal motion display- A novel tool to assess ventricular asynchrony

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Currently, left ventricular (LV) asynchrony is expressed as time-delay of regional velocities, independent of the remaining myocardial function. We hypothesise, that apical transversal motion (ATM) is an integrative parameter reflecting regional function. In this study we investigated this new parameter in different conduction delays.

Methods: We examined 59 persons, 11 patients with post-infarct (LBBB, QRS 155±19 ms) and 20 patients with non-ischaemic left bundle branch block (LBBBn, QRS 167±19 ms), 11 patients with right bundle branch block (RBBB, QRS 150±13 ms) and 16 healthy volunteers (NORM, QRS 8±9 ms). Colour tissue Doppler data of 3 heart cycles were acquired from an apical 2-, 3- and 4-chamber view. An ATM trace was calculated from apical motion curves of the six LV walls and displayed in a polar coordinate system by custom made research software. Main direction and amplitude of the ATM trace was compared among the groups.

Results: Mean QRS width was not sign. different between BBB groups, but sign. higher than in NORM (p<0.01). Mean ATM was 1.7±0.7 mm in NORM, 1.3±0.4 mm in RBBB (ns), 2.6±1.7 in LBBB (ns) and 4.2±1.8 in LBBBn (p<0.001 vs NORM and RBBB, p<0.05 vs LBBB). ATM of BBB patients did not correlate with QRS width or ejection fraction. Patients with LBBBn were clearly identified by a typical ATM pattern. A cut-off of 3 mm motion amplitude separated LBBBn from all other groups with a sensitivity and specificity of 94% and 86%, resp.

Conclusion: Assessing LV asynchrony by ATM is feasible. ATM considers the amplitude of asynchronous myocardial motion and, thus, reflects remaining function. ATM may therefore serve as a new parameter of LV asynchrony, e.g. in the context of resynchronization therapy. Further studies are needed to evaluate its clinical potential.