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ARRHYTHMIAS AND CARDIAC PACING

Rapid atrial pacing efficacy in preventing atrial fibrillation recurrence assessed by reliable electrograms

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Background: Today's pacemakers offer an entire range of programming functions that enable physicians to individually tailor their patient's cardiac treatment. In order to optimize pacemaker use in clinical practice, a reduction in the most essential programming and statistical functions can be considered for the generally present default functions. The new range of digital pacemakers monitors patient day and night and, during a follow up device check, shows doctors everything they need to know in just a few seconds. Digital pacemaker saves historical data from previous follow-ups. It keeps diary of arrhythmia episodes that monitors whole period in between follow-ups, capturing up to 400 episodes. The possibilities to classify the heart rhythm are much more extensive. Aim of study was to compare quality of life in patients with digital DDD/DDDR pacemakers.

Methods: We enrolled 30 patients (16 males). Mean age of the study group was 79.2±9.1 years. Mean weight was 77±16 kg. We compared two groups of patients group PACING 1 we programmed frequency 60ppm, hysteresis 15 ppm, atrial sensitivity 0.7 mV DDD, group PACING 2 frequency 80 ppm, without hysteresis atrial sensitivity same, AV delay +40 ms over spontaneous (maximum 260 ms). Both groups were programmed for 12 weeks. We compared patient symptoms at standard conditions (at home, resting) using our own query sheet, afterwards at follow up patient had an exercise (on bicycle ergometer 1.5 W per kilogram for 10 minutes)

Results: Rapid atrial stimulation did not provocate symptoms or hemodynamical changes. Recurrent AF was in group PACING 1 in 17 patients (mean time 28 days from 1–62), in group PACING 2 in 9 patients (mean time 56 days, range 6–84) $p<0.05$. AF recurrence was asymptomatic in 45 % of patients.

Conclusion: Our results suggest that the multifaceted programming and statistics functions of a modern digital pacemaker differ considerably in their uses and benefits. A reduction in the most essential programming and statistical functions can be considered for the generally present default functions. And more time for cardiologist means better setting for patient, therapy advisor allow us early therapy changing due to special pacemaker functions.

ARRHYTHMIAS AND CARDIAC PACING

Five-year experience with transvenous electrode implantation for biventricular pacing in patients with chronic heart failure

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Background: Biventricular stimulation has become an adjunctive therapy for patients with low ejection fraction (LVEF) and asynchronous contraction of the left ventricle (LV).

Goal: To assess technical success rate in LV lead implantation, early and late complications and long-term results of cardiac resynchronization therapy (CRT) at our department.

Results: Between January 2002 and October 2006, BVS implantation was attempted in 145 patients (70±9 years, 41 women) with NYHA class III/IV heart failure (88 patients with coronary artery disease and 57 patients with dilated cardiomyopathy), mean LVEF 22±7 % and QRS complex width of 170±24 ms. Overall success rate achieved 96 % (n=139). Overall implantation time was 151±71 min and fluoroscopic time 25±20 min. Learning curve effect when comparing years 2002–2004 and 2005–2006 was noticed not in success rate but in significant reduction of both procedural and fluoroscopic times (197±68 min vs 119±52 min, $p<0.00001$), and 33±24 min vs 19±14 min, $p<0.00001$, resp). LV pacing threshold was significantly higher than RV pacing threshold both acutely during implantation and during whole follow-up. The most often peri-implantation complication was CS dissection (5 %), acute LV lead dislocation (2 %) and pneumothorax (1.4 %). Pulmonary edema, lead insulation break, incorrect connection of the electrodes with the device, complete AV block, induction of ventricular fibrillation, CS branch rupture without tamponade and tamponade after temporary lead extraction were present in 0.7 % of cases. In the

early post-implantation period (within 4 weeks), 2 patients died of refractory heart failure. During 12 months follow-up, the need for pacing system revision arose three times due to LV lead dislocation and once due to irresolvable phrenic nerve stimulation (PNS). Other PNS were resolved by electronic repositioning (reprogramming of the electrical pacing vector). One pacemaker infection and one decubitus of pacemaker pocket were resolved by explantation of the whole system and plastic operation, respectively.

Conclusions: Biventricular pacemaker implantation with LV lead embedding into the lateral branch of the coronary sinus is safe and technically feasible in 96 % of case. Learning curve effect significantly shortens both procedural and fluoroscopic times.

ARRHYTHMIAS AND CARDIAC PACING

Analysis of the cost of therapy in patients with atrial fibrillation in the Czech Republic

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Background: We have calculated medical costs in patients with atrial fibrillation (AF).

Methods: Using a retrospective inquiry sent to local cardiologists, data from 306 patients (94 women, 64±11 years) was obtained. Patients undergoing AF ablation were not included. Total expenses at treatment of AF patients were calculated as costs spent on hospital stay, medical investigations, diagnostic tests, therapeutic interventions, drugs, and transportation. The calculated items were the following: complex and targeted examination by local cardiologists and general practitioners, prothrombin time evaluation, Holter ECG monitoring, transthoracic and transesophageal echo-cardiography, electrical and pharmacological cardioversion, hospital stays for AF or embolic complication, coronary angiography, atrial flutter I ablation, pacemaker implantation, emergency medical service, pre-paid medical care, spas, stomatology, and transportation.

Results: Total expenditure per patient was 42 406.60 Czech crowns (1413 Euro) per year. Of the individual items, the cost of therapeutic interventions amounted to 50 %. Catheter ablation of type I atrial flutter was the most expensive intervention employed to reduce the arrhythmic burden (410 EUR). Hospital stays followed as the second largest item of the overall cost (27 %). If flutter ablation was not calculated, hospital stay would represent the highest cost (327 EUR). Expenditures on antiarrhythmic and anticoagulation therapy amounted to 9 % of the total costs.

Conclusion: Similar studies from other European countries showed yearly expenditures on the medical care of AF patients of around 3 100 EUR, which is roughly double of the burden of 1413 EUR in the Czech Republic. This difference is caused mainly by lower price of work and by global economic situation in the Czech Republic. In addition to the atrial flutter ablation, hospital stays represented the major expenditure, which is in concord with previous studies.

ARRHYTHMIAS AND CARDIAC PACING

Amiodarone-induced thyrotoxicosis

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Objective: To focus on amiodarone-induced thyrotoxicosis, its possible clinical courses, treatment procedures, and treatment approach based on interdisciplinary cooperation of cardiologists and endocrinologists.

Methods: The authors retrospectively analyse a group of 100 patients (75 males and 25 females) at the average age of 64.75±11.27 years, treated with amiodarone, examined at the Out-patient Department of Arrhythmias and Cardiac Pacing at

the Middle Slovakia Institute of Cardiovascular Diseases in Banská Bystrica within the period from 1.1.2005 to 30.4.2006. In the frame of standard screening (once per year at minimum) the authors assess the values of TSH and fT4 (by means of RIA method) due to suspicion of thyroid disorder.

Results: Within the investigated period the authors assessed average values of TSH and fT4 in the total of 100 patients in amounts of 5.07±5.38 mIU/l and 20.67±9.6 pmol/l respectively being in accord with the assumed effect of amiodarone (with TSH and fT4 medians of 2.71 mIU/l and 19.1 pmol/l respectively). The amiodarone-induced hypothyroidism was confirmed in 10 patients (with TSH and fT4 medians of 18.15 mIU/l and 13.15 pmol/l respectively). In 6 cases the authors detect amiodarone-induced hyperthyroidism (fT4 and TSH medians of 45.85 pmol/l and 0.04 mIU/l respectively). They review the details of case histories of two patients (with ICD implantations) with entirely different clinical courses of amiodarone-induced thyrotoxicosis. The first case has an oligosymptomatic form; the other patient develops thyrotoxic crisis due to which thyroidectomy in florid stage of disease was indicated. The authors introduce the selected therapeutic procedures resulting in remission of the disease and long-term favourable effect of treatment.

Conclusion: The frequency of amiodarone prescription calls for its deliberate use and sufficient prophylactic screening of its adverse effects. Amiodarone-induced thyrotoxicosis is a significant complication of amiodarone-based treatment; therefore it is necessary to pay sufficient attention to its early diagnosis, clinical course, and correctly selected therapy.

ARRHYTHMIAS AND CARDIAC PACING

3-D mapping in ablation of atrial fibrillation: NavX vs CARTO systems

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Introduction: Ablation of atrial fibrillation (AF) can be done using of various 3-D mapping techniques enabling to navigate the catheter within the left atrium (LA) and around the oscium of pulmonary veins (PV). The early experiences with NavX system were compared with the results gained from CARTO system.

Methods: The study was conducted within the period of III–X/2006 in 75 patients in whom ablation was performed due to paroxysmal or chronic AF. In 15 patients (group I, age 54±11 years) the navigation was performed by NavX system, in the rest of 60 patients (group II, age 57±10 years) CARTO system was used. In all patients CT of LA was performed, in group II then the CT picture was integrated with the 3-D map. In addition to 3-D mapping the authors used intracardiac echocardiography. The ablation was performed by cooled hp catheter. The objective resided in entire antral isolation of all PVs, supplemented by the lines in both atria and ablation of fractioned potentials in chronic AF.

Results: The procedure time in both groups was the same (249±68 minutes in group I vs 244±56 minutes in group II). The fluoroscopy time in group I was longer than in group II (36±8 vs 28±9 minutes, $p<0.05$). The periods up to the gain of geometric details of LA and PV were similar in both groups.

Conclusions: Both NavX and CARTO procedure times were similar. Lesser experience with NavX system prolonged the fluoroscopy time. Both methods enable fast and accurate visualization of the ablation catheter in LA, and contribute greatly to the efficacy of AF ablation.

ARRHYTHMIAS AND CARDIAC PACING

Recurrent arrhythmias after ablation of chronic atrial fibrillation and results of repeated ablations

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Objective: To evaluate the recurrent arrhythmias after ablation of chronic atrial fibrillation (AF) and result of repeated ablations.

Methods: The first ablation consisted of encircling lesions with isolation of pulmonary veins (PV), complex linear lesions

in left atrium (LA), or ablation in coronary sinus (CS). Out of 82 patients with chronic AF (chronic phase 28±28 months, resistant to amiodarone and electric cardioversion), 44 (54 %) patients have had sinus rhythm (SR) since the first ablation. 9 patients (9 females, age 52±10 years) out of the rest of 28 patients (34 %) were subject to second ablation due to paroxysmal AF (2), persistent type I. atrial flutter (1), right atrial tachycardia (1), paroxysmal AF (2), persistent AF (13), paroxysmal LAT (1), persistent LAT (10). The third ablation was performed in 4 patients due to paroxysmal AF (1), paroxysmal LAT (1) and persistent LAT (2).

Results: Paroxysmal AF/LAT was eliminated with no further possibility of its re-induction. AF (3) was terminated by linear lesion connecting the right lower PV with the mitral ring, LAT (2) ablation on the septal margin of the oscium of left atrial appendage (LAA). All persistent LATs were terminated on septal margin of oscium of LAA (1), upper margin of oscium of LAA (3), in the region of Bachmann's bundle (BB) (1), in the roof of LA (1), in the antrum of left PV (2) and in CS (4). Out of all persistent AFs, the SR was recovered directly from AF in 1 patient (left PV), and via transient LAT in 5 patients. The sites of SR recoveries were: BB (3), septal margin of LAA (1) and the roof of LA (1). Right atrial tachyarrhythmias were eliminated with no further possibility of its re-induction in both patients. 13±10 months after the latest ablation, stable SR was achieved in 21 (75 %) patients, 5 (18 %) patients had persistent AF (AF was neither terminated by re-ablation nor organized into LAT) and 2 (7 %) patients had persistent LAT.

Conclusion: After complex ablation in LA due to chronic AF: 1) the presentation of LAT is high; 2) these LATs were cured by repeated ablations; 3) the recovery of SR requires extra posterior LA wall ablation in majority of patients; 4) AF reoccurred, unless the repeated ablation resulted in termination of arrhythmia or at least in organization into LAT.

ARRHYTHMIAS AND CARDIAC PACING

Structural changes in left atrium after catheter ablation of chronic atrial fibrillation

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Objective: To compare the volume and voltage changes in left atrium (LA) gained from electroanatomic 3-D maps at first or repeated ablations of chronic atrial fibrillation (AF).

Methods: Out of 82 patients suffering from chronic AF (chronic phase 28±28 months, resistant to amiodarone and electric cardioversion), 26 (32 %) patients (9 females, age 52±10 years, chronic phase of AF 29±22 months) were subject to re-ablation in 9±6 months after the first ablation. The ablation strategy was based on encircling lesions with isolation of pulmonary veins (PV) and complex linear lesions in LA, or ablation within the coronary sinus (CS). The LA volumes (LAV) calculated by means of CARTO software and LA volumes related to the body surface (LAV/m^2) were compared. The source sites of LA map were divided into 3 groups according to voltage (<0.2; 0.2–1; >1 mV) and the groups were compared as to the presence of sites.

Results: The first map was formed at AF; the second map in 17 patients at AF, and in 10 patients during LAT. The number of source sites at first and repeated ablations did not differ significantly (118±19 vs 113±20; p=0.2). LAV or LAV/m^2 of repeated 3-D maps were significantly lower (147±26 vs 120±23 ml; p<0.001; or 72±12 vs 57±9 ml; p<0.001). The presence of LA sites <0.2 mV increased from 35±21 to 42±15 %; p=0.02; the presence of LA sites of 0.2–1 mV decreased from 53±17 to 40±7 %; p=0.03, and the presence of LA sites >1 mV increased from 12±8 to 18±15 %; p=0.001.

Conclusion: 1) Complex LA ablation was associated with a significant reduction in LA volume; 2) the presence of LA sites showing voltage <0.2 mV increased especially in the regions of PV oscia and along the linear lesions especially at the expense of sites with voltage of 2–10 mV. However the presence of sites with voltage lower than 1 mV increased significantly, especially within the appendage of LA; 3) the results indicate that the complex ablation in LA can lead to reversible structural remodelling of LA.

ARRHYTHMIAS AND CARDIAC PACING

The occurrence of different types of heart rhythm disorders in relation to gender of patients

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Objectives: Different frequencies of clinicaly important cardiac arrhythmias have been reported in association with gender of patients.

Aim of the study: Retrospective study of different types of cardiac arrhythmias occcurence in patients treated in University Hospital Olomouc.

Methods: Assessment of frequency of cardiac arrhythmias according to statistic report of patients admitted to University Hospital Olomouc in 2005 and according to electrophysiologic laboratory register in the 1st Department of Internal Medicine during last 4 years.

Results: Patients admitted in 2005 – absolute values for different diagnosis in ratio male/female: cardiac arrest: 111/40, paroxyzmal tachycardia 273/125, atrial fibrillation and flutter 1557/ /728, sick sinus syndrome 81/44.

Electrophysiologic studies male/female in period 2003 to 2006: atrioventricular nodal reciprocating tachycardia (AVNRT) 51/97, atrioventricular reciprocating tachycardia (AVRT) 10/3, Wolff-Parkinson-White syndrome (WPW) 24/21, atrial tachycardia 5/ /14, atrial flutter 122/33.

Conclusions: Majority of arrhythmias under study were more frequent in males. There were more frequent AVNRT and atrial tachycardia in females. The findings could be partially explained by predominance of arrhythmias associated with structural heart disease in male population (cardiac arrest, atrial fibrillation and flutter). There are possible gender specific hormonal influences on electrophysiologic properties of female myocardium in the manifestation of AVNRT and atrial tachycardia.

ARRHYTHMIAS AND CARDIAC PACING

ICD Implantation in children and adolescents

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Patients and methods: Between 1993 and October 2006 underwent 28 patients (median age 13.5 years; range 3.9–18.7 years; 5 pts<10 years) ICD placement in our institution. The underlying cardiac disorders included congenital heart disease in 7 patients, arrhythmogenic right ventricular cardiomyopathy (ARVC) in 4 pts, dilated cardiomyopathy (DCMP) in 1 pt, hypertrophic cardiomyopathy (HCMP) in 1 pt, congenital long QT syndrome (LQTS) in 10 pts, catecholaminergic polymorphic ventricular tachycardia (CPVT) in 1 pt, idiopathic ventricular fibrillation in 3 pts and other ventricular tachycardia in 1 pt. The ICD was implanted for ventricular fibrillation in 8 pat., sustained monomorphic ventricular tachycardia in 6 pts sustained polymorphic ventricular tachycardia in 3 pat., syncope in 8 pat. and palpitations in 3 pts. Programmed ventricular stimulation (not performed in pat. with LQTS, CPVT, DCMP and HCMP) was positive in 9 of 15 pts. The transvenous ICD implantation underwent 26 pts, subcutaneous array was used in 1 pt (weight 15 kg) and pericardial array in 1 pt (weight 24 kg). The mean±SD follow-up was 2.86±2.35 years.

Results: There was no perioperative complication. Defibrillation safety margin was >0 J in 27 from 28 pts, R wave amplitude was 12±5.7 mV. Reintervention was indicated in 5 pts (high defibrillation threshold in 1 pt, lead dislodgements in 3 pts, lead fracture in 1 pt). 16 patients (57.1 %) experienced 197 appropriate therapies. There were 11 inappropriate therapies in 5 pts (17.9 %) caused by T wave oversensing in 2 pts, sinus tachycardia in 2 pts and lead fracture in 1 pat. During the follow-up occurred 2 deaths (aspiration during ICD arrhythmic storm in 1 pt and progression of the heart failure in 1 pt with DCMP).

Conclusion: ICD implantations in children and adolescents provide safe and effective prevention of sudden cardiac death. The rate of complications is acceptable.

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ARRHYTHMIAS AND CARDIAC PACING

An asymmetric influence of autonomic nervous system on sinus and atrioventricular nodes – a physiological reaction?

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Background: The depressive reaction on sinus node during head-up tilt test in patients with vasovagal syncope is the most frequent while the function of atrioventricular node is usually difficult to assess. In some cases there is an isolated atrioventricular block with concurrent sinus tachycardia.

The aim of the study is to assess the incidence of an asymmetric response of sinus and atrioventricular nodes to autonomic denervation, evaluated using electrophysiological parameters measured during transesophageal atrial pacing (TAP).

Material and methods: TAP was performed in 100 patients. The following parameters were assessed: sinus cycle length (CL), sinoatrial conduction time (SACT) by Narula and Strauss methods, corrected sinus node recovery time (cSNRT) and Wenckebach point (WP).

Groups: 1) 16 patients with sinus node dysfunction (SND+) and vasovagal syncope (VVS+),

2) 24 patients SND+ and VVS-, 3) 32 patients SND- and VVS+, 4) 28 patients SND- and VVS-. All sinus node (SN) and atrioventricular node (AVN) parameters were measured in basal state and after pharmacological autonomic blockade (AB). As a *worseni*ng of SN or AVN function we called the lengthening of CL, cSNRT or SACT and a decrease in WP. As an improvement we called shortening of CL, cSNRT or SACT and an increase of WP.

Results: An asymmetric reaction, e. g. a worsening parameters of one of the nodes and an improvement of parameters of the other node was observed: 1) in 5 (31 %), 14 (58.3 %), 13 (40.6 %) and 10 (35.7 %) patients in groups 1-4, respectively, in case the changes of SACT or cSNRT were noted as an reaction of SN and changes of WP were noted as an reaction of AVN, 2) in 10 (62.5 %), 12 (50 %), 16 (50 %) and 11 (39.3 %) patients in groups 1–4, respectively, in case the changes of CL were noted as an reaction of SN and changes of WP were noted as an reaction of AVN.

Conclusion: An asymmetric reaction of SN and AVN after pharmacological denervation was frequent in all studied groups.

ARRHYTHMIAS AND CARDIAC PACING

Five-year follow-up after catheter ablation for supraventricular tachycardias

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Introduction: Catheter ablation (CA) is first line treatment of supraventricular tachycardias (SVT) today. Long-term effect and quality of life (QoL) after catheter ablation is studied rarely.

Methods: We studied 233 consecutive patients (99 male and 134 female patients) who underwent catheter ablation in years 1997–2001 (134 for AV nodal reentry tachycardia, 77 for AV reentry tachycardia, 22 for typical atrial flutter). Questionnaire form of follow-up was used (generic measure of health-related quality of life EQ-5D).

Results: 170 patients respond to our letter (73 %). During the mean follow-up of 82 month 17 % of patients described palpitations (dominantly extrasystoly and atrial fibrillation, two times recurrence of SVT), in two patients was pacemaker implanted 5 year after CA because of sinus node dysfunction. 80 % of patients appreciate CA as a marked improvement of health state. In the objective part of EQ-5D was documented significant improvement of QoL (mean improvement 25 %, $p<0.001$) in all groups except atrial flutter patients. In the subjective part of EQ-5D was documented significant improvement of QoL (mean improvement 50 %, $p<0.001$) in all groups. Other concomitant diseases did not influence significant improvement of QoL.

Conclusion: CA of SVT leads in long-term follow-up to significant improvement of health status and quality of life of our patients. The only exceptions are patients with atrial flutter because of atrial fibrillation coincidence.

ARRHYTHMIAS AND CARDIAC PACING

Implantable cardioverter-defibrillator therapy in patients having the primary prophylactic indications: Single centre results with long-term clinical outcomes

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Background: Therapy with implantable cardioverter-defibrillator (ICD) has been proven to reduce the risk for sudden cardiac death (SCD) in high risk populations. The aim of our study was clinical evaluation of prospectively followed-up (FU) patients implanted with an ICD in our center, in whom indication for the ICD therapy was primary prophylaxis of SCD. The second endpoint was assessment of therapeutic ICD interventions for ventricular arrhythmias.

Methods and results: Out of 395 primary ICD implantations in our institution through 1998 to 2006, forty-six patients (11.6 %) had a primary prophylactic indication for ICD implantation, i.e., subjects have not experienced a life-threatening ventricular arrhythmia or symptomatic equivalent, cardiopulmonary resuscitation, unexplained syncope with work-up suggesting a high probability of ventricular tachyarrhythmia, or ventricular tachycardia/fibrillation except during the first 48 hours after myocardial infarction (MI). All patients had a class I recommendation for ICD implantation. Since 1998, the number of primary prophylactic ICD implantations has been continuously increasing (3.6 % in 1998 to 25 % in 2006). The principal underlying heart disease of these patients was coronary artery disease (CAD) (34 pts, 74 %) followed by nonischemic dilated cardiomyopathy (DCM) (7 pts, 15 %), and Brugada syndrome (3 pts, 7 %). ICD implantation in this high-risk population was a part of a complex therapeutic strategy, including pharmacotherapy, and revascularization that has been performed in 16 (47 %) of all CAD pts.

All CAD and DCM patients had severe left ventricular systolic dysfunction (ejection fraction (mean±SEM) 28.6±1.1 % and 30.3±4.1 %, respectively). Mean age of patients at the time of implantation was 57.2±1.9 yrs. Patients with prior MI underwent ICD implantation with mean time delay 26±9 months after MI.

During a postimplantation FU (mean 28.1±4.7 months) adequate ICD interventions (antitachycardia pacing and/or shock) occurred in 9 pts (19.6 %), with a mean interval 18.2±7.6 months from ICD implantation. In all cases interventions were appropriate.

The mortality of this group of patients was 13 %, causes of death were: progression of refractory HF (3 pts), acute MI (1 pt), pulmonary artery emboli (1 pt), and gastrointestinal bleeding (1 pt).

Conclusions: The number of primary prophylactic ICD implantation is growing also in the setting of specialized tertiary cardiovascular centre in Slovakia, what corresponds to a worldwide trend. Adequate antitachycardia intervention resulting in abortion of potentially life-threatening tachyarrhythmias was noted in 20 % of patients during a mean follow-up of 2.3 years, without observing inadequate ICD interventions. Mortality benefit derived from these data is in agreement with evidence based medicine.

ARRHYTHMIAS AND CARDIAC PACING

Bipolar radiofrequency ablation of atrial fibrillation with mitral valve surgery

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Introduction: Atrial fibrillation affects 30 to 50 % of patients undergoing mitral valve surgery. We report our initial clinical experience with bipolar radiofrequency for intraoperative ablation of atrial fibrillation concomitant with mitral valve surgery.

Methods: From October 2003 to February 2006 a bipolar radiofrequency clamp Atricure was used to facilitate atrial fibrillation ablation in 156 patients. Preoperative atrial fibrillation was intermitent in 5 % and permanent in 95 % patients. All patients underwent bilateral pulmonary vein isolation performed with bipolar radiofrequency clamp and excision or exclusion of the left atrial appendage. All patients had also connecting lesions between the right and left pulmonary veins and to mitral annulus.

Results: All patients left the operating theatre with sinus rhythm or with ventricular pacing for an underlying nodal rhythm. Perioperative atrial fibrillation was common, affecting 71 % of

patients. By discharge 61 % of patients were in sinus rhythm. By 3 months postoperatively 69 % of patients and by 1 year 75 % of patients were on sinus rhythm. There were no device-related complications. Mean time required for ablation was 12 min (7–18 min).

Conclusions: Bipolar radiofrequency ablation of atrial fibrillation in patients undergoing mitral valve surgery is a safe, easy to perform and fast method.

ARRHYTHMIAS AND CARDIAC PACING

Left atrial tachycardias after ablation of atrial fibrillation

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Objective: To present clinical picture and results of mapping and catheter ablation of left atrial tachycardias (LAT) after former ablation of atrial fibrillation (AF)

Methods: The group was composed of 29 patients (8 females, 57±10 years of age) out of whom 14 (48 %) were after ablation of chronic AF (3x2 ablations), 2 (7 %) patients were after ablation of persistent AF, 11 (38 %) patients were after ablation of paroxysmal AF (6x2 ablations) and 2 (7 %) patients were after surgical maze ablation.

Results: Prior to LAT re-ablation, the clinical LAT was persistent in 23 (7 %) patients and paroxysmal in 6 (21 %) patients (5x after ablation of paroxysmal AF, once after ablation of chronic AF). Stable LAT was selectively mapped (Carto) in 19 (66 %) patients) (10x after chronic AF, 2x after persistent AF, 5x after paroxysmal AF and twice after maze), however due to further forms of LAT the ablation was terminated anatomically in 9 patients (6x after chronic AF, 2x after paroxysmal AF and 1x after persistent AF). Due to changing of LAT morphology the mapping and ablation were performed anatomically in 10 patients (4x after chronic AF, 8x after paroxysmal AF). Selective mapping revealed focal origin of tachycardia in 2/19 (11 %) patients – from the oscia of pulmonary veins (PV) (1x after ablation of chronic AF and 1x after paroxysmal ablation of AF – this single one had the character of ectopic arrhythmia). SR was successfully recovered by ablation in 28 (97 %) patients. The sites of ablation, after which stable sinus rhythm was achieved were: Bachman bundle 7x, septal oscium of appendage 3x, higher oscium of appendage 3x, left atrium roof 4x, left PV oscium 5x, coronary sinus 4x, and the region between the right lower PV and mitral ring 2x.

Conclusion: 1) LAT after former catheter or surgical ablation of AF has prevailingly the character of re-entry; 2) the critical sites of re-entry circuits are often in various sites of left atrium; 3) the risk of development of LAT depends on the extent and number of former ablations; 4) arrhythmogenic substrate and re-entry circuits are often complex; 5) the so-called non-mappable LAT can be solved by anatomical approach to ablation.

ARRHYTHMIAS AND CARDIAC PACING

Predictors of response to cardiac resynchronization therapy (CRT) in pediatric and congenital heart disease. Subanalysis of a retrospective European multicenter study

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Background: Response to CRT in a heterogeneous population with pediatric and congenital heart disease may differ from adult ischemic and idiopathic cardiomyopathy.

Methods: Retrospectively collected data from 109 patients aged 0.24–73.8 (median 16.9) yrs with congenital heart disease (n=87), cardiomyopathy (n=12), congenital complete AV block (n=10) with systemic left (n=69), right (n=36) or single (n=4) ventricular dysfunction and spontaneous (n=16) or pacing induced (n=84) ventricular desynchronization subjected to CRT and followed-up for a median of 7.5 mo were analyzed. Predictors of clinical non-response and improvement in systolic function were evaluated.

Results: 16.1 % of patients were identified as non-responders. Predictors of non-response were the presence of primary cardiomyopathy (univariate: 40.0 % vs 3.8 %, $p<0.001$; multivariate: $p<0.001$), higher NYHA class (univariate: median 3.5 vs 2.0, $p<0.001$; multivariate: $p=0.004$) and greater systemic ventricular enddiastolic dimension (univariate: median Z-score: +6.36 vs +2.66; multivariate: NS). Major improvement in systolic function (over the 50th percentile of the study group) was predicted by the presence of systemic LV (univariate: 95.0 % vs 47.4 %, $p=0.001$; multivariate: $p<0.001$), lower initial ejection fraction (univariate: median 25 vs 30 %, $p=0.062$; multivariate: $p<0.001$) and age at CRT (univariate: median 11.0 vs 17.9 yrs, $p=0.032$; multivariate: NS). Increase in ejection fraction/fractional area of change was better for systemic LV than RV (mean +15 vs +6 %, $p=0.029$).

Conclusions: Primary dilated cardiomyopathy and high initial NYHA class were two independent predictors of poor response to CRT. Improvement in systolic function was significantly better in patients with systemic LV than RV. Other factors, like QRS duration and change, age or presence of pacing-induced vs spontaneous ventricular desynchronization did not play a role in prediction of outcome. (Roman A. Gebauer was supported by the Research Project No 6301 of University Hospital Motol, Prague)

ARRHYTHMIAS AND CARDIAC PACING

Arrhythmias in congenital heart defects

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Aim of the study: Evaluation of the incidence and severity of late arrhythmias in patients with predisposing congenital heart defects – either due to the anatomy of the defect itself or as a result of a particular type of surgical intervention.

Patients and methods: In a retrospective long-term study authors analyzed 158 patients (divided into 5 groups) with congenital heart defects after surgical correction. Evaluated were: the incidence of rhythm disturbances, the type of arrhythmia and the need of medication or intervention.

Results: The most rhythm disturbances occurred in patients after physiological correction of D-transposition of the great arteries (68.5 %) and these patients also mostly needed medication or pacemaker implantation; followed were by patients with Hypoplastic left heart syndrome after Fontan procedure (40 %), then were patients after long-term correction of Tetralogy of Fallot (31.1 %), Atrial septal defect sinus venosus type with partial anomalous pulmonary venous return after Warden correction (25.7 %) and Congenitally corrected L-transposition of the great arteries (25 %). Most of these arrhythmias were asymptomatic and there was no need to treat them. There was an increased incidence of arrhythmias with time ($p<0.05$).

Discussion: During childhood in patients after surgical correction late arrhythmias mostly do not represent a severe problem, but with time, when reaching adulthood, this may be an issue. It is therefore very important to understand the anatomy, physiology and the arrhytmogenic substrate of every high risk congenital heart defect.

ARRHYTHMIAS AND CARDIAC PACING

Comparison the effectiveness of damped sine wave monophasic and rectilinear biphasic shocks in patients with persistent atrial fibrillation

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Aims: 1) To compare the effectiveness of electrical cardioversion (ECV) using biphasic and monophasic waveforms in patients with persistent atrial fibrillation, and 2) To evaluate the impact of the underlying disease, previous medical treatment, duration of atrial fibrillation, and the echocardiographic parameters on the efficacy of electrical cardioversion.

Methods: Two hundred patients with persistent atrial fibrillation were chosen to receive electrical cardioversion according to the guidelines of the ACC/AHA/ESC. All patients were evaluated clinically and pharmacologically, and underwent laboratory and auxiliary tests prior to the administration of electrical cardioversion. The prevention of the thromboembolism was applied by the guidelines of the ACC/AHA/ESC. Using the "alternating method" of random selection, the patients were randomly assigned into two groups (100 patients per group). Patients in the first group (BC) received the exponential biphasic electric shock, and the patients in the second group (MC) received monophasic damped sine waveform shock. The maximum number of shocks delivered during a single session was four (BC: 100 J, 200 J, 270 J, 270 J, MC: 200 J, 300 J, 360 J, 360 J). For electrical cardioversion to be successful, it was expected to induce a sinus rhythm lasting longer than 60 seconds.

Results: BC was overall significantly more successful in restoring a sinus rhythm compared with MC (93 % vs 83 %, $p<0.05$). BC used lower average cummulative energy (256.7±209.955 J and 636.0±370.945 J, $p<0.01$), was more successful across all levels of electrical discharges, and on an average utilized fewer electric shocks (1.21 vs 1.61, $p<0.01$). BC was more successful in a group of patients with left atrial diameter >50 mm (96.43 % vs 72.22 %, $p<0.05$), and in a group of patients with more than three months longer duration of atrial fibrillation (78.26 % vs 40.0 %, $p<0.01$). The effectiveness of electrical cardioversion was decreased as a function of BMI levels (BMI <25: 96.55 %, BMI 25-30: 94.87 %, BMI >30: 79.57 %, $p<0.01$), and duration of atrial fibrillation (all patients: 100 %, 94.18 %, 89.65 %, 70.96 %, $p<0.05$). The effectiveness of the electrical cardioversion seems to be independent of underlying disease and gender. Due to a small number of patients who did not use any anti-arrhythmic drugs prior to electrical cardioversion., we cannot evaluate the effects of the medication on the effectiveness of electrical cardioversion. There were no anesthesiological or cardiac complications during any of the employed procedures.

Conclusion: Our study has confirmed, that 1. The Electrical cardioversion is a safe and an effective method in conversion of atrial fibrillation to a sinus rhythm. 2. Biphasic electric shock is more effective than monophasic shock and should by preferred in electrical cardioversion of atrial fibrillation.

ARRHYTHMIAS AND CARDIAC PACING

Comparison of different methods of the atrial fibrillation substrate ablation

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The aim: comparison of the different methods of radiofrequency ablation (ARF) of the atrial fibrillation (AF) substrate.

Material and methods: to eliminate the learning curve effect the first 100 ARF were excluded from the study. We analyzed 85 consecutive ARF (22 K; 49±12 lat) performed by the same electrophysiologist: with Lasso 2515 catheter (group 1), pulmonary vein isolation using CARTO system (group 2), ARF with Lasso and intracardiac echo (ICE) (group 3), ARF with Lasso and LocaLisa (group 4), ARF with Lasso and invasive pressure monitoring during transseptal puncture (group 5). Follow-up 12±8 m-th. Group 3 was significantly older than 1, 2, 5 ones. In group 2 the ARF were significantly more extensive than in groups 1, 3 and 5. Follow up was longer for group 1 and 2 than for 3–5.

Tab. 1. Comparison of different methods – significant factors.

Group	age	Procedure duration (min)	Fluoroscopy time (min)	Number of vein with ablation	AF recurrence (%)
Lasso n=35	48±12	221±77	37±14	4.1±1.2	16
CARTO isolation n=17	48±11	288+66	32±20	5.3+1.4	12
Lasso + ICE n=10	57+5	181±38	44+16	3.9±0.8	30
Lasso + LocaLisa n=7	49±14	186±60	24±11	4.4±1.1	14
Lasso + invasive pressure n=16	48±14	162±51	34±17	4.1±1.2	6

Results: Group 1 – one cerebral ischemic stroke, no other complications. Statistically significant differences (details in Table 1): fluoroscopy time was shorter in group 4 than in group 3 ($p<0.001$); the duration of the procedure was longer in group 2 than in others ($p<0.003$) and longer in group 1 than in group 3 and 5 ($p=0.03$; 0.003). Recurrences of AF were more frequent in group 3 (possible result of older patients or smaller number of isolated veins).

Conclusion: 1) Presented methods of ablation had similar safety and success rate. 2) Ablation – isolation with CARTO system has tendency to reduce fluoroscopy time with simultaneous prolongation of the procedure and increasing extensiveness of the procedure.

ARRHYTHMIAS AND CARDIAC PACING

Combination of pulmonary vein isolation and superior vena cava isolation in patients with atrial fibrillation detecting “af nests” using spectral analysis of signal in sinus rhythm

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Background : Real time spectral analysis of atrial electrocardiograms in sinus rhythm (SR) can identify regions essential for persisting atrial fibrillation , “AF nests”. The purpose of this prospective randomized study was to evaluate potential benefit of combination of “AF nests” ablation together with Pulmonary Vein Isolation (PVI) and Superior Vena Cava isolating (SVCI) in pts with atrial fibrillation (AF) in contrast with the PVI and SVCI only.

Methods: The cohort of 91 pts had PVI, SVCI and “AF nests” ablation (C1) and 45 pts had PVI+SVCI only (C2). All pts have been followed minimally for 60 days. There was no significant difference in age, LA size, LVEF, co-morbidities and AF duration between C1 and C2. In C1 the Pachon´s algorithm of spectral mapping in both atriums was used after PVI and SVCI and the “AF nests” sites were ablated. Finally, the coronary sinus was mapped and recognized “AF nests” were ablated with application of 35 W for 20 s. The highest density of “AF nests” was obtained in caudal crista terminalis (5.8±4.9 RF applications) and in LA appendage (2.5±1.7 RF applications).

Results: In pts of C1 cohort the combination of PVI, SVCI and AF nests decreased recurrences of AF comparing with C2

group in 60 days follow up. In pts with paroxyzmal AF the AF recurrence was documented in 11 % in C1 and 20 % in C2. In pts with persistent AF the recurrence of AF in C1 was 20 % and 30 % in C2. In C1 the procedure time was 191±59 min with and fluoro time was 68±29 min, in C2 procedure time 168±69 min with fluoro time 59±15 min. One patient developed TIA.

Conclusion: "AF nests" mapping and ablation is a safe method that can be performed without increasing procedure time and radiation exposure. Reduction of AF recurrence in pts after PVI, SVCI and "AF nests" ablation suggests this method could be used in practice.

ARRHYTHMIAS AND CARDIAC PACING

Pacing in hypertensive patients

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Aim: To evaluate the influence of pacing on blood pressure level (BP) in patients treated for hypertension.

Study group and methods: The retrospective analysis of the group of 259 patients with treated hypertension, in who the implantation of pacemaker (PM) was performed at our department within the period of years 2004–2006. There were 134 men (52 %), the mean age of the patients was 74±9 years (median 75 years). We investigated the BP before and after PM implantation and also other factors influenting BP. Good controlled hypertension was considered as BP<140/90 mmHg, BP=140/90 mmHg as a worse controlled hypertension.

Results: Before PM implantation the mean systolic BP was 146±25 mmHg (median 145 mmHg) and the mean diastolic BP 82±14 mmHg (median 80 mmHg); in 79 (30.5 %) patients was BP<140/90 mmHg, BP=140/90 mmHg in 80 (69.5 %) patients. After PM implantation the mean systolic BP was 130±16 mmHg (median 130 mmHg) and the mean diastolic BP 76±11 mmHg (median 80 mmHg); BP<140/90 mmHg was measured in135 (52 %) patients and BP=140/90 mmHg in 124 (48 %) patients. There was statistically significant decrease in the rate of patients with worse controlled hypertension ($p<0.001$). We also found statistically significant increase in the rate of patients treated by betablockers (BB) after PM implantation ($p<0.001$). There were 128 (49 %) patients treated by BB before PM implantation, and 177 (68 %) patients after the implantation.

Conclusion: We discovered, that the alone PM implantation could lead to decrease of BP in some patiens due to baroreflex mechanism. But the more important was finding, that pacing could improve the control of hypertension due to possibility of treatment by BB in patients, in whom BB were not tollerated because of its bradycardia effect.

ARRHYTHMIAS AND CARDIAC PACING

Catheter ablation of cavo-tricuspid isthmus for typical atrial flutter at Department of Cardiology, University Hospital Brno

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Introduction: Typical atrial flutter is very common and clinically significant supraventricular tachyarrhythmia. Efficacy of pharmacological treatment is low. Successful catheter ablation of cavo-tricuspid isthmus prevents induction of this macroreentry arrhythmia in right atrium and the patients are cured with long-term effect.

Aim of the study: To evaluate acute and long-term follow-up of the patients after ablation of cavo-tricuspid isthmus because of typical atrial flutter at the Dpt. of Cardiology University Hospital Brno within the years 1998–9/2006 and to compare limitations in the quality of life before and an improvement after the procedure.

Group of the patients, methods: There were 1216 catheter ablations of supraventricular arrhythmias performed at our department within the years 1998–9/2006. There were 246 ablations (20.2 %) performed due to typical atrial flutter: 59 women

(24 %) and 187 men (76 %), mean age 59.1 years (SD 9.5). The end-point of the procedure was creation of linear lesion and bidirectional block at cavo-tricuspid isthmus that was confirmed by pacing. We have also evaluated questionnaires concerning quality of life that were answered by patients before and after the procedure.

Results: There were 3 times more men than women in our group of 246 patients who undergone ablation for typical atrial flutter. Typical atrial flutter significantly dominates in men. There was the largest amount of middle aged patients within 45 – 59 years of age (44.7 %) and within 60 – 74 years of age (40.3 %). The dominating symptoms were palpitations (in 98 % of patients), dyspnea (23.8 %), presyncope (3.2 %), angina pectoris (3.2 %). There was no patient with syncope. The most frequently used antiarrhythmic drugs were betablockers (in 42.9 % of patients) and amiodarone (36.5 %). The number of patients without antiarrhythmic drugs treated by ablation is increasing: from 20 % in the year 2002 to 38 % in the year 2006. The efficacy of the procedure is more than 95 % in the last 3 years: 95.5.% in the year 2004, 97.5 % in 2005, 96.0 % in 2006. The efficacy is even more increased by repeated procedure. The quality of life after the procedure has increased by 75 %.

Conclusion: We recommend catheter ablation for typical atrial flutter as a first line treatment of choice because of high efficacy, low rate of complications and significant improvement of quality of life.

ARRHYTHMIAS AND CARDIAC PACING

Septal pacing – acute effect on ventricular dyssynchrony

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Background: Right ventricular apical pacing may promote cardiac dyssynchrony and compromise hemodynamic function of left ventricle (LV). Selective site right ventricular (RV) pacing has been suggested as an approach to achieve normal physiologic activation of LV. The goal of this study was to evaluate acute effect of septal pacing on echocardigraphic parameters of ventricular dyssynchrony.

Methods: 26 patients (18 male, mean age 73±10 years) with complete AV block and preserved LV ejection fraction (EF>45 %) were included. A screw-in lead was systematically positioned in the RV septum. Echocardiography coupled with pulsed Doppler tissue imaging (TDI) was performed within one week after implantation. Indexes of inter-or intraventricular dyssynchrony were evaluated. Interventricular mechanical delay (IVMD) was assessed using the difference in the time from Q-wave until the onset of aortic and pulmonary outflows (left and right preejection time). Intraventricular LV dyssynchrony was analyzed from TDI data. The septal-to-lateral delay was measured as the time difference of onset respectively peak systolic velocities.

Results: Left ventricle preejection time was 139±22 ms, right ventricle preejection time was 115±23 ms, IVMD was 17±22 ms. The septal-lateral delay was 6±30 ms and 30±52 ms for onset and peak velocities.

Conclusion: Our data suggest that septal pacing does not induce significant acute both inter and intraventricular dyssynchrony, but there is a wide individual spread in all measured parameters.

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ARRHYTHMIAS AND CARDIAC PACING

Ventricular tachycardias as manifestation of vasospastic angina pectoris – 4-year follow-up

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Introduction: For the first time in 1959 Prinzmetal described the unusual syndrome of paroxysmal stenocardia exclusively taking place at rest and associated with ST elevations, referred to as Prinzmetal´s vasospastic AP.

Objective: To review the relation of vasospastic AP to life-threatening malignant ventricular dysrhythmias and the risk of sudden arrhythmic death.

Methods: The investigated group was composed of 4 patients, male smokers, average age 42 years (25–59 years) with documented transient ECG changes, Pardee waves co-occurring with malignant dysrhythmias VT/VF. The patients undergone stress test, selective coronarography and EPS with no pathological findings. During the coronoarographic examination one of the patients developed vasospasm with prompt recovery ad integrum.

Results: All presented patients were evaluated as suffering from vasospastic AP and being at high arrhythmogenic risk. Two patients were released with combined anti-arrhythmic treatment with amiodarone+Ca agonist; two patients had ICD implanted. One of the patients with implanted ICDs developed one adequate defibrillation activity of ICD, in another of non-sustained VT was documented not requiring ICD intervention.

Conclusion: 4 year FV study of patients after implantation of ICD due to ventricular tachycardias induced by vasospasms shift patients with this diagnosis into group of patients being at risk of sudden death with the necessity of ICD implantation.

ARRHYTHMIAS AND CARDIAC PACING

Infection of the implanted PM/ICD – always an indication for the whole system extraction?

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Introduction: Proved infection of the pocket of the implanted PM/ICD nearly almost leads to the extraction of the whole system, e.g. both the device and intracardial electrodes.

Methods: V.A.C. (vacuum assisted closure) enables non-invasive treatment of an infected wound using local negative pressure, formed during continuous suction. In the wound, bacterial contamination is decreased or even eliminated, edema is decreased, perfusion of the surrounding tissues and the production of granulomatous tissue are increased. During the therapy, PM/ICD device remains in the place.

Results: Untill now, V.A.C. was used in 5 patients. Therapy duration ranged from 28 to 64 days (43.4), numbe of dressings from 9 to18 (13.2). In 4 cases, the wound was surgically closed. One patient has experienced a small superficial dehiscence, which was healed per secundam.

Summary: The possibility to treat local infectious complications of the implanted PM/ICD using V.A.C. seems to be a suitable alternative compared to the whole system extraction despite time demands. In certain cases (recurrent infections, complicated BiV ICD implantation) it may be a method of choice.

ARRHYTHMIAS AND CARDIAC PACING

Invasive electrophysiology in Children's cardiac centre

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Introduction: Since september 2004 electrophysiologic investigation of children with cardiac arrhythmias was reintroduced Children's cardiac centre in Bratislava.

Patients: During last two years in 34 children (13 boys and 21 girls) in the age of 3 to19 years invasive electrophysiology was performed.

Results: 27 children with various forms of supraventricular tachycardias were tested before radiofrequency ablation (RFCA). In 4 children induction of ventricular tachycardia was attempted, while in 3 atrioventricular conduction system was tested. Ventricular tachycardia/fibrillation was induced in one patient with unexplained syncopal episodes with subsequent implantation of AICD. Disturbed distal AV conduction was found in one child after Amplatzer closure of ventricular septal defect. Temporal ventricular electrode was placed and after short course of steroid therapy AV conduction was normalized.

Radiofrequency ablation was not performed in 7 children: in 4 of them accessory pathway was in close vicinity of His bundle, in 2 children treated for permanent junctional ectopic tachycardia this tachycardia was not inducible as was the case also for one patient with previous AV nodal reentrant tachycardia.

Radiofrequency ablation was performed in 11 pts with AV nodal reentry tachycardia (AVNRT), in 6 pts with concealed (URAP) and in one pt with apparent ventricular preexcitation (W-P-W), and in 2 pts with permanent junctional reciprocal tachycardia (PJRT). In all pts with AVNRT was RFCA successful, in 2 pts tachycardia reappeared on the 2nd day and/or after 6 months and was successfully reablated in both. RFCA was successful in both pts with PJRT- in one in the os of coronary sinus, and left laterally in left ventricle in the other patient RFCA was successful in 3 out of 6 pts with URAP with transaortic approach. In 2 of them reablation using transseptal technique was successful, one patient having three accessory pathways,

Complications relating to the procedure had 3 out of 27, i.e. 11.1 % of children. In one patient on echocardiography subaortic filiform floating structure was found, which later disapeared. In one child during AVNRT ablation atrial rhythm, with shortened PQ interval and in another transient I st degree AV block.

Conclusions: AVNRT ablation was successful in 100 % of children with 18 % of recurrence and uneventful reablation. 100 % success was also with permanent junctional reciprocal tachycardia. Retrograde approach for RFCA of URAP was effective in half of the pts, while using also transseptal approach success was in 84 % of pts. Complications of the procedure were not serious.

ARRHYTHMIAS AND CARDIAC PACING

Hemodynamic optimization of biventricular pacing using QuickOpt algorithm

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Aim: Pulsed Doppler echo determination of hemodynamic optimization of cardiac resynchronization therapy (CRT) using QuickOpt algorithm.

Methods: We performed pulsed Doppler echo to determine the maximum LV outflow track velocity time integral (VTI) in patiens (pts) treated with CRT (SJM, Atlas+HF, Epic+HF). We provided correlation of the optimal PV and VV delays obtained by intracardiac based algorithm QuickOpt (QO) with optimal PV and VV delays obtained by echo. VV delay was optimized among activations: LV pre-excitation 15, 20, 30, 40 ms, simultaneous, RV pre-excitation 15, 20 ms. For each VV delay were estimated VTI values for PV delay (80, 100, 120, 140 ms). 8 pts (age 62 (51–72) years, LVEF 25.8±5.3 %, LVEDD 67.1±6.4 mm, LA 50.8±6.3 mm, 100 % ischemic, LBBB, 1 pt with atrial fibrillation (AF), 1 pt without intrinsic R wave) were included.

Results: The optimal values of VV and PV delays were individual for VV and PV delay. QO measurement was not successful in 1 pt without intrinsic R wave. In 7 pts with intrinsic R wave a strong concordance between QO algorithm and echo optimization was observed in 5 pts. In 2 pts was QO VTI significantly lower (17.6 vs 22.4 cm, resp. in AF pt 12.7 vs 22.6 cm).

Conclusions: QO measurements were optimal in 5 of 7 pts with CRT. QO algorithm provides quick and seems to be effective way to optimize biventricular pacing. QO measurements is limited in pts without intrinsic R wave and in pts with AF.

ARRHYTHMIAS AND CARDIAC PACING

Cryoenergy catheter ablation of supraventricular tachycardias – where is its place?

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Introduction: Currently, catheter ablation of supraventricular tachycardia (SVT) is considered to be a standard therapeutical approach. Radiogrequent energy (RF) is mostly used, cryoenergy is an alternative. The aim of this study was to evaluate the efficacy of both approaches.

Patients and methods: SVT cryoablation was used in 6 pa-

tients. In 5 cases it was the cavo-tricuspidal isthmus (CTI) ablation, (mean age 59.4±8.2 years), in one case it was slow pathway ablation. Control group included 98 patients with the mean age 61.6±7.5 year, who underwent RF ablation of CTI. Fluoroscopy and procedural time, immediate success and analgetics consumption were evaluated. During both RF and cryoablation of CTI, catheter with 8mm tip was used, in cryoablation of slow pathway catheter with 4mm tip was used.

Results: We found no significant differences in age, fluoroscopy time and immediate efficacy. Differences were found in procedure time, which was longer in cryoablation (200.5±124.3 vs 184.0±62.5 min, $p<0.05$) and in analgetics consumption during the procedure. Patients, who underwent cryoablation, did not require analgetic administration.

Summary: SVT cryoablation is as effective as RF ablation. Its advantage is painless procedure and great catheter stability. Its disadvantage is some prolongation of the procedure and high catheters cost. Although our experience with cryoablation is limited, we consider this method to be indicated in patients with bad tolerance of the procedure and in SVT ablations close to conduction system.

ARRHYTHMIAS AND CARDIAC PACING

Assessment of health- related quality of life in patients with various pacing modes

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Background: Goal of the pacing therapy is to improve prognosis as well as functional status of the patient. Few data exist on the differences between various pacing modes regarding quality of life (QoL).

Aim: of the study was to assess quality of life (QoL), anxiety and depression in patients with various pacing modes.

Patients and methods: QoL was assessed in seventy – five patients (40 men, 35 women, mean age 63±14 years) with implanted pacemaker (PM). Mean time from implantation was 6.4±5.9 years. Twenty two patients received VVI pacemaker, 15 patients VVIR PM, 13 patients DDD PM , 19 patients DDDR PM, 4 patients VDD PM and 2 patients VDDR PM.

QoL was measured by the SF-36 scale and a new pacemaker patients specific questionnaire Aquarel. Psychological aspects were evaluated by Beck scale for anxiety and Zung depression scale.

Results: No differences in QoL were observed between patients with single chamber and dual chamber PM. Significant differences were noted between patients with rate responsive and non- rate- responsive pacing. Patients with rate responsive PM had higher scores in SF 36 subscales reflecting physical role (SFFCS 49.7±20.6 vs 40.2±19.8, $p<0.05$), mental health (SFMCS 58.7±20.6 vs 51.8±16.3, $p<0.05$), physical function – SFFYS ($p<0.05$), vitality – SFVIT ($p<0.05$) and pain SFPIJN ($p<0.05$). They have more favourable results in Aquarel 1 scale – chest pain (18.2±8.8 vs 21.1±7.2, $p<0.05$) and Aquarel 2 – dyspnea (20.2±6.4 vs 23.1±6.3, $p<0.05$). Similarly they exhibited lower degree of anxiety (Beck 16.1±12.1 vs 21.2±13.6, $p<0.05$) and depression (Zung 39.5±8.9 vs 43.2±8.4, $p<0.05$). By subgroup analysis differences between rate responsive a non-rate responsive pacing were shown only in dual chamber pacemakers, differences were not observed in the group of single chamber pacemakers.

Conclusion: In patients with dual chamber pacemakers, rate responsive pacing offers better QoL and more favorable psychological profile when compared to dual chamber non- rate- responsive pacing. No significant differences in QoL and psychological profile were observed between patients with single chamber and dual chamber pacemakers.

ARRHYTHMIAS AND CARDIAC PACING

Genetic polymorphisms of the renin angiotensin system in patients with vasovagal syncope

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Background : A familiar occurrence and genetic predisposition was reported in vasovagal syncope (VVS).VVS is associated with abnormalities in the regulation of extracellular sodium and urinary sodium excretion. The renin angiotensin system is a primary mechanism regulating sodium and water metabolism. Genetic polymorphisms of this system may be associated with predisposition to VVS.

Aim of the study was to compare distribution frequencies of genes involved in regulation of renin–angiotensin system in syncopal patients with positive and negative head-up tilt test.

Methods: DNA was collected form 116 patients (mean age 43±12 years, 33 men, 82 women). Head-up tilt test was positive in 68 patients and negative in 48 patients. Following genetic polymorphisms were determined in genomic DNA using the PCR method: ACE insertion/deletion polymorphism (I/D ACE), angiotensinogen gene polymorphism (M 235) and angiotensin II receptor (ATR1) polymorphism (A 11666C).

Results: There were no significant differences in distribution of genetic polymorphisms between syncopal patients with positive and negative HUT. Following distribution of polymorphisms was observed: I/D ACE: ID 43 % vs 48 %, DD 34 % vs 40 % a II 23 % vs 12 %. Angiotensinogen gene polymorphism MT 50 % vs 45 %, MM 24 % vs 26 %, TT 26 % vs 29 %. ATR1 polymorphism AA 44 % vs 32 %, AC 51 % vs 60 %, CC 4 % vs 8 %.

Conclusion: Genetic polymorphisms of ACE gene, angiotensinogen gene and angiotensin-receptor gene are not associated with predisposition to VVS.

ARRHYTHMIAS AND CARDIAC PACING

Catheter ablation of atrial fibrillation using an intracardial ultrasound: comparison of 8-mm and cooled tip catheter

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Introduction: Catheter ablation has become a standard therapeutical method in patients with symptomatic drug resistant atrial fibrillation. At present, several ablation approaches are used. The authors compared the use of 8-mm and cooled tip catheter in patients who underwent radiofrequency (RF) pulmonary veins isolation.

Methods: 120 patients (107 men, mean age 54±9 years) with symptomatic atrial fibrillation, resistant to antiarrhythmics, underwent RF pulmonary veins isolation using lasso catheter and navigated by an electro-anatomic mapping system CARTO Merge (Biosense-Webster Inc., Diamond Bar, CA, USA) and intracardial ultrasound (Acuson, Mountain View, CA, USA). In 79 patients, 8 mm tip was used for RF pulmonary veins isolation (Group I). Group II consisted of 43 patients, who underwent RF ablation using cooled tip catheter. In both groups, ablation parameters, safety and efficacy were compared.

Results: Total procedure time was slightly shorter in group II: 244±57 min vs 254±46 min in group I, p=ns. Fluoroscopy times were not significantly different as well (group I: 26±8 min, group II: 27±8 min, p=ns). Total time and the number of RF energy applications was significantly shorter in procedures with cooled tip catheter used (group II vs group I: 2283±629 sec vs 2750±705 sec; 80±22 vs 108±32 RF applications), $p<0.01$. After a 6-month follow up, 65 % of cases (45/69) in group I were without recurrent atrial fibrillation. At present, follow up in group II is shorter (3±1 month), good results were achieved in 70 % (20/29) of examined patients. Regarding the number and types of complications, no significant differences were observed in both groups.

Summary: Significantly shorter RF application time is needed for achieving an electric pulmonary veins isolation using cooled tip catheter compared to 8-mm tip. No significant differences were found between total procedure time and fluoroscopy time in both groups. The results of intervention were slightly better in patients from cooled tip catheter group. Longer follow up is needed for a definitive conclusion.

ARRHYTHMIAS AND CARDIAC PACING

Morphology and function of left and right atrium after catheter ablation of chronic atrial fibrillation

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Aim of the study was to echocardiographically evaluate the morphological and fuctional parameters of right atrium (RA) after a complex ablation in left atrium (LA) due to chronic atrial fibrillation (AF).

Methods: Among 82 patients, who underwent ablation of chronic AF, comparison of echocardiographic parameters was possible in 58 pacients (12 females, 55±9 years). Ablation strategy consisted of circular and complex linear lesions in LA. Transthoracal and transesophageal echocardiography was performed before the procedure, and 6 weeks and 3 months after the procedure. Parameters of RA and LA in short and long axis (in apical projection) and LA appendage (LAA) output velocity were compared.

Results: Left atrium was shortened in long axis from 64±7 (49–87, med 63) to 60±7 (45–80, med 61) mm; ($p<0.001$) and in short axis from 44±6 (32–59, med 41) mm; ($p=0.001$).

Right atrium was shortened in long axis from 58±6 (46–72, med 57) to 54±6 (41–67, med 54) mm; ($p<0.001$) and in short axis from 42±6 (30–55, med 41) to 40±7 (28–65, med 39) mm; ($p=0.04$). LA appendage output velocity was increased from 60±25 (12–134, med 59) to 81±35 (20–174, med 78) cm/s; ($p<0.001$). LA appendage output velocity was decreased in 12 (15 %) patients, from which 11 patients had bordeline changes, maximally from 11 cm/s and more. In one patient with the LA appendage output velocity decreased from 109 to 25 cm/s, an embolic stroke developed immediately after the intervention. From 12 patients with worsened LAA output velocity, 10 patients experienced AF or atrial tachycardia at control visit.

Summary: 1) Parameters of both left and right atria were significantly decreased after the complex ablation in LA due to AF. 2) LAA output velocity, as the main factor of thromboembolic risk, was significantly improved. 3) The patient with significant worsening of the LAA output velocity had experienced stroke as early compliation after ablation. 4) It is necessary not to principally disturb electric activation of LAA in order to preserve the mechanical function of the appendage.

ARRHYTHMIAS AND CARDIAC PACING

Determination of "optimal" atrioventricular interval by means of transthoracic impedance cardiography in patients with sick sinus syndrome treated by dual-chamber pacing

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Aim: 1) To determine by means of impedance cardiography (ICG) the "optimal" atrioventricular interval (AVI) in accordance with maximal (max) cardiac output (CO). 2) To review whether A00 pacing yields higher CO than D00 pacing does. 3) To review the influence of controlled breathing (CB) on CO.

Patients and methods: In 34 patients (pts), 19 males and 15 females, of an average age of 70±10.6 years, with sick sinus syndrome – SSS (9 of ischemic, 25 of non-ischemic etiology) CO was determined by ICG (Task Force Monitor CNSystems, Austria) in lying position during normal breathing (NB) and with CB of 20 breaths per minute. The PM was programmed: DDD, 80 ppm (to achieve stable pacing frequency), AVI 75, 100, 120, 140, 160, 180, 250 and 300 ms (AVI programmed in random order). Equalizing phase 2 min, NB 2 min, CB 4 min. In the case of identical max CO in two adjacent AVIs the longer AVI was applied. Retest of one of AVIs was performed in 10 pts.

Results: Max CO in individual AVI (DDD, 80 ppm, n=34)

AVI [ms]	75	100	120	140	160	180	250	300
max CO (NB) in n pts	1	9	4	13	1	7	0	0
max CO (CB) in n pts	1	10	5	9	3	5	1	1

Results confirmed the reproducibility of measured values with a deviation of ±0.1 $l.min^{-1}$, during both NB and CB.

Discussion: During experimental extension of the AVI in pts with SSS there is a change in atrial contribution to ventricular filling (increase – decrease) and a change in ventricular activation pattern as presented by the QRS shape (full capture with D00, fusion beat, spontaneous QRS with A00). Both factors influence CO. Higher CO with A00 vs D00 pacing was not proved. It could be caused by long atrial stimulus-QRS interval (227±51ms, 120–300ms). An unexpected result was the high number of pts with "optimal" short AVI (leading to sequential pacing D00 with possible development of ventricular dysfunction). A proper definition of the "optimal" AVI remains a question.

Conclusion: "Optimal" AVI (as that causing max CO) in pts with SSS was determined by impedance cardiography. The values show obvious interindividual variation (in agreement with other methods). Higher CO during A00 pacing in comparison with D00 pacing was not proved. Statistically, CO does not change significantly during CB when compared to NB.

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ARRHYTHMIAS AND CARDIAC PACING

Contribution of transthoracic impedance cardiography for determination of "optimal" dynamic atrioventricular interval in patients with 3rd degree atrioventricular block treated by dual chamber PM

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Aim: To determine the atrioventricular intervals (AVI) providing maximal cardiac output (max CO) during sequential pacing 80 and 100 ppm by means of impedance cardiography (ICG).

Patients and methods: 13 patients (pts), 10 males and 3 females, of an average age 76.6±6.2 years, with PM implanted for 3rd degree AV block (in 8 pts of ischemic, in 5 pts of non-ischemic) were examined by ICG (Task Force Monitor CNSystems, Austria) in lying position during normal breathing (NB) and controlled breathing (CB) 20 breaths per minute with determination of CO. The PM was programmed DDD 80 and 100 ppm (to achieve stationary pacing frequency), AVI 100, 120, 140, 160, 180 ms (AVI in both frequency settings programmed in random order). Equalizing phase 2 min, NB 2 min, CB 4 min. In case of identical max CO in two adjacent AVIs the longer AVI was applied.

Results: Median (range) of "optimal" AVI (defined as providing max CO) in D00 pacing, 80ppm during NB was 140 (120–160) ms, during CB 140 (100–180) ms, in 100 ppm during NB as well as CB 140 (100–180) ms.

AVI providing max CO in individuals D00, 80.min^{-1} a 100.min^{-1} (n=13)

Pts (ID).	1	2	3	4	5	6	7	8	9	10	11	12	13
AVI NB, 80	140	160	120	120	140	140	100-180	140	160	140	120	160	120
AVI NB,100	120	160	100	140	100	120	100-180	140	180	120	140	180	100
AVI CB, 80	140	180	100	100	120	120	100-180	140	160	140	120	180	100
AVI CB,100	120	140	100	140	100	140	100-180	140	180	120	140	180	100

Discussion: In case of max CO determined for borderline AVI (100 or 180 ms), it is necessary to add measurement in AVI 75 or 200 ms respectively. It is not sufficient to determine "optimal" AVI at settings of two pacing frequencies and AVI 100–180 ms for a significant percentage of pts for optimizing dynamic AVI by means of ICG.

Conclusion: "Optimal" AVI defined as providing maximal CO in patients with 3rd degree AV block shows significant interindividual variation. AVI difference during D00 pacing 80 and 100 ppm in individual patients varies from minus 40 to plus 40 ms. CO is not significantly influenced by controlled breathing. ICG may help in programming base and dynamic AVI in patients with 3rd degree AV block.

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ARRHYTHMIAS AND CARDIAC PACING

Impact of completeness of revascularization and Q wave evolution on QT dynamicity after myocardial infarction with ST elevations

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Background: QT dynamicity is a marker of ventricular repolarization used in risk stratification of cardiac death. The aim of this study was to correlate QT dynamicity parameters with completeness of revascularization and Q wave evolution after myocardial infarction with ST elevations (STEMI).

Methods: A 24-hour ECG monitoring was performed in 133 patients 48 – 72 hours after acute STEMI. All these patients were treated with direct percutaneous coronary intervention (dPCI). The QT dynamicity (assessed by slope of linear QT/RR regression line) was automatically analysed from 24-hour ECG recordings using QT Guard software of MARS Unity Workstation, GE Medical. Occurence of pathologic Q wave was assessed on 12-lead ECG 48 hours after STEMI.

Results: Complete revascularization was achieved in 68 patients (group A), in 64 patients multivessel diesase was present (group B). The QT/RR slope of the groups A and B was not different (0.2±0.117 vs 0.225±0.109, p=0.1). Pathologic Q wave evolved in 86 patients (group C), in 46 patients no Q wave was observed (group D). The QT/RR slope was significantly steeper in the group C compared to the group D (0.229±0.118 vs 0.181±0.099, p=0.007).

Conclusions: No simple relationship between completeness of revascularization and the QT dynamicity was found probably due to different times from STEMI beginning to artery opening. The QT/RR slope is steeper in patients with Q wave evolution after STEMI confirming that they are high risk individuals.

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ARRHYTHMIAS AND CARDIAC PACING

Abnormal low voltage areas in patients with right ventricle outflow tract arrhythmia – are they associated with arrhythmia's characteristics?

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Background: Electroanatomical voltage mapping in patients (pts) with right ventricle outflow tract arrhythmia (RVOT), provides insight into the size and location of electrical abnormalities of endocardium, which are sometimes present despite normal ECG, echocardiography and even magnetic resonance imaging (MRI). Therefore, the purpose of our study was to analyze voltage maps of RV recorded in pts with RVOT and correlate presence and size of endocardial voltage abnormalities with arrhythmia's characteristics.

Methods and results: Between 2001and 2006 72 consecutive pts (43 woman, mean age 36±18) with severely symptomatic RVOT (sustained/non-sustained VT, polymorphic VT-pVT, frequent premature ventricular beats-PVB) underwent cathether ablation with the use of CARTO system. All pts had arrhythmia with LBBB morphology and an inferior axis. One pt had sustained polymorfic VT triggered by PVB, cardiac arrest and ICD implanted. No structural heart dissease was detected by physical examination, ECG and echocardiography. MRI performed in 16

	Area <10 cm^2	Area >10 cm^2
Number of pts	7	10
Arrhythmia's characteristics	PVB's	Couplets, triplets, nsVT ? 6 pts
		pPVBs (2 morphologies) ? 1 pt
		Monomorphic VT ? 2 pts
		Polymorphic VT ? 1 pt

Low-voltage areas-distribution in pts.

cases showed no signs pointing ARVD/C. A 3-D voltage map of RV was obtained. Low voltage areas, defined as regions of bipolar electrograms <1.8 mV were found in 17 pts (24 %) and ranged from 6 to 52 cm^2. Areas of bipolar electrograms <0.5 mV (assumed as a scar) were present in 11 pts (15 %). All mentioned above areas were measured with "area measurement"- application of CARTO-Merge system.

In vast majority "scar" area didn't exceed 3.5 cm^2 but in 1 pt it was 23.8 cm^2 (pt had sustained pVT triggered by PVB, cardiac arrest and ICD implanted). In all pts earliest activation sites were located in the scar area or in tranzition zone between low voltage and scar area, on anterior RVOT wall.

Conclusions: In pts with RVOT arrhythmia abnormal low voltage areas in RV occur but are not frequent. They usually correspond with arrhythmia's site of origin. Large areas and/or presence of multiple low voltage regions are observed in pts with malignant outcome. Further follow-up will show if such findings can predict future development of ARVD/C.

ARRHYTHMIAS AND CARDIAC PACING

Some pitfalls of implantation LV pacing leads for cardiac resynchronization therapy

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Introduction: LV pacing leads implantation for cardiac resynchronization therapy (=CRT) by transvenous approach yields some pitfalls. When percutaneous transvenous placement is unsuccessful, LV pacing can be achieved by cardiac surgical approaches.

Objectives: In group 134 patient with heart failure treated CRT in our Cardiac Centre Trinec from April 2002 to October 2006 we analyzed reasons of unsuccessful LV lead transvenous implantation and we evaluated successfulness of subsequent surgical epicardial implantation.

Results: 1) Unsuccessful endovasal implantation of LV leads was observed in 19 pts (=14 % pts). Main reasons were formation of dissection coronary sinus (=CS) or target vessel (6 pts=31 %), acutely angulated target vessel take off or tortuosity target vessel (5 pts=26 %), gracility and diffuse disease CS and his branches (3 pts=16 %), the phrenic nerve stimulation (2 pts=10.5 %), failure of cannulation the orifice of CS (2 pts=10.5 %).

All dissection were clinically insignificant. There was 1 death in endovasal treated group in perioperative period due to advanced terminal heart failure – paradoxically in patient with successful LV lead implantation .

2) Epicardial implantation by surgical approach we performed consecutively in 15 pts from 19 endovasal unsuccessful patients. Only 1 pt had complication during surgical perioperative period (extensive subcutaneous emphysema of thorax).

Surgical placement we did not indicate in 1 pt due to advanced age (age 83), in 1 pt due to advanced bilateral heart failure, in 2 pts due to improvement of functional status after implantation of endovasal ICD leads.

Conclusions: 1) There is very great technological development in endovasal approaches of LV lead implantations (for example OTW technics, telescoping by subselective guiding catheters – Select II Medtronic…). In spite of that there are relatively frequent pitfalls and difficulties. But they have insignificant effect on mortality during these procedures.

2) In setting good teamwork between cardiology a cardiac surgery finally reliable LV lead insertion can be performed with a near 100 % success rate without great complications.

ARRHYTHMIAS AND CARDIAC PACING

Stratification of sudden cardiac death using baroreflex sensitivity test in the era of MADIT II – yes or forget on stratification?

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Introduction: The results of large secondary, but mainly primary, preventive ICD studies on benefit of ICD implantation in prophylaxis of sudden cardiac death (SCD) have proved the benefit of ICD in patients with severe left ventricular dysfunction

without the need of further stratification. In praxis, this „empirical“ indication means an enormous financial burden on economics. That is why noninvasive methods enabling to prevent superfluous ICD implantation are still needed. Baroreflex sensitivity test (BST) is one of them.

Aim of this study was to evaluate whether BST can replace an invasive electrophysiology study (EPS) in stratification scheme.

Patients and methods: The group consisted of 74 patients (63 M/ /11 F, mean age 61 years). All patients were successfully resuscitated after documented VT/VF or with syncopes accompanied by nonsustained VT in history. Standard stratification was performed in patients (ECG, echocardiography, EPS). In case EPS was positive, also selective coronary angiography and eventual revascularization (PCI/CABG) was performed. Subsequently BST was performed.

Results: Sustained VT was induced in 46 patients. This group was significantly different from others (28) in EF (37 vs 50 %), ischemic heart diseases and MI (32 vs 16) and revascularization in history (17 vs 4) as well as BST value (5 vs 9 ms/mmHg) (all $p>0.05$). BST values were not related to other monitored parameters (univariant analysis, $r<0.3$). When confirming the relationship between pathological BST (<6 or <4 ms/mmHg) and sustained VT inducibility during EPS, this parameter showed a high positive predictive value (90 %) and a limited negative predictive value (61 %). Reduced EF <30 % (MADIT II criteria) predicts VT induction with 88 % positive predictive value and 68 % negative predictive value.

Summary: Reduced BST values showed a significant relation to the VT inducibility during EPS. Limited number of patients does not allow to definitely conclude whether this test can replace present gold standard – an invasive EPS.

ARRHYTHMIAS AND CARDIAC PACING

VDD- pacing in RVOT a IVS- novel pacing strategy with passive fixation pacing lead

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Background: Single-lead atrioventricular synchronous pacing system (VDD) using single-pass leads has been accepted as a therapeutic alternative for atrioventricular block with normal sinus node function. Standard VDD leads are primarily designed for right ventricular apical insertion (RVA), leads with active fixation are yet not available due to the electronic complexity. According to current knowledge the RVA pacing is may deteriorate cardiac function. VDD pacing in non-RVA localities could be an attractive alternative.

Aim: This study sought to determine clinical performance and short-/long-term safety of VDD pacing using non-apical right ventricular lead possitions including middle and upper interventricular septum or RVOT. 38 consecutive adults implanted with VDD pacemakers for AV block withe normal sinus node function were recruited. Patients were assigned to one of two implantation groups (group I: RVA VDD (23 pts) and group II: non-RVA VDD (15 pts)) according the site of the possition of the ventricular lead tip. Electrodes (Phymos 940; Medico, Solox SLX 65/13; Biotronik) were positioned randomly to RVA and non-RVA site. In each group, the P- and R-wave amplitudes were determined at implantation, predischarge, 1-month, 6-month and 1-year follow-up. At each follow-up visit ventricular treshold, P- and R-wave amplitude measurements were performed. Complications (loss of AV-synchrony, micro- and macrodislocations with the need for the lead repositioning and abnormal treshold increase) were recorded and compared among the groups.

Results: Both groups did not differ in their main characteristics (age: 70 vs 73 y, presence of comorbidities: coronary heart disease, arterial hypertension, ejection fraction. Only diabetes prevailed in the non-RVA group (30 % vs 13 %). There were no significant differencies among the ventricular tresholds and P-wave amplitudes measured throughout the study visits in both groups (all $p>0.05$). Atrial undersensing occured in the predischarge period in 1 patient from the non-RVA group, a lead reposition was performed. No micro- or macrodislocation occured in studied subjects during the follow-up. No other significant complications (pneumothorax, bleeding, infections) occured.

Conclusion: Non-apical VDD pacing is an effective strategy for treatment of patients with symptomatic AV block and normal sinonodal function. Our results suggest that this novel approach of VDD pacing is a viable and safe alternative to standard RV--apical VDD pacing in selected patients despite the passive design of the VDD leads.

ARRHYTHMIAS AND CARDIAC PACING

Atrial fibrillation – one year follow-up at Department of Internal Medicine of Kutna Hora Hospital

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Introduction: The author focused on one-year retrospective survey of atrial fibrillation (AF) patients treated at Department of Internal Medicine of a regional/district hospital. Atrial fibrillation occurred in 228 patients, i.e. in 8 % out of all hospitalised. Patients were older than 60 years in 83 %. Furthermore, the frequency of some causative factors and most common complications were monitored.

Results: In total, 2860 patients were hospitalised at Department of Internal Medicine of Kutna Hora Hospital in 2004. Atrial fibrillation occurred in 228 (8 %) patients. The mean age of the patients with the monitored diagnosis was 72.5 years, the youngest being 35, oldest 99 years. Paroxysmal AF was diagnosed in 35 patients (16 %), persistent AF in 86 patients (38 %) and permanent AF in 106 patients (46 %). AF can be provoked by several conditions. Hypokalemia was observed in 4 patients (2 %), sick sinus syndrome in 23 patients (10 %), thyroid dysfunction in 28 patients (12 %), chronic obstructive pulmonary disease in 46 patients (20 %) and mitral valve defect in 98 patients (43 %). When analysing the medical notes the following conditions were frequently observed: left-ventricular heart failure in 54 patients (24 %), edema of lower extremities in 56 patients (25 %), symptoms of embolic stroke in 38 patients (16 %). Atrial fibrillation was at our department treated as follows: rhythm control was indicated in 56 patients. Drugs used – Amiodaron in 25 patients, Propafenon in 31 patients. Rate control was applied in 135 patients. Betablockers were administered to 89 patients, digitalis to 106 patients, calcium channel blockers affecting the conductive system to 19 patients. The majority of patients received preventive treatment against CNS embolization. Anticoagulation was administered to 114 patients, antiaggregants to 90 patients.

Conclusion: Atrial fibrillation is the most often treated arrhythmia at our department. Its occurrence increases significantly with age, it is often accompanied by changes of mitral valve and chronic obstructive pulmonary disease. Most common complications are heart failure and embolic stroke.

ARRHYTHMIAS AND CARDIAC PACING

Electrophysiological findings in patients without documented arrhythmia prior to indication of catheter ablation

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Introduction: Catheter ablation (CA), leading with high success rate to curative treatment of tachyarrhythmia, has recently become a standard nonpharmacological therapeutic method. In majority of cases it is indicated on the basis of patients history clinical findings, and/or standard electrocardiogram (ECG) and/ /or documented arrhythmias.

In the majority of patients, ECG recording at the moment of symptoms, is the key finding. On the other hand the attempt to obtain it can lead to an unnecessary delay of effective treatment.

Patients and results: The authors analyzed a group of 402 patients, indicated within two years (2004–2005) for electrophysiology study (EPS) due to palpitations. In 37 (9.2 %) of them ECG was never documented at the moment of palpitations. From these 37 patients 9 (24.3 %) had negative EPS, in the remaining 28 patients (75.7 %) EPS revealed the cause of palpitations. In total 26 patients were successfully treated following the EPS with CA for proved paroxysms of atrioventricular nodal reentry tachycardia (n=22) or orthodromic atrioventricular reentry tachycardia (n=4).

Conclusion: The presented results indicate that in patients with history of palpitations, the predominant EPS finding is paroxysmal supraventricular tachycardia, which can be effectively treated by CA. Consequently the authors consider prolonged and pertinacious attempts to reveal the complaints on ECG as contrapositive.

ARRHYTHMIAS AND CARDIAC PACING

Catheter ablation of arrhythmic storm caused by polymorphic ventricular tachycardias in patients after myocardial infarction

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Introduction: Multiple runs of polymorphic ventricular tachycardias (VTs) leading to an arrhythmic storm is rare, but serious complication in patients after myocardial infarction. At least partially, the polymorphic VTs are triggered by monomorphic ventricular ectopy. The goal of the study was to analyze our initial experiences with mapping and catheter ablation in these patients.

Methods: We report 3 patients (2 women, mean age of 65±6 years) with arrhythmic storm caused by recurrent runs of polymorphic VTs that were triggered by monomorphic ventricular ectopy. All patients were after extensive anterior myocardial infarction (interval of 1, 1 and 23 months). Mean left ventricular ejection fraction was 23±2 %. The mapping was performed using electroanatomical mapping system (CARTO, BiosenseWebster) in all cases.

Results: All patients had frequent monomorphic ventricular ectopy that originated from the conduction system along the scar borderzone (anterior fascicle n=2, posterior fascicle n=1). Ablation of this ectopy acutely suppressed the VTs runs in all cases. No major procedural complications were observed. During the follow up one patient was free of all VTs, one patient had recurrence of arrhythmic storm after 6 months and underwent successful reablation and the last patient died of heart failure progression one week after the ablation procedure.

Conclusion: Frequent ectopic activity from the conduction system along the infarction borderzone may trigger multiple runs of polymorphic VTs. In such case, catheter ablation of the ectopy may successfully suppress the VTs.

ARRHYTHMIAS AND CARDIAC PACING

A complex assessment of the short-term effects of cardiac resynchronization therapy

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Introduction: Cardiac resynchronization therapy (CRT) is an established non-pharmacological therapy for advanced heart failure with electromechanical delay. Despite compelling evidence of the benefits of CRT a constantly troubling issue remains the lack of favorable response in about one-third of patients.

Aim: To assess the short-term effects of cardiac resynchronization therapy (CRT) in a prospective study.

Methods: In nineteen patients (mean age 67 years (44–77)) with heart failure (NYHA functional class II–III/IV, caused by dilated cardiomyopathy in 5 patients, ischemic heart disease in 12 patients and coincidence of both in 2 patients, QRS duration >150 ms) a biventricular system was implanted between August 2005 and August 2006 (CRT-ICD in 11 patients, CRT in 4 patients and upgrade of existing pacemaker in 4 patients). At baseline and 3 months after inclusion the following parameters were determined: NYHA class, quality of life measured by the Minnesota Living with Heart Failure questionnaire (MLHF), 6-min walking distance, echocardiography including inter- and intraventricular dyssynchrony, dP/dt and aortic outflow tract velocity time integral (VTI).

Results: After 3 months of cardiac resynchronization therapy NYHA class improved from 3 to 2, the Minnesota score decreased from 47.3 to 31.6 points ($p<0.05$), the 6-min walking distance increased from 375 m to 430 m ($p<0.05$). The left ventricular ejection fraction demonstrated a slight improvement (from 21.1 % to 23.9 %), mitral regurgitation improved from 2.58 to 2.02 grade, dP/dt increased from 337 mmHg/s to 780 mmHg/s ($p<0.001$), aortic outflow tract VTI increased from 12.2 cm to 14.5 cm ($p<0.001$). A difference was observed between patients with QRS duration >200 ms and QRS duration =200 ms in the Minnesota score (with QRS >200 ms the Minnesota score decreased from 47.4 to 30.4 points vs QRS =200 ms from 46.8 to 33.4 points) and 6-min walking distance (with QRS >200 ms 6-min walking distance increased from 351 m to 433 m vs. QRS =200 ms from 405 m to 417 m, $p<0.05$).

Conclusion: After 3 months of cardiac resynchronization therapy NYHA class, 6-min walking distance, quality of life and cardiac ultrasound parameters had improved in the majority of our patients.

ARRHYTHMIAS AND CARDIAC PACING

One-year mortality of CRT patients with sinus rhythm compared to atrial fibrillation

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Aim: The aim of study was to evaluate one-year mortality and the quality of life in patients with congestive heart failure (CHF) after receiving cardiac resynchronization therapy (CRT). We compared patients with sinus rhythm (SR) and atrial fibrillation (AF).

Study group and methods: Follow up of the quality of life in 1st-3rd-6th-12th month and the mortality in 12th month of CHF patients treated with CRT devices at the Department of Cardiology in The University Hospital in Brno within the years 2003–2006.

CRT devices received 74 patients with CHF, the mean age was 67±8 years, the mean left ventricular ejection fraction (LVEF) was 25 %, male patients 71.6 %. The mean follow up of the patients was 23±14 months.

9 patients (12.2 %) were in AF, 65 pts were in SR, of whom permanently in SR retained 59 pts (79.7 %) and AF developed in 6 pts (8.1 %) after receiving CRT.

Results: One-year mortality of patients with SR was 11.9 % (7 pts), of patients with AF was 11.1 % (1 pt) and of patients with newly developed AF after CRT implantation was 16.7 % (1 pt). The quality of life was considered by the NYHA class, the exertion tolaration and subjective qualification of the health performance of the patient himself. The best quality of life was found in the first month after the CRT implantation in all the patients.

Conclusions: The benefit from the CRT in CHF patients was confirmed by the one-year follow up. No significant differences were found between SR patients and permanent AF patients (p=NS) nor between SR patients and patients with newly developed AF (p=NS). The quality of life did not differ in the 1st month after the CRT implantation. The quality of life in SR patients vs AF patients was significantly better in 3rd, 6th and 12th month after the CRT implantation ($p<0.001$).

ARRHYTHMIAS AND CARDIAC PACING

Risk analysis in patients with WPW syndrome: comparison of transesophageal atrial pacing and electrophysiological study

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Objective: Patients with overt WPW syndrome (WPW), short R-R interval during atrial fibrillation (AF) and short refractory periods of accessory pathways (ERPAP) are at risk for sudden cardiac death (SCD). Aim of this study was to compare risk factors estimated during transesophageal atrial pacing (TAP) and invasive electrophysiological study (EPS).

Patients: Group consistent of 132 symptomatic pts (54 women), in the mean age 43.2±17.7 years, with overt WPW syndrome scheduled for accessory pathways ablation. Twelve pts from this group experienced aborted SCD due to AF to VF conversion.

Methods: Patients were studied by TAP and EPS to assess risk for SCD. Risk factors for malignant arrhythmia were: minimal R-R interval during AF≤250 msec (min. RR) and ERPAP ≤250 msec. Values gained during TAP and EPS were correlated. Risk for VF was estimated for pts with min. R–R≤250 msec. and ERPAP≤250 msec in comparison to patients with those values grater than 250 msec.

Results: TAP was performed in 125 pts, EPS in 132 pts. AF episodes were induced in 85 pts from TAP group (68 %) and 86 pts from EPS group (65.1 %). Correlations between values gained during TAP and EPS (min. RR and ERPAP) were highly significant r=0.99; p=0.0001. Risk for VF (95 % confidence limits) in pts with and without risk factors was estimated for TAP and EPS (Table).

Method	250 msec<min. RR≤250 msec	250 msec<ERPAP≤250 msec
TAP – risk for VF	1 : 5.0	1 : 6.3
EPS – risk for VF	1 : 5.1	1 : 6.3

Conclusion: Transesophageal atrial pacing is comparable with electrophysiological study in risk factors for SCD in patients with overt WPW syndrome. Transesophageal atrial pacing is a very simple test for selecting high risk patients with WPW syndrome who should be treated with transcatheter ablation of their accessory pathways.

ARRHYTHMIAS AND CARDIAC PACING

Optimal pacing site in right ventricle – electrophysiological view

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Introduction: Right apical pacing could have negative haemodynamic effect by lowering the systolic function of left ventricle. Therefore another optimal pacing sites in right ventricle are looked for.

The aim of this study is to compare electrophysiological charakteristics of pacing in the apex (RVA), outflow tract (RVOT) and mid part of interventricular septum (IVS) in the right ventricle.

Methods: In the group of 28 patients indicated for permanent pacing was done pacing from RVOT, RVA and IVS with registration of surface 12-lead ECG and intracardiac ECG (IECG). The width of QRS, time interval from the beginning of QRS to the beginning and the peak of IECG (Q–V) and morphological surface ECG criteria were evaluated in the group of patients without LBBB (18 pts) and with LBBB (10 pts)

Results: Pacing of IVS leads to significantly narrower QRS (148.3±12.7 ms) compare to RVA (170.8±17.7 ms) and RVOT (175.2±17.2 ms), p=0.002. This favourable effect of septal pacing was in the subgroup of pts with LBBB (QRS 150.6±15.4 ms), p= 0.03, too. In the subgroup of pts without LBBB was the smallest prolongation of QRS in IVS pacing compare to basal value (62.2±9.6 ms). In the subgroup with LBBB was the prolongation of QRS only 13.9±11.3 ms. Interval Q–V was significantly shorter in septal pacing (1.7±8.2 ms) than in RVOT (12.6±8.3 ms) and RVA pacing(13.0±9.4 ms), p= 0.003.

Conclusion: 1) In IVS pacing is the width of QRS significantly shorter compare to RVA nad RVOT. 2) The time interval Q–V in the site of pacing is significantly shorter in IVS. 3) Septal pacing shortened the duration of QRS not only in patients subgroup without LBBB but also in patients with LBBB, where is the difference in QRS width more expressed than in RVA and RVOT sites. 4) The signs of optimal localization are the morphology QR or Qr in lead I, R in lead II higher than in lead III and intracardiac electrogram –20 to +10 ms from the beginning of surface QRS.

ARRHYTHMIAS AND CARDIAC PACING

Occurrence of obstructive sleep apnea in patients examined for cardiac arrhythmias

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Introduction: Data exists in literature about incidence of cardiac arrhythmias in patients with obstructive sleep apnea (OSA). But there are only a few data available about the incidence of OSA in patients examined for cardiac arrhythmias.

Objectives: The aim of the study was to determine in a pilot project the occurrence of symptoms of OSA in patients examined for cardiac arrhythmias and subsequently polysomnographic examination in symptomatic patients to establish the diagnosis of OSA.

Patients and methods: 177 patients (82 men) mean age 59.31 years (59.79 male and 59.31 female), who underwent Holter monitoring due to a history of cardiac arrhythmias completed a questionnaire for primary symptoms of OSA. After evaluating the incidence of OSA symptoms in the first 100 patients the next 44 patients with at least two symptoms of OSA (19 men) were indicated for polysomnographic examination.

Results: High incidence of OSA symptoms was confirmed in a pilot project in patients examined due to history of cardiac arrhythmia, snoring reported 70 patients (39 men) i.e. 39.54 %, apnea 15 patients (9 men) i.e. 8.47 %, fatigue 80 patients (30 men) i.e. 45.19 %, microsleep 70 patients (27 men) i.e. 39.54 %. From 44 patients invited for examination only 14 came for the visit (6 men) i.e. 31.81 % indicated, in 3 patients (1 man) i.e. 21.4 % of examined OSA was confirmed.

Conclusion: High incidence of OSA symptoms was confirmed in patients examined for cardiac arrhythmias as well as high incidence of OSA confirmed with polysomnography. At the same time low interest of patients in OSA testing was proved, probably due to poor knowledge of the seriousness of the disease.

ARRHYTHMIAS AND CARDIAC PACING

Role of endomyocardial biopsy in patients with malignant ventricular arrhythmias

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Introduction: Malignant ventricular arrhythmias (sustained ventricular tachycardia and ventricular fibrillation) most often occur in patients with ischaemic heart disease and cardiomyopathies. In a specific group of patients the cause of ventricular arrhythmias can not be established by using conventional diagnostic methods (echocardiography, SKG).

Patients and methods: During 2005 – 2006 endomyocardial biopsy was performed at the Institute of Pathology, VÚSCH Košice in 11 patients with negative SKG, with no severe echocardiographic abnormalities (EF >45 %, without severe valvular defects) and with documented serious ventricular arrhythmias – following resuscitation for ventricular tachycardia/fibrillation and/or positive electrophysiologic testing in the sense of inducible sustained ventricular tachycardia/fibrillation.

Results: In 3 out of 11 examined patients (27 %) the pathologist detected a mild form of myocarditis with the recommendation of subsequent biopsy. The average age of patients with positive histology results was 26 years, all had normal echocardiographic and SKG findings. In 2 patients (with intolerable arrhythmias) ICD was implanted, in the third patient (with haemodynamicaly tolerable sustained ventricular tachycardia) treatment with amiodarone was effective.

Conclusion: In a part of patients with severe ventricular arrhythmias subclinical myocarditis can be histologically confirmed that may have significant influence on the long-term management of these patients.

ARRHYTHMIAS AND CARDIAC PACING

Treatment strategy for electrical storm in patients with implantable cardioverter defibrillator

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Introduction: Electrical storm (ES) is an afraid complication in patients with implantable cardioverter-defibrillator (ICD). One year incidence is 0.8–1.5 %. According to the most common definition it is the occurrence of more than 3 adequate discharges for ventricular tachycardia (VT) or ventricular fibrillation (VF) during 24 hours. The objective of this study is to provide an analysis of the reasons, incidence and therapeutic methods for ES in the environment of a specialized centre.

Patients and methods: During the years 2004 to 2006, 136 ICDs were implanted at our department, while ES with the need of 3 and more discharges in 24 hours occurred in this time period 12 times in 11 patients. The mean age in the study group was 62.5±14.5 years, there were 2 females and 9 men. After hospital admission, serial testing of cardiospecific enzymes, electrolyte levels and inflammation markers were performed. Patients with inadequate discharges were not included in to the study. If needed, subsequent programming of detection and therapeutic parameters was adjusted, in 3 patients the defibrillator was temporary inactivated to save the battery.

Results: Statistical analysis did not show differences in clinical characteristics of the primary group of patients with ES. In the majority of cases the induction cause was not documented. In all patients the condition was managed within 24 hours from first symptoms. Median number of discharges was 4 (range 3–11), average time from ICD implantation 174±211 days. Therapeutically hypokalemia correction was applied in 3 patients, betablocker dose increase in 1 patient and infusion of amiodarone in 4 patients.

Conclusion: ES represents an emergent and life-threatening clinical situation in patients with ICD. For successful management it is necessary to differentiate the substrate and the immediate cause of VT/VF. Adequate treatment must include withdrawal of aggravating medications, correction of electrolyte dysbalance, change of antiarrhytmic medication, antitachycardia stimulation and in necessary cases emergency catheter ablation, coronary intervention and surgery for ventricular dysrrhythmia.

ARRHYTHMIAS AND CARDIAC PACING

Efficacy of antiarrhythmic agents and RF-ablation in patients with symptomatic idiopathic ventricular ectopic beats

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Background: Antiarrhythmic agents (AA) are the first line therapy in patients with symptomatic ventricular ectopic beats (VEBs) and no organic heart disease. Beta-blockers are currently recommended as the initial treatment, however, prospective studies addressing this issue are lacking. Moreover, radiofrequency ablation seems to be very effective and safe in patietns with ineffective AA treatment.

Aims: Prospective evaluation of efficacy and tolerance of AA therapy and radiofrequency (RF) ablation in unselected, consecutive patients with frequent symptomatic idiopathic VEBs.

Methods: Prospective, cross-over, open-label study was performed in 73 consecutive patients (mean age: 49±16) with frequent (>2500/24 hr) symptomatic VEBs and no organic heart disease. Patients were treated for 2–3 weeks with propafenone (P), metoprolol (M) or verapamil (V), administered in a random order and titrated to a maximal tolerated dose. Responders were defined as those with a 90 % reduction of VEBs and no proarrhythmic effects during a 24-hr Holter ECG. Following AA-treatment, non-responders or patients with AA-intolerance were referred for RF ablation with conventional mapping.

Results: Based on ECG criteria and/or invasive electrophysiology findings, the majority of patients had VEBs originating from the right (RVOT, n=41) or left ventricular outflow tract (n=15). P was more effective than M or V (40 % vs 6 % and 14 %, p<0.01, respectively), however, treatment with P was associated with the highest rate of adverse effects (15% vs 5 % and 10 %). In 22 (30 %) patients at least one of tested AA (P=15, M=4, V=3) was effective and well-tolerated in long-term period. Patients who underwent RF ablation of arrhythmogenic focus had 84 % (28/33) long-term success rate (92 % in RVOT) with mean 1.2 RF sessions and no serious complications. In 2 patients epicardial aproach were used and in 6 patients radiofrequency aplications were delivered from left or non-coronary aortic cusps.

Conclusions: In patients with idiopathic VEBs propafenone is more effective than metoprolol or verapamil. Efficacy and safety of RF ablation should encourage the use of invasive approach in majority of symptomatic patients. However, randomized trials comparing the efficacy and cost-effectiveness of AA treatment and RF ablation are needed to establish the first line therapy in symptomatic idiopathic VEBs.

ARRHYTHMIAS AND CARDIAC PACING

Characteristics of mortality in long-term observation of patients treated with cardiac resynchronization pacing – should it always be accompanied by defibrillator?

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Background: CRT influence on reducing mortality has been shown recently by Companion and Care-HF studies. Prevention of sudden cardiac death in heart failure patients by adding ICD to CRT is spreading method. Aim of an analysis was to assess mortality and its characteristics in CRT-alone patients in at least one-year follow-up

Methods: Observational, multisite analysis of patients with CRT-alone systems implanted according to accepted indications. One year and more follow-up on mortality, mechanisms of death and accompanying clinical characteristics was performed.

Material: One year observation time since implantation has been achieved in 100 pts (17 F, 83 M), aged 60.2±9.6 (35–78). Baseline NYHA class was 3.2±0.4 (3–4). Ethiololgy of CHF was: CAD in 52 %, non-coronary DCM in 48 %. Contact was lost in 2 pts (1 F, 1 M).

Results: Mean time of observation was 725 days (360–1780) median: 625. There were 20 deaths (20.4 %): 5 SCD (25 %), 12 other cardio-vascular deaths – CVD (60 %) and 3 deaths of other reasons (15 %). 13 pts (65 %) died in first year of observation. Mean time to all deaths was 303±277 (19–960) days, mean time to CVD was 339±313 (19–960) days and to SCD – 208±127

(31–343) days. There was no difference (ns) between survival and all deaths groups in: EF (25±10 vs 20±8 %), 6-min walking test (276±166 vs 285±163 m) and peak VO_2 (12.7±3.6 vs 14.1±3.7 ml/kg/min), the only difference occurred in baseline LVEDD (71±9 vs 78±10 mm, p=0.05). SCD and CVD groups did not differ (ns) in age 62.0±5.4 vs 56.6±13.2; gender: 80 % M vs 83 % M, baseline NYHA class: 3.1±0.2 vs 3.5±0.3; EF 22±9 vs 17.5 %, LVEDD 86±10 vs 79±9 mm, 6-min walking test: 270±142 vs 292±188 m and peak VO_2: 14.8±0.3 vs 13.9±4.2 ml/kg/min. Among 5 SCD pts 4 were of non-coronary CHF ethiology while only one among 12 CVD pts (p=0,003).

Conclusions: Mortality in our CRT population was highest in first year of follow-up. Sudden deaths occured only within the first year of follow-up, majority of its victims were non-coronary patients. No other basic clinical characteristics were associated with higher risk of SCD. CRT population, despite of heart failure ethiology, should always require ICD therapy consideration.

ARRHYTHMIAS AND CARDIAC PACING

Ventricular repolarization parameters in patients with severe impairment of left ventricle after anterior myocardial infarction and different types of ventricular arrhythmias

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Background: QT interval is dependent on the sympathovagal balance, especially early repolarization – QT apex (QTa), while late repolarization - TapexTend (TeTe) reflects transmural dispersion. Several papers showed importance of these measurements in risk stratification of sudden cardiac death, especially in patients after myocardial infarction (MI).

The purpose of the study was to analyze what differences in repolarization parameters may be found in patients (pts) after anterior myocardial infarction with severe impairment of the left ventricle in regard to different types of ventricular arrhythmias.

The study population consisted of 95 pts with previous anterior MI (>30 days) with PVC, episodes of non-sustained ventricular tachycardia (nsVT), sustained VT (sVT) or documented ventricular fibrillation (VF). The cohort was divided into two groups: 50 pts without sVT or VF (No VT/VF) (39 males, 64±12 years, EF: 37±8 %) and 45 pts with sVT or VF (VT/VF) who underwent ICD implantation (35 males, 62±10 yrs, EF: 34±10 %). No true antiarrhythmics were used. QT, QTa and TaTe intervals were calculated beat-to-beat from 24h Holter recordings for daytime (D) (6 am–9 am and 2 pm–10 pm) and nighttime (N) (10 pm–6 am) periods. Parameters were corrected to the heart rate (HR) with Bazzet's formula.

Results: Groups did not differ in age, gender, EF and extent of coronary artery lesions. All repolarization indices were longer in VT/VF group (Tab. 1). No day-to-night differences were found in both study groups.

Tab. 1. QT parameters in study population.

	QT-D	QT-N	QTa-D	QTa-N	TaTe-D	TaTe-N
NoVT/VF	428±26	431±31	341±24	345±30	87±12	86±13
VT/VF	469±28	467±29	359±19	363±19	110±10	104±14
p value	<0.001	<0.001	<0.01	<0.01	<0.0001	<0.0001

All values are given in ms, corrected to the heart rate.

Conclusion: Early and late repolarization indices, especially TapexTend interval, are longer in VT/VF patients- both during day and night time periods of time. It may indicate greater transmural heterogeneity of this process what can be responsible for the presence of the malignant ventricular arrhythmias.

ARRHYTHMIAS AND CARDIAC PACING

Utilization of multi-polar mapping catheter Mesh Mapper in isolation of pulmonary veins

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Introduction: Isolation of pulmonary veins belongs to basic steps of catheter ablation for atrial fibrillation. The aim of this paper is presentation of our first experiences with mapping catheter Bard Mesh Mapper.

Group of the patients and methods: We used this catheter in 6 patients (5 men, 1 woman, mean age 53.8 years) within June and November 2006 so far. Symptomatic atrial fibrillation was the reason for the procedure in all of the patients. The endpoint of the procedure was segmental isolation of electrically active pulmonary veins. The procedure was performed conventionally. There were 2 catheters via double trans-septal puncture introduced into left atrium: ablation catheter and the mapping catheter Bard Mesh Mapper. This catheter is 8F wide, non-steerable. Mapping is enabled by the mesh structure of 32 circumferential electrodes which sense 32 uni- and/or bipolar signals. The diameter of this mesh structure is expandable in range 11–25 mm according to diameter of the targeted pulmonary vein. The electrode structure is coated by heparin.

Results: The overall procedure time was 294.2 minutes, the mean fluoroscopic time was 58.9 minutes. There were 18 pulmonary veins isolated (2.6 per patient). The complete isolation was achieved in all electrically active pulmonary veins. All of the patients were in sinus rhythm at the time of discharge, longer follow-up is not possible to evaluate yet. We have not had any significant complications during the procedures. There were transient ST elevations probably due to micro-embolism to RCA in 1 of the patients. There was transient disorder of vision probably due to micro-embolism to CNS in 1 of the patients. Both of the disorders were only temporary, recovered without any sequalae. We can not judge if there was direct relation to this catheter. There were difficulties with the mechanic handling of this catheter in 2 of the procedures.

Conclusion: Mapping catheter Bard Mesh Mapper could be an alternative to the other circumferential catheters which are being used for mapping of pulmonary veins. The procedure times and fluoroscopic times are comparable. To advantages we can count quality of signals, position stability in the ostium of pulmonary vein and the possibility of sizing according to the diameter of pulmonary vein. Non-steerability and probably higher risk of embolism belong to main disadvantages of this catheter.

ARRHYTHMIAS AND CARDIAC PACING

Atrial fibrillation complication in chlamydia myocarditis

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Aim of study: Presentation of the case of the patient with acute myocarditis with severe heart failure, atrial fibrillation with fast ventricular response and periferial embolization.

Case presentation: 41-years old man admitted to the cardiac ICU due to pulmonary oeodema and chest discomfort with deterioration soon after admission. Sever hypotension, tachypnoe, desaturation, ECG shows atrial fibrillation with ventricular response up to 170 BPM. On echocardiography there is several segmentar hypocontractility with global ejection fraction of LV 23 %. Laboratory investigasion showed no elevation of cardiospecific enzymes including troponin I. Patient were given Intravenous diuretics because of pulmonary eodema, digoxin for heart rate control, low molecular weight heparine, epinephrine and iv fluid. Patient was given as well amiodarone continious infusion. Iv infusion of levosimendan was given after stabilization of the blood pressure with the immidiate response and patients conditions has progressively improved. On ECG sinus rytm restored. Next day patients conditions suddenly deteriorated and there was left hemiparesis. Patient was examined by neurologist and immidiate CT scan of the brain was done which showed severe ischemia in PCA supply areas. The same day common femoral artery embolism confirmed by vascular-surgeon and embolectomy was done. Serology test showed elevation of chlamydia pneumonie antibodies which was treated previously by antibiotics. Another echocardiography investigation was done soon after patients conditions stabilized which

showed significant improvment of ejection fraction of LV almost by 15 %.

Conclusion: Restoration of sinus rytm in atrial fibrillation can have serious consequences for instance ischemic cerebral stroke. We do not have a big choice of the antiarytmics for controlling heart rate at patients with severe heart failure.

ARRHYTHMIAS AND CARDIAC PACING

Post long pause overdrive pacing, a new algorithm for the prevention of early recurrences of atrial fibrillation

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Introduction: Early recurrence of atrial fibrillation has been defined as a recurrence of atrial fibrillation within 10 minutes after termination of the preceding episode. Effective overdrive pacing of the atrium may prevent early recurrences.

Methods: The Post Long pause Overdrive Pacing clinical research study was designed to test the efficacy of the PLOP feature in 60 randomized patients with a documented history of paroxyzmal AF. Unlike the conventional algorithms, PLOP is activated when episode termination is first expected (as indicated by one or more consecutive long pauses), even if not yet confirmed by the device detection algorithm. Patients were randomized to periods of 3 months of either PLOP programmed ON or OFF, and were crossed over to the other treatment arm after the appropriate follow-up period.

Results: 36 Patients have complete paired data. Three patients developed persistent AF, 2 during PLOP off and 1 during PLOP on, and another patient's medication was significantly changed in the course of the study. These 4 patients were excluded from the analysis. 16/32 patients had more than 5 early recurrences per week during the off phase. PLOP significantly reduced the median number of ERAF 32 during PLOP off compared to 21 during PLOP on (p=0.049, Wilcoxon). However, PLOP had no significant effect on the median number of weekly episodes: 43 during PLOP off compared to 32 during PLOP on (p=NS). The burden (median hours in AF per week), on the other hand, did show a trend towards a reduction being 31 during PLOP off compared to 16 during PLOP on (p=0.077, one-sided T-test after log Transformation). In the whole patient population PLOP did not affect the median number of weekly episodes and early recurrences was 11.8 and 4.4 respectively during PLOP off, compared to 10.0 and 4.9 during PLOP on (p=NS).

Conclusion: These preliminary results indicate that the PLOP algorithm reduces early recurrences of AT/AF in patients that suffer from ERAF, but has no effect on total number of episodes. PLOP has a trend towards lower AF burden.

ARRHYTHMIAS AND CARDIAC PACING

Sudden cardiac death in children and adolescents

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Sudden heart death (SCD) in childhood is rare, but always represents the worst nightmire for every parents. About 50 % of sudden death cases are constituted by known disorders (epilepsy, asthma, cardiovascular disease). In 30 % of cases, the cause is detected during autopsy, and the remaining percentage stays unexplained. The incidence of SCD is reported in 0.8 – 6.2/100 000 individuals. There exist great geographical differences in the causes for SCDs, and there are significant differences in sex and races.

Cardial causes of the sudden death can be classified into the following categories: 1) cases after operations congenital heart

disease (after repair of transposition of the great arteries – Mustard and Senning operation, tetralogy of Fallot, etc.), 2) structural heart disease (congenital heart disease, hypertrophic cardiomyopathy, tumours), 3) gained disorder (myokarditis, commotio of the heart, Kawasaki disease, etc.), 4) primary arrhytmias (av block, Long QT syndrome, WPW syndrome, Brugada syndrome, etc.).

The rist of SCD can be reduced through one of the following approaches: a correct and timely diagnostics of congenital heart disease (CHD), by adequate care for children after CHD operation, by correct assessment of haemodynamics and indication of apropriate reoperation plus correct risk stratification in endangered individuals. Further important contributors to the SCD risk decrease are: correct care for so far not operated patients with CHD, correct risk stratification in patients with primary arrhytmias, adequate treatment plus ICD implantation. Also, preventive cardioloty examination of members of all families with documented, reported or anticipated generic cause. A detailed history and physical investigation are always necessary. The yields of other investigations are questionable.

In spite of all taken measures and preventive steps, we are not able to totally eliminate SCD cases in children and adolescents.

ARRHYTHMIAS AND CARDIAC PACING

Real-time dominant frequency mapping of atrial fibrillation - feasibility study

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Purpose: Analysis of local dominant frequency of atrial fibrillation (AF) identifies the sites of high-frequency activity with acceptable temporal and spacial stability that represent the substrate for arrhythmia perpetuation.

Methods: We developed a system that analyzes bipolar mapping signal sampled at 1 kHz, digitally filtered (infinite impulse response, high-pass 30–40 Hz), and rectified. Obtained signal envelope is processed by discrete Fourier transform applied to 3 Hanning-weighted 1-second segments with 50 % overlap. Dominant frequency (DF) is calculated by autocorrelation function (inverse Fourier transform) in order to suppress the impact of higher harmonic spectral components. The system detects QRS complexes as reference and generates voltage impulses with the delay relative to QRS reference and proportional to the instantaneous value of DF. This artificial signal is fed into the CARTO system (Biosense Webster) as a bogus intracardiac lead that is manually annotated during left atrial mapping. In such way, colour-coded electroanatomical map of DF is directly created.

Results: We investigated 10 patients with paroxyzmal/persistent AF. In agreement with previous studies, we documented hierarchical distribution of DF reflecting one or more left atrium mother rotors. In case of paroxyzmal AF, single driver within a pulmonary vein antrum was usually identified with centrifugal DF gradient (Figure). In persistent AF, we observed more disperse distribution of sites with high-frequency activity with predilection at interatrial septum.

Conclusions: Real-time dominant frequency mapping of atrial fibrillation is technically feasible. This may have a practical value for guiding the RF ablation of arrhythmogenic substrate, particularly in persistent AF.