GENDERING CARDIOLOGY: IS SCIENCE THE KISS OF DEATH FOR A FEMALE DOCTOR'S CAREER?

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There are thousands of articles on sexual differences and sexual bias in cardiology. To improve the number and career of female doctors in cardiology would hopefully help to gender cardiology. At the Innsbruck Medical University in 2000 female enrollment surpassed male.
A survey at the Innsbruck University clinics in 2002 used standardised anonymous questionnaires. Of the female doctors, 271(77.0%) participated in the survey: 176(65.0%) in training, 95(35.0%) specialists. Mean age: 35.7a. A very important motive for having studied medicine was wanting to work with people (81.9%), wanting to help people (53.1%), scientific career 15.9%. Only 4.1% of the respondents had acquired venia docendi, 10.7% were working toward it. Future plans: remain at the university clinics (49.9%), have own practice (23.2%). No respondent aimed for a position as head of a clinical department of a non-university or university hospital. Despite this no future scenario 81.9% would study medicine again!
Does the desire of female doctors to work with people, namely to care for patients, preclude a leading departmental position and help gendering cardiology? The typical leading departmental career for medical doctors is predominantly based on scientific achievement, namely the major hurdle for women. Do the efforts to keep women at the university hospitals beyond their training and to help them up the career ladder mean, that we will reach gender medicine goals in cardiology?

NEUROHORMONES AND INFLAMMATORY MARKERS IN CARDIAC RESYNCHRONIZATION THERAPY

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Purpose To evaluate the effects of cardiac resynchronization therapy (CRT) on certain neurohormones (brain natriuretic peptide- BNP and endothelin 1- E1) and inflammatory markers (high sensitivity C reactive protein- hsCRP and interleukin 6- IL6).
Methods We enrolled 12 patients (11 male, mean age 61.2±10.3 years), with congestive heart failure (4 in NYHA class II and 8 in NYHA class IV, mean LVEF 23.7±6.7%) who met the electrocardiographic and echocardiographic criteria for CRT device implantation. All patients underwent 6-minute walking test before and one month after implantation. Blood samples were collected before CRT implantation, after two days, and after 1 month. Levels of BNP, E1, hsCRP, and IL6 were assessed by ELISA technique.
Results The mean walking capacity was increased significantly from 134±129 to 336.2±163.8 steps after implantation. BNP levels were increased significantly after implantation and remained high for one month. E1 levels were decreased significantly after implantation but were elevated significantly after one month. The inflammatory markers were increased significantly and remained elevated after one month.

Table

	BNP	E1	hsCRP	IL6
Before CRT	453±256	5.3±1.7	1.3±1.8	19.8±21.3
After 2 days	571.8±316.8	4.0±2.0	2.6±2.0	11.0±11.9
After 1 month	572±335.5	4.9±2.0	2.5±1.8	11.7±13.8

Conclusions CRT implantation resulted in improvement in exercise capacity, but not in neurohormonal or inflammatory markers.

INTER AND INTRACARDIAC SYNCHRONIZATION OF A HETEROTOPIC HEART TRANPLANT PERFORMED BY A CRT-D DEVICE

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Biventricular pacing is a valid tool in the management of heart failure with systolic dysfunction associated with mechanical and electrical asynchrony.
We would like to describe the attempt of an inter- and intra-cardiac resynchronization in a patient with heterotopic heart transplant.
A 64-years old male had suffered from non-ischemic dilated cardiomyopathy.
In 1998, after a relapse of heart failure, he underwent to heterotopic heart transplant.
A progressive worsening of his hemodynamic status, with dyspnoea during mild effort, began in 2003.
In May 2004 he was admitted in intensive care unit because of congestive heart failure and ventricular fibrillation of the native heart. The arrhythmia recurred several times, and was repeatedly treated by biphasic DC shock 150 J. A permanent atrial fibrillation was the rhythm of the native heart.
Therefore a biventricular high energy ICD was implanted: the objective was a rapid interruption of the episodes of ventricular fibrillation, resynchronization of the activation pattern of the native heart, and to avoid hemodynamic deterioration and cardiac failure.
The atrial lead was actively fixed in the right atrium of the transplanted heart, RV and LV leads respectively were positioned in the right ventricle and in a lateral branch of coronaric sinus of native heart. The device was programmed in DDD mode to allow the sequential activation of the atrium of the heterotopic heart and the ventricle of the native heart. Echo-guided optimization of A-V delay was performed, according to the highest cardiac output (PW integral-area method).
Because an elevated shock threshold, a SQ Array device was implanted.
In the 2 following months no episodes of sustained ventricular tachycardia were recorded.
To our knowledge, this is the first case of inter- and intra-cardiac synchronization of an heterotopic heart transplant performed by a CRT-D device.

PREDICTORS OF THE LONG-TERM EFFECT OF CARDIAC RESYNCHRONIZATION THERAPY

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Cardiac resynchronization therapy (CRT) has been shown to improve quality of life, reduce heart failure symptoms, need for hospitalizations and mortality in short and long observations. The aim of the study was to find the predictors of long term improvement during cardiac resynchronization therapy. Methods: 47 patients (aged 39-83 years; mean 68,6; 78,7% males) with CRT were followed-up for 2 years after implantation. Baseline characteristics: LVEF 18-40% (mean 29,19; SD 4,88); LVEDd 7,04cm (SD 0,93); mitral regurgitation (MR) area 7,07cm2 (SD 3,90); QRS 170,74ms (SD 33,57), non-ischemic cardiomyopathy 30%, chronic AF 15%, upgrade from RV pacing 28%. During 2 years follow-up, mean LVEF increased to 33,12% (p<0,001);

LVEDd decreased to 6,53cm (p<0,001); MR area decreased to 3,36 cm2 (P<0,001). We searched for predictors of the improvement of LVEF among fifty variables. The following characteristics correlated with the change of LVEF during 2 years of CRT in the univariate analysis: baseline QRS duration > 150ms [as a categorical variable] (R=0,29; p=0,04), LVEF<30% [categorical variable] (R=0,51; p<0,001), LVEF% (R=-0,41; p<0,01) and pulmonary artery ejection time (R=-0,37; p=0,045). In the multivariate analysis the independent factors were: LVEF<30% (partial correlation = 0,51; p<0,01) and pulmonary artery ejection time (partial correlation = -0,44; p<0,05). Presence of non-ischemic cardiomyopathy and QRS>150ms contributed to the multivariate model on a p-level <0,06. Conclusions. CRT improves LVEF in long-term observation. We found that LVEF<30% and short pulmonary artery ejection time were predictors of a favorable remote effect of CRT on left ventricular EF.

PLASMA LEVEL OF BRAIN NATRIURETIC PEPTIDE AS A PARAMETER OF RESPONSE TO CARDIAC RESYNCHRONIZATION THERAPY

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Purpose Plasma levels of Brain Natriuretic Peptide (BNP) are elevated in patients with heart failure and it could be a useful parameter for monitoring the response to cardiac resynchronization therapy (CRT). The aim was to evaluate the significance of BNP levels as marker for monitoring the response of CRT.
Methods A group of 30 patients with cardiomyopathy, mean age 65±12, left bundle branch block, EFLV less than 35% underwent CRT. At the baseline and 18 months after the CRT we recorded plasma levels of BNP(ng/l), NYHA class, EFLV and six-minutes walk test. Based on the NYHA class improvement >=I patients were divided in two groups (responders and non-responders).
Results There were 22 responders and 8 non-responders to CRT. At the baseline there were no difference between those groups (p>0.1) in NYHA class and after CRT significant difference occurred (p<0.001). Pre-implant BNP level was 280.19±189.00 in responders group and 312.46±164.65 in non-responders group (p>0.1). At the follow up BNP level was 127.99±107.59 for responders and 446.00±201.00 for non-responders (p<0.001). Performance of six-minutes walk test pre-implant was 220.81±85.0.7m in the first group and 168.75±84.17m (p>0.1). After CRT the performance was 384.50±122.20 for responders and 187.00±122.00 for non-responders. The echocardiography response (defined as absolute increase in EFLV >5%) has occurred in 67% of patients after CRT. Also reduction of plasma BNP levels after CRT is correlating with good clinical response (improvement NYHA class >I) and performance of six-minutes walk test (p<0.001).
Conclusion We observed a good agreement between the decrease of plasma BNP level and clinical response to CRT and to echocardiography as well. The echocardiography was lower. Still the level of BNP stands as a reliable parameter of response to CRT.

USEFULNESS OF IEGM IN CRT-D NON-RESPONDERS PATIENTS

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Background The optimization of the atrium and ventricle relationship is the most important clinical prerequisite for the optimal result of a biventricular pacing system. This prerequisite is absent in patients affected by atrial fibrillation. An effective system to obviate this problem is undergoing patients with heart failure due to tachyarrhythmic atrial fibrillation, not responsive to the arranged antiarrhythmic therapy, to atrioventricular node ablation. After this procedure a CRT device implantation is necessary to reach a cardiac resynchronization.
Sometimes the benefit of these arranged procedures, although is immediately evident, is not confirmed during time. Such patients enter in the so called Non Responders group. We evaluated what role could have the intracardiac electrogram recording, implemented in CRT devices, in the identification of this patients.
Materials and Methods We evaluated fifteen patients (10 males and 5 females; mean age 71,2 ± 5,8 years), affected by high degree congestive heart failure, implanted with a CRT-D Epic HF and Atlas +HF (St. Jude Medical Inc.) and undergone to AV node ablation.
This procedure has been carried out previously or during CRT-D system implantation and its success has been estimated in acute phase.
Results In the subsequent follow-up visits, 3 patients were defined non-responders.
The IEGM evaluation in these 3 patients allowed to identify episodes of tachyarrhythmic atrial fibrillation, in two cases completely asymptomatic, and to confirm the ablation procedure failure.
Conclusions This experience demonstrates how various the CRT non responders population is.
In this particular patient group the IEGM reading plays a fundamental role because it has diagnosed relapsing AF, asymptomatic and able to reduce the effectiveness of biventricular stimulation.
The IEGM reading, well integrated with the device diagnostic data allows an electrical therapy optimization and in addiction it is able to supply further therapeutic indications so, reaching the final result of a reduction of the number of non responders.

RELIABILITY AND ACCURACY OF TRANSVALVULAR IMPEDANCE (TVI) RECORDING IN SEPTAL POSITION

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Transvalvular impedance (TVI) is detected with conventional pacing leads in dual-chamber pacing systems, by application of subthreshold current pulses of automatically adapted amplitude between atrial and ventricular electrodes. Previous studies indicate that minimum diastolic and maximum systolic TVI values can reflect, respectively, ventricular preload and telesystolic volume. Therefore, the TVI sensor has been proposed as a new tool for permanent hemodynamic monitoring of pacemaker patients. However, all available information on TVI is referred to implants in ventricular apex, while alternative pacing sites are now suggested to minimize stimulation-induced ventricular desynchronization. We report on the first case of TVI recording by screw-in leads (model 350, Medico, Italy) placed in right-atrial appendage and interventricular septum, at the implantation of a pacemaker provided with TVI sensor (Sophòs 151, Medico, Italy). TVI waveform was detected between the atrial ring and either ventricular ring or tip electrodes. In both configurations, the signal showed the same essential features as described in RV apex: i.e., TVI decreased in two steps corresponding to passive and active ventricular filling and increased after R-wave detection or ventricular stimulation, reaching the maximum peak at the end of the T-wave. The rising phase comprised an early high-slope component followed by a slower progressive increase, which might be related to blood ejection. During VDD pacing with 150 ms AV delay (fully evoked QRS), diastolic TVI was 372 +/- 3 and 420 +/- 5 Ohm, and systolic TVI was 429 +/- 2 and 457 +/- 3 Ohm, in ring-ring and ring-tip TVI configuration, respectively. The larger impedance excursion with ring-ring TVI was essentially due to a more prominent fast component. Our preliminary observations suggest that TVI recorded at RV septum as

well as RV apex reflects mechanical ventricular activity and can be proposed as an implantable monitor of cardiac hemodynamic performance.

TRANS-VALVULAR IMPEDANCE IN THE ASSESSMENT OF PACING-INDUCED INTERVENTRICULAR DESYNCHRONIZATION

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Right-sided ventricular pacing (RV pacing) can impair ventricular synchronization and affect hemodynamic efficiency to various degree. At present, assessing the impact of ventricular stimulation in each patient requires time-consuming echocardiographic evaluation. Our study is testing whether the trans-valvular impedance (TVI) signal can be proposed as a routine alternative in the clinical setting. The time elapsed between pulmonary and aortic valve opening (Po-Ao) and between basal septum and lateral wall activation (IVS-LW) has been measured by Doppler echocardiography in 3 patients implanted with the pacemaker Sophòs 151 (Medico, Padova, Italy), a DDD-R device equipped with the TVI sensor. Pacing leads were positioned in right atrial appendage and RV apex. The Po-Ao interval was 10, 15 and –14 ms under intrinsic AV conduction (the latter case presented with RBBB) and changed to 14, 6 and 53 ms, respectively, during VDD pacing with 80 ms AV delay. The IVS-LW interval was 14, –7, 0 ms with intrinsic conduction and 21, 0, 28 ms with RV-pacing. TVI waveform is related to RV mechanical activity and volume changes, as TVI rises throughout the QT interval. Indeed, the time difference between Po and TVI onset (Po-TVIon) and between end of pulmonary flow and maximum TVI peak (Pc-TVIpk) was limited to 30±12 ms and 12±24 ms, respectively, during intrinsic conduction. RV-pacing anticipated the TVI signal, as both Po-TVIon and Pc-TVIpk intervals were reversed (–35±22 ms and –59±11 ms, respectively). TVI waveform and peak-peak amplitude were little affected in the two patients showing no desynchronization during RV-pacing, while the amplitude was reduced by 15% and the signal broken in 3 peaks in the patient where RV-pacing substantially prolonged the Po-Ao interval. These preliminary results confirm the hemodynamic interpretation of the TVI signal and support its use in the evaluation of RV-pacing effects on ventricular mechanics.

DETERMINATION OF OPTIMAL AV DELAY BY SERIAL LVDP/DT MEASUREMENT COMPARED TO CALCULATION BY INDIVIDUAL INTERATRIAL CONDUCTION AND LEFT HEART ELECTROMECHANICAL TIME INTERVALS

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Ritters approach to calculate optimal AV delay (AVD) in AV block pacing could be utilized in simultaneous biventricular pacing if pitfalls of the method can be exluded. Therefore, we calculated optimal AV delay by noninvasively measuring, separately, individual interatrial conduction (IACT) and electromechanical time intervals (EMT) using optimal AVD = IACT + EMT.

Aims To compare noninvasive AVD calculation by invasive serial LVdp/dt measurements.

Methods: After implantation of biventricular DDD systems in 23 congestive heart failure (CHF) patients, left ventricular pressure was recorded invasively to determine hemodynamically optimal AV and VV delay for VDD pacing by maximal LVdp/dt. Using echo device, we performed simultaneous recordings of transmitral flow (TMF) and oesophageal left atrial electrogram (LAE). IACT was measured in LAE. To determine EMT from LAE and TMF, conditions of non-physiologically short and long AVDs were individually defined programming AVD duration of about IACT-20ms and IACT+150ms, resp..

Results LVdp/dt resulted in optimal AV and VV delay for VDD pacing in 21 of the 23 pts. Echo and LAE provided IACTs and optimal AVD for VDD and DDD pacing in all patients. Concerning optimal AVD, we found significant correlation (p=0,01) with differences of 10,3±19,9ms between both methods, at mean. In 14 of the 21 patients, the deviation was within the measuring accuracy of the LVdp/dt measurements of ±20ms.

Conclusion 1. In CHF patients, resulting optimal AV delays in VDD operation were comparable between both methods. Thus, 2. Pitfalls of AV delay calculation by echo can be avoided in CHF pacing by measuring individual IACTs.

WHEN TIME IS A GAIN IN CARDIAC OUTPUT: A PRELIMINARY EXPERIENCE IN OUTPATIENTS CRT SETTING

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Purpose CRT (cardiac resynchronization therapy) has becoming the best available therapy in advanced heart failure syndrome. The purpose of this study is to determine if optimization of V-V offset in sequential biventricular pacing (BP) may reduce LV dyssynchrony and improve LV function.

Methods echo-TDI, strain and doppler analysis were performed in 20 pts after CRT device implant. We tested 3 predetermined configurations of ventricular pacing (LV-RV offset 0 ms, -40 ms, +40 ms).The images were digitized and computer-analyzed off-line (EchoPac, GE). Intra-ventricular electromechanical delay obtained by color-coded time to peak TDI velocities (Tp) and by strain analysis (Sr) were calculated in each configuration. Cardiac output (CO) was determined as a mean of 3 consecutive measures on the basis of PW integral-area method. For each pt the BP was optimized according to the highest CO (group A). The group B included the configuration, for each pt, corresponding to the lowest CO. Results: varying pacing configuration, we obtain a significant improving in CO (5,13 ± 1,33 L/min Vs. 4,37 ± 1,16 L/min, p <0,001), with a optimal overlap between septal and lateral wall TDI curves (Tp:50 ± 44 msec Vs. 74 ± 45 msec, p= 0,01), and a positive trend as regard strain analysis (80 ± 67 msec Vs. 113 ± 57 msec, p=0,17). The mean increase of CO for each pt is 18,2%. Thereafter we find a correlation between CO and absolute septal TDI peak velocity (r=0,4, p<0,001).

Conclusions intra-ventricular LV dyssynchrony leads to a worsening in hemodynamic status in HF patients. Sequential CRT offers the exciting chance to reduce the asynchrony burden and to determine LV reverse remodeling, and long-term benefits. US-guided CRT optimization reduce the degree of dyssynchrony with an increase in CO; as a consequence we expect a reduction of the number of non-responders.

SHORT-TERM EFFECTS OF BIVENTRICULAR PACING ON ELECTROCARDIOGRAPHIC AND VECTORCARDIOGRAPHIC DESCRIPTORS OF VENTRICULAR DEPOLARIZATION AND REPOLARIZATION

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Aim To assess the short term effects of BiV pacing on ECG and VCG descriptors of ventricular depolarization and repolarization in a population of HF patients fulfilling the current criteria for cardiac resynchronization therapy.
Methods We studied 29 consecutively recruited HF patients (26 males/3 females, mean age 68±1.1 years) who underwent successful implantation of a BiV device. Etiology of HF was ischemic in 22 patients and non-ischemic in 7 patients. All study patients underwent one 12-lead digital ECG before implantation (before) and one 30 days later (after). The maximum and minimum QT intervals, their difference (QTd), the maximum and minimum QRS duration, their difference (QRSd), heart rate and the VCG descriptors spatial T amplitude, spatial QRS amplitude and spatial QRS-T angle, were calculated for each of the two ECGs.
Results Maximum QT interval was significantly decreased (before: 505±8 ms vs after: 482±10 ms, p =0.015), whereas the minimum QT interval (before: 436±7 ms vs after: 419±8 ms, p =0.053) and QTd (before: 68±3 ms vs after: 62±7 ms, p =0.158) did not differ between the two ECGs. Maximum QRS duration (before: 209±8 ms vs after: 176±10 ms, p <0.001) and minimum QRS duration (before: 145±6 ms vs after: 122±7 ms, p =0.001) were significantly decreased, while QRSd showed only a trend towards lower values after the implantation of the BiV device. The spatial T amplitude (before: 489±67 microV vs after:348±35 microV, p 0.048) and the spatial QRS amplitude (before: 1654±147 microV vs after: 1398±176 microV) showed a trend towards lower values, while the spatial QRS-T angle (before: 16±3 degrees vs after: 16±2 degrees) was not altered.
Conclusions Improvement or no alteration of ECG and VCG descriptors of ventricular depolarization and repolarization was demonstrated one month after successful implantation of a BiV device in patients with advanced HF

BIVENTRICULAR ICD INSERTION IN THE PRESENCE OF SUPERIOR VENA CAVA FILTER

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A 65-y/o female presented with non-ischemic dilated cardiomyopathy and heart failure refractory to optimal medical treatment. She was referred for cardiac resynchronization therapy, based on the presence of left ventricular ejection fraction <20% and left bundle branch block. The patient had a remote history of deep venous thrombosis of the right upper extremity, and her preoperative radiograph showed the presence of a superior vena cava filter. For this reason, a selective contrast injection was performed prior to device insertion from the right internal jugular vein. This documented patency of the vena cava, with no apparent filter thrombosis. Patency of the left subclavian vein was also assessed by contrast injection through an ipsilateral antecubital vein. Following this, the left subclavian vein was easily accessed using an extrathoracic approach, and three guidewires were advanced to the high right atrium under fluoroscopic guidance. Lead positioning was performed successfully and without any difficulty. The patient had an uneventful post-operative course and experienced immediate symptomatic improvement. At six-month follow-up, she was in NYHA functional class I, with appropriate biventricular pacing.
This case report has several unusual features. Filter placement for upper extremity deep venous thrombosis is rarely performed. Second, there are no reports of catheter manipulation for electrophysiology study or device insertion in patients with such filters. Only one previous study (Sinha SK et al, Heart Rhythm 2005;2:15-8) demonstrated the feasibility of electrophysiology studies through a femoral venous approach in five patients with inferior vena cava filters. One limitation of that study was the potential underdiagnosis of filter thrombosis, due to the lack of imaging prior to catheter insertion. In our patient, the venograms obtained before catheter advancement excluded filter thrombosis. This report suggests that device implantation may be safely performed in patients with caval filters, who have a strong clinical indication for such procedures.

USE OF A RETAINED GUIDEWIRE TO IMPROVE THE LEFT VENTRICULAR PACING THRESHOLD DURING CARDIAC RESYNCHRONIZATION THERAPY

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INTRODUCTION Although transvenous access has simplified left ventricular (LV)pacing, achieving satisfactory pacing positions can remain time-consuming, resulting in unacceptable pacing thresholds and failure to capture or phrenic nerve stimulation. We report use of retained guidewire to improve LV pacing threshold and facilitate satisfactory cardiac resynchronization therapy (CRT) pacing.
CASE REPORT A 71 year old man underwent CRT pacing with ICD implant for poorly controlled heart failure and non-sustained ventricular tachycardia. He had paucity of veins in postero-lateral territory, cannulating which proved very difficult but was achieved using intra-coronary nitrate. It was not possible to capture the ventricle in either cannulated vein(threshold >7.5volts). We postulated whether extending guidewire from the end of pacing catheter might improve surface area for stimulation and lower pacing threshold. Doing this dropped the threshold from 7.5volts to 0.7volts, but we were uncertain of the long-term performance. The pacemaker company (Biotronik) had no data as this had never been done before. However this technique has been used previously to improve lead stability, so long-term safety wasn't a concern. We proceded with this approach with patient's consent. The guidewire was advanced approximately 1cm from tip of pacing lead to a point that gave us best threshold and stability. Top end of guidewire was cut level with end of pacing lead which was screwed into the header of pacemaker, trapping and fixing the top end of guidewire. Final lead positions were very satisfactory(LV lead threshold 0.7volts, R wave 31millivolts). QRS reduced from 164milliseconds to 126milliseconds in biventricular pacing. Defibrillation threshold was <6joules.It is now over 1 year since implant, leading to significant symptomatic improvement in heart failure. Chronic threshold of LV lead has settled at 1.3volts and been stable, with no complications from the implant.
CONCLUSION Using a retained guidewire extended from the end of LV pacing lead, can be employed to improve pacing thresholds.

PERCUTANEOUS ANGIOPLASTY OF THE LATERAL BRANCH OF THE CORONARY SINUS FACILITATING LV LEAD IMPLANTATION

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A 72-year-old lady with a standard VDD pacemaker implanted in 2001 due to repetitive syncope and documented infra-His block dur-

ing electrophysiology was admitted at our institution because of malignant ventricular arrhythmias and severe congestive heart failure despite optimal pharmacotherapy. Biventricular (BiV) ICD system could not be implanted at the site of previous implant because of narrowing and occlusion of the left subclavian vein as documented during angiography. Therefore, we decided to implant the BiV ICD contralaterally. The only suitable lateral branch of the coronary sinus was depicted during CS angiogram, but this particular branch had 80% stenosis in its mid portion, which prevented the insertion of the LV pacing lead (Attain OTW model, Easy Track 2 model). After percutaneous angioplasty of the stenosis, the lead finally entered into the distal part of the branch, ensuring the desired stability and optimal threshold and sensing parameters.

Discussion The anatomy of the coronary sinus and its branches is now practically the only limiting factor for a successful BiV implantation. The success rate achieves 97.3% in our series of 150 patients implanted during since 1/2003. When the target branch is small and tiny, the most used approach is implantation of an epicardial lead via limited left lateral thoracotomy. If the diameter of the target branch is satisfactory, then a significant stenosis can prevent successful implantation. Such a frustrating situation can be overcome by a balloon dilatation of the stenosis as documented in our case. In our series of 150 patients we used this method successfully three times.

SYSTOLIC DYSSYNCHRONY INDEX AT 3D REAL TIME ECHOCARDIOGRAPHY CORRELATES WITH LEFT VENTRICULAR EJECTION FRACTION IN PREVIOUS MYOCARDIAL INFARCTION AND IN CONTROLS

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Background Mechanical asynchrony (MA) is a major observation in patients with heart failure and is a therapeutic target in resynchronisation therapy. Real time 3D Echocardiography (RT3DE) is a novel technique which provides qualitative and quantitative assessment of MA by measuring the Systolic Dyssynchrony Index (SDI), which is defined as the standard deviation of the time for the 16 segments to reach their minimum. No data exist on the relation between MA at 3D echo and EF in patients with previous myocardial infarction

Aim To investigate in patients with previous myocardial infarction (MI) and in controls correlation between mechanical asynchrony expressed as SDI at RT3DE and left ventricular ejection fraction (LVEF) at rest.

Methods 48 consecutive pts were recruited, 18 with previous MI (group 1) mean age 69 + 11 and 30 controls with normal LV function, (group 2), mean age 60+12. RT3DE scanning was performed using the Philips ie 33 and analyzed offline with QLAB to produce time-volume curves. Systolic dyssynchrony index was derived from the dispersion of time to minimum regional volume for all 16 segments.

Results SDI correlate negatively with LVEF in all patients (p=0.04, r= -0.57), both in patients with previous MI (p=0.03, r= -0.61 n= 18), and in controls (p=0.006, r= -0.74 n= 30). The SDI was significantly higher in pts with previous MI 8,1 + 9 vs 1,24 +1, in controls, p<0,01. There was a significant difference in LVEF in the two groups, 36% + 13 in group 1 vs 58%+4 in group 2 p=0,001. An SDI >9 identified patients with EF <35% p= 0,004.

Conclusions Our findings show the correlation between mechanical asynchrony expressed as SDI at three dimensional echocardiography and LVEF. SDI is correlated with systolic function in all patients both in patients with LVEF dysfunction and in controls.

LEVOSIMENDAN AND ECHOCARDIOGRAPHIC DISSINCRONY PARAMETERS IN CHRONIC HEART FAILURE: A CASE REPORT

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Introduction The role of inotropic therapy in chronic heart failure (CHF) has long been a subject of controversy. Although all conventional inotropic agents exert favourable haemodynamic effects, none of them have produced consistent improvement in symptoms or exercise tolerance, and many have shortened the survival. Over the last few years there has been increasing interest in the pharmacological agents acting on the responsiveness of myofilaments to calcium, the so-called calcium sensitizers. Levosimendan is the most thoroughly studied compound of this class of drugs.

Materials and Methods We evaluated the echocardiographic dissinchrony parameters in a young male subject (aged 55 years old) with a non ischemic dilatative cardiomyopathy, before and after a 48h infusion of levodimendan.

Results After a 48h infusion of Levosimendan, the dissinchrony monitored parameters shifted from a negative value to a positive one (pulmonary flow vs. aortic flow time stable at 25 ms.; TDI between interventricular septum and lateral wall from 0 ms. to 80 ms.). The mitral regurgitation markedly reduced (from +++/++++ to +/++), such as the measures of right ventricle (from 46 to 40 mm.) and the values of systolic pulmonary artery pressure (from 50 to 20 mmHg). Subsequently, the patient were implanted with a biventricular ICD, with a long lasting good maintenance of reached synchrony parameters.

Discussion These data exemplify a new possible interesting aspect of these calcium sensitizers drugs. These drugs may be a sort of a pharmacological stressor capable of revealing hidden dissinchrony parameters in selected patients with CHF and normal synchrony parameters at an echocardiographic basal evaluation. In these new class of subjects, it should be of interest the possibility of implanting them with a biventricular pacemaker, in order to give them better synchrony parameters not only at rest but also during physical activity.

A CASE OF BUNDLE BRANCH REENTRY VENTRICULAR TACHYCARDIA IN A PATIENT IMPLANTED WITH A DUAL - CHAMBER PACEMAKER: THE DIAGNOSTIC VALUE OF STORED ELECTROGRAMS

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PURPOSE WE DESCRIBE THE CASE OF A 70-YEAR-OLD FEMALE PATIENT WHO PRESENTED EPISODES OF PALPITATIONS IN THE CONTEXT OF PAROXYSTIC THIRD-DEGREE ATRIO-VENTRICULAR BLOCK TREATED BY A DUAL-CHAMBER PACEMAKER. BEFORE IMPLANTATION ECG SHOWED RIGHT BUNDLE BRANCH BLOCK (RBB) AND LEFT ANTERIOR HEMIBLOCK (LAH). MOREOVER THE PATIENT PRESENTED A HISTORY OF CORONARY ARTERY DISEASE TREATED WITH SURGICAL REVASCULARIZATION.

MATERIAL AND METHODS STORED INTRACARDIAC ELECTROGRAMS (EGMS - AIDA) WERE ANALYZED 1 MONTH AFTER IMPLANTATION. THEY SHOWED EPISODES CLASSIFIED BY THE DEVICE AS SUSTAINED VENTRICULAR TACHYCARDIA (VT

MAX 44 SEC WITH VENTRICULAR HEART RATE = 210 BPM); ANNOTATION MARKER DEFINED THE ONSET OF ARRHYTHMIAS AND THE PRESENCE OF EVIDENT ATRIO-VENTRICULAR DISSOCIATION. SHORT EPISODES OF ATRIAL TACHYCARDIA WERE ALSO RECORDED. IN ORDER TO OBTAIN MORE INFORMATION ABOUT THE DETECTED TACHYARRHYTHMIAS, WE PROVIDED THE PATIENTS WITH AN EXTERNAL LOOP RECORDER. FOUR DAYS LATER THE PATIENT ARRIVED IN EMERGENCY ROOM WITH CHEST PAIN AND PALPITATIONS: THE ANALYSIS OF LOOP RECORDER MEMORY VALIDATED PACEMAKER DIAGNOSTIC DATA. THE SURFACE ECG SHOWED A WIDE QRS TACHYCARDIA WITH A COMPLETE RBBB AND LAH PATTERN.

RESULTS DURING THE HOSPITALISATION CLINICAL AND ELECTROPHYSIOLOGICAL STUDIES IDENTIFIED THE TACHYARRHYTMIA TO BE A BUNDLE BRANCH REENTRANT VENTRICULAR TACHYCARDIA. AFTER 1 MONTH OF UNSUCCESSFULLY PHARMACOLOGICAL TREATMENT WITH VERAPAMIL, WE PROCEEDED TO RADIOFREQUENCY ABLATION OF DISTAL HIS BUNDLE IN RELATION TO BRADY-ARRHYTHMIA HISTORY, DETECTED CONDUCTION DISTURBANCES AND PREVIOUS IMPLANTATION OF A DUAL CHAMBER PACEMAKER. IN THE FOLLOW-UP AIDA SHOWED NO EVIDENCE OF TACHYARRHYTHMIA RECURRENCES.

CONCLUSIONS THE ENHANCED DIAGNOSTIC AND MEMORY FUNCTIONS OF MODERN PACEMAKERS ALLOW DETECTION OF ASYMPTOMATIC ARRHYTHMIAS AND OFFER THE POSSIBILITY TO DOCUMENT THE CAUSAL RELATION BETWEEN SYMPTOMS AND INFREQUENTLY OCCURRING ARRHYTHMIAS THROUGH THE EVALUATION OF EGMS.

OUTCOMES OF OUT-OF-HOSPITAL CARDIAC ARREST AFTER EARLY DEFIBRILLATION: A 24 MONTHS RETROSPECTIVE ANALYSIS

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Introduction Among cardiovascular deaths, sudden, out of hospital cardiac arrest claims approximately 1000 lives each day in the United States alone. Most of these cardiac arrests are due to ventricular fibrillation. Though highly reversible with the rapid application of a defibrillator, ventricular fibrillation is otherwise fatal within minutes, even when cardiopulmonary resuscitation is provided immediately. The overall survival rate in the United States is estimated to be less than 5 percent. Recent developments in automated external defibrillator technology have provided a means of increasing the rate of prompt defibrillation after out of hospital cardiac arrest. After minimal training, also nonmedical personnel (e.g., flight attendants and casino workers) are able to use defibrillators in the workplace, with lifesaving effects. Nonetheless, such programs have involved designated personnel whose job description includes assisting persons who have had sudden cardiac arrest. Data are still lacking on the success of programs in which automated external defibrillators have been installed in public places to be used by persons who have no specific training or duty to act.

Materials and Methods All patients who had an out of hospital cardiac arrest between January 2003 and December 2004 and who received early defibrillation for ventricular fibrillation were included. We conducted a 24 months retrospective analysis of the outcome in our population.

Results 446 people had non traumatic cardiac arrest, and in all of them it was observed a ventricular fibrillation. Eighty nine patients (about 19%) with ventricular fibrillation were successfully resuscitated, including eighteen who regained consciousness before hospital admission.

Conclusions Automated external defibrillators deployed in readily accessible, well marked areas, is really very effective in assisting patients with cardiac arrest. However, it is quite true that, in the cases of survivors, most of our users had good prior training in the use of these devices.

SLEEP APNEA IS NOT RELATED TO VENTRICULAR ARRHYTHMIAS IN PACE-MAKERS RECIPIENTS

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INTRODUCTION Sleep apnea (SA) is the most common breathing disorder occurring during sleep; it is characterized by recurrent episodes of cessation of breathing (apnea) and decrease in breathing (hipopnea). SA is associated with oxyhaemoglobin desaturation in the blood, excessive arousals and sympathetic activation. These and other physiopathologic mechanisms can contribute to the morbidity and mortality of patients with heart failure, in which set SA frequently occurs; other reported consequences are represented by arrhythmias, family disruption and increased incidence of traffic accidents. SA associated with daytime hypersomnolence is estimated to affect 2 to 4% of the middle aged population of the United States; there is evidence that this breathing disorder is also associated with an increased risk of cardiovascular disease. If SA is related to an enhanced occurrence of ventricular arrhythmias (PVCS) is still an open issue.

METHODS A population of 36 patients (Pts), including 20 women and 16 men was enrolled in our study, with mean age of 70.77 years and an average left ventricular EF of 53%. Underlying heart disease was ischemic, hypertensive, valvular, others. All Pts have been implanted with a Ela -Medical Talent 3 253 DDDR pace-maker (pm) because of various rhythm disturbances. The pm, utilizing a peculiar algorithm, measures minute-ventilation by variations of thoracic impedance; so, pm records apnea/hypopnea histograms of last 24 hours, total number of episodes in the follow-up phase and a/h indexes related to the total number of hours of sleep; Pts. carried out a 24 hours Holter Ecg, in order to establish a possible correlation between PVCS and SA. An interrogation of pm was effected at the time of Holter removal.

RESULTS A higher apnea index did'nt significantly correlate with a larger number of PVCS at Holter. Nevertheless, considering only valvular Pts. apnea index seems to correlate with a larger number of PVCS.

AGE OF FIRST FAINT IN RELATIONSHIP TO THE MODALITIES OF CLINICAL PRESENTATION OF NEURALLY MEDIATED SYNCOPE

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Understanding the natural history of the neurally-mediated syncope might prove helpful in the diagnostic evaluation. The aim of this study was to evaluate the age of first faint in relationship to the clinical presentation of syncope. Of 437 pts referred for suspected neurally-mediated syncope, 103 with structural heart disease, abnormal ECG and carotid syncope were excluded. Thus, we studied 334 consecutive pts (156 M, 55 ±19 yrs) with a median of 2 syncope spells (range 1-30). The range of duration of history of syncope was 0.003-46 yrs. Pts were assigned to 4 age groups: 18 to 25 yrs (Gr.A: 41 pts), 26 to 50 yrs (Gr.B: 70 pts), 51 to 71 yrs (Gr.C: 155 pts), and above 71 yrs (Gr.D: 88 pts). The clinical presentation of the first spontaneous

episode was typical vasovagal syncope (VVS) in 150 pts (45 M, age 47 ± 20 yrs, mode 26 yrs), situational syncope in 44 (15 M, age 53 ±20 yrs, mode 15 yrs) and atypical VVS in 140 (73 M, mean age 63 ±19 yrs, mode 65 yrs). A clinical spectrum suggestive of typical VVS was observed in 56% (Gr.A), 67% (Gr.B), 41% (Gr.C) and 28% (Gr.D) of pts ($p < 0.002$ Gr. A and B vs. Gr. D). A clinical spectrum suggestive of situational syncope was found in 15% (Gr.A), 10% (Gr.B), 16% (Gr.C) and 11% (Gr.D) of pts (p= n.s.). A clinical spectrum suggestive of atypical VVS was observed in 29% (Gr.A), 23% (Gr.B), 44% (Gr.C) and 60% (Gr.D) of pts ($p < 0.001$). In conclusion the pts with the age < 50 years had most often a first spontaneous typical VVS; the pts with first situational syncope had similar distribution into the 4 age groups; the occurrence of the first atypical VVS increased significantly with age.

AGE DIFFERENCES IN RESPONSE TO HEAD-UP TILT TESTING: EXPERIENCE WITH SUBLINGUAL NITROGLYCERIN IN PATIENTS WITH RECURRENT UNEXPLAINED SYNCOPE

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The importance of head-up tilt testing (HUTT) has been demonstrated in patients (pts) with unexplained syncope. Sublingual (SL) nitrates provocation is increasingly used to improve diagnosis accuracy, with few data regarding the results of these tests in elderly pts.

Objective To evaluate the utility of HUTT followed by SL nitroglycerin (NTG) in a population referred for syncope of unknown etiology and compare the responses obtained in older and younger pts.

Methods We studied 158 pts submitted to HUTT using SL NTG as a provocative agent. Pts were divided into <65 years (group A, 42+/-14 years; n=74) and >=65 years (group B, 72+/-8 years; n=84). The protocol included a stabilization phase, a passive phase and a provocation phase. The test was considered positive when there was reproduction of symptoms with bradycardia and/or arterial hypotension. Abnormal responses were defined as cardioinhibitory, vasodepressive or mixed. A gradual and parallel decrease in blood pressure after SL NTG administration was considered an exaggerated response to nitrates.

Results HUTT was positive in 57% of group A and 51% of group B (p=NS), with an exaggerated response to nitrates in 11% and 16%, respectively (p=NS). Among pts with neurocardiogenic responses, cardioinhibitory syncope occurred in 17% of group A and 7% of group B (p=NS), vasodepressor syncope was more frequent in group B (24% vs. 53%; p=0.001) and there was a trend to a higher incidence of a mixed pattern in group A (59% vs. 40%; p=0.07).

Conclusions In a population with syncope of unknown origin, HUTT potentiated by NTG is safe and provides a significant contribution for the etiological diagnosis of syncope, with an identical accuracy in older and younger pts and is associated with a higher incidence of vasodepressive patterns among older pts but with no differences in the rate of exaggerated responses to nitrates.

NON INVASIVE ECG EXAMINATION AS A TOOL IN DEFINING SINUS NODE DYSFUNCTION AMONG PATIENTS PRESENTING WITH SYNCOPE OF UNKNOWN ETIOLOGY

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Objectives To compare abnormal non-invasive ECG (N-I ECG) findings on 12-lead ECG or/and 24-hour Holter monitoring (HM) with Electrophysiology study (EPS) findings suggesting Sinus Node Dysfunction (SND) in patients presenting with syncope of unknown origin (SUO).

Methods 141 patients (age 59.53±16.73) suffering from SUO with concurrent findings on N I ECG evaluation (ECG or/and HM) consisting of sinus bradycardia (SB) with HR<60bpm on ECG or/and mean 24 hour HM HR<60bpm underwent EPS. We compared the findings on the N-I ECG evaluation with abnormal findings on EPS defined as: 1.Corrected Sinus Node Recovery Time (CSNRT) >525msec, 2.Sino-Atrial Conduction Time (SACT) >140msec, 3.Chronotropic response to Atropine or Isoproterenol<90bpm, 4. Estimation of Intrinsic Heart Rate (IHR) according to the formula IHR=118.1-(0.57x age) +-SD, 5.Secondary pauses on estimation of CSNRT.

Results From141 patients with SB on either ECG, or 24-hour HM, 76 (53.90%) had at least one abnormal finding on EPS predicting SND. Among 68 patients with SB only on ECG, 30 (44.12%) had evidence of SND on EPS. Furtermore, 60 (82.14%) of 73 patients with SB on both 12-lead ECG and 24-hour HM had evidence of SND on EPS. After logistic regression analysis, adjusted for age, sex, ejection fraction and evidence of organic heart disease, patients with SUO and SB only on ECG, had 3.87 Odds Ratio (OR) for EPS evidence of SND (CI=2.15-6.96, p<0.001), whereas for patients with combined bradycardia on ECG and 24-hour HM, the OR was even higher, 35.55 (CI=16.09-78.53, p<0.001).

Conclusion ECG and Holter rhythm monitoring can be considered as a combined tool for the prediction of SND on EPS in patients with recurrent SUO and borderline sinus bradycardia. The only independent predictor of EPS evidence for SND, was the non invasive electrocardiographic presence of either instantaneous SB and particularly the combination of instantaneous SB with persistent 24 hour HM SB.

UTILITY OF NON-INVASIVE ECG EXAMINATION (12-LEAD ECG AND 24-HOUR HOLTER MONITORING) IN DEFINING ARRHYTHMIC CAUSES OF SYNCOPE AMONG PATIENTS PRESENTING WITH SYNCOPE OF UNK

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Objectives To compare abnormal non-invasive ECG (N I ECG) markers on 12 lead ECG or/and 24-hour Holter monitoring (HM) with Electrophysiology study (EPS) abnormal findings among patients presenting with syncope of unknown origin (SUO).

Methods A total of 421 patients (age 56.45±17.49) suffering from SUO referred to our laboratory for EPS. All patients were initially screened with ECG, HM and subsequently underwent EPS. We divided our patient population into 4 groups: Group 1:abnormal ECG and HM (ECG+/HM+), Group-2:abnormal ECG (ECG+/HM-), Group-3:abnormal HM (ECG-/HM+), Group-4:normal ECG and HM (ECG-/HM).

As abnormal ECG or HM findings were considered the presence of at least one of: 1.sinus bradycardia (SB), 2.different conduction defects, 3.delta or Q wave, 4.RV repolarization abnormalities, 5.episodic 2ndAVB, 6.sinus pauses>2.0 but <2.5sec, 7.blocked atrial premature beats, 8.complex ventricular ectopy, 9.runs of supraventricular tachycardia.

Results The sensitivity of observing at least one abnormal EPS finding (Sinus or/and AVN dysfunction, substrate for potentially syncopal supra or ventricular tachyarrhythmia) among the 4 groups was significantly higher in group-1 (82.18%), falling to 68.09% and 33,7% among groups-2 and 3. In group-4 this proportion was extremely low (9.09%). After logistic regression analysis, adjusted for age, sex, ejection fraction and evidence of organic heart disease, patients of groups 1st, 2nd, 3rd compared to the 4th one had 35.94 ($p<0.001$), 17.83 ($p<0.001$), 3.45 ($p=0.064$) odds ratios of abnormal findings on EPS respectively (all $p<0.01$).

Conclusion Simple, non costly, reproducible and readily available to the general cardiologist and/or internist NI-ECG evaluation of SUO patients may help define important arrhythmic and treatable causes of syncope.

A PROSPECTIVE, MULTICENTRE, RANDOMISED, DOUBLE BLIND TRIAL TO EVALUATE THE EFFICACY OF PFO CLOSURE WITH STARFLEX® TO PREVENT REFRACTORY MIGRAINE: THE MIST TRIAL

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Purpose Observational studies demonstrated that patent foramen ovale (PFO) closure in stroke and decompression sickness patients led to the improvement or resolution of migraine in 65-90% of patients. The MIST (Migraine Intervention with STARFlex® Technology) Trial is the first trial to attempt to investigate these observations with a prospective, double blind, placebo-controlled design.

Materials and Methods Patients with frequent migraine (and some aura) that was not controlled with two or more classes of prophylactic medications were recruited. Transthoracic contrast echocardiography was used to detect right-to-left shunts and to semi-quantitatively assess their size. Patients with a large or medium size PFO were randomised to PFO closure with the STARFlex® septal repair implant or to a sham procedure. Patients and their headache specialist remained blind to randomisation during the 180-day follow-up period.

Results 432 patients were recruited and screened for shunts. 260 (60.2%) had a shunt, of which 163 (37.7% of total patients and 62.7% of those with shunts) had a large PFO. The mean diameter of the PFOs among the patient population was 9.21mm (±3.27mm). 73 patients were randomised to the sham procedure and 74 to the closure procedure with STARFlex®. 42% of patients who had their PFOs closed with STARFlex® had a 50% reduction compared to 23% in the control arm.

Conclusion Large right-to-left shunts (mostly PFOs) are 6 times more common in migraine with aura patients than in the general population. The average diameter of the PFO in this patient population is similar to that seen in patients with paradoxical embolism.

MIST has successfully demonstrated that closure of PFO with STARFlex® provides a significant treatment effect in some patients. Longer follow up of this patient population (MIST III) and future trials (MIST II is currently recruiting in the US) will improve our understanding.

DISCORDANT QRS AND ST/T ELECTRICAL ALTERNANS SIMULTANEOUSLY OCCURRING IN THE SETTING OF PERI-PARTUM ACUTE MYOCARDIAL ISCHEMIA WITH NORMAL CORONARY ARTERIES

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ST-segment and/or T-wave alternans are well known predictors of ventricular fibrillation recognising different electrophysiological mechanisms such as alternating early afterdepolarisations or marked difference of action potential duration at different myocardial sites. This occurs in the concordant electrical alternance. If adiacent myocardial cells alternate opposite phases of the action potential, an electrical alternance of the QRS complex is also observed on the surface ECG, named discordant alternance, reproduced in animal models tipically during ischemia and high frequency pacing.

We describe the case of a 30-year old pregnant woman who developed discordant electrical alternans in the setting of caesarean section. 12-L ECG showed sinus tachycardia and electrical alternans of the QRS, the ST segment and the T wave were simultaneously present. QRS complexes exhibited shift in axis together with ST and T-wave discordant alternans. The ECG abnormalities resolved within one hour. Significant elevation of cardiac enzymes CK-MB and Troponine-T was observed. No other metabolic or ion abnormalities were present. 2-D Echocardiogram documented septal and anterior wall akinesia. Negative T waves on V1-V3 developed on following days. Stress ECHO and Coronary angiography were normal. At 1-month follow-up resting ECG was normal and a control 2-D Echo was normal as well. Virus and other test were negative.

Discordant alternans of QRS, ST segment and T wave associated with transient wall motion abnormalities and enzymatic necrosis has never been previously described in the peripartum setting. An acute ischemic damage caused by prolonged coronary vasospasm is the most probable cause of discordant electrical alternans in this case.

ELECTROPHYSIOLOGICAL CONSEQUENCES OF MURINE POST-MI REMODELING

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Background After myocardial infarction (MI), the noninfarcted ventricular myocardium undergoes significant morphological and functional alterations, known as post-MI remodeling. Studies have shown that the electrophysiological changes in remodeled myocardium promote arrhythmia. Here, we established and characterized the murine model of post-MI remodeling with the special emphasis on its electrophysiological consequences.

Methods Twenty six CD1 mice underwent thoracotomy and ligation of the left coronary artery or sham-operation. Using ECG, echocardiographic imaging (M-mode and transesophageal), electrophysiological study (EPS) and postmortal morphological examination, we evaluated alterations in ventricular morphology and function at 16th day following MI.

Results Left ventricles (LV) of post-MI mice were found significantly dilated and their fraction shortening was reduced comparing with those of sham-operated mice. Histological analysis of noninfarcted myocardium of post-MI hearts revealed increase in diameter of myofibers. In ECG, on 16th post-MI day, the QT intervals were significantly prolonged. A single extrastimulus delivered at the edge of QT interval induced runs of VT in all post-MI animals, but only in 54.5% of shams. In both groups, VT was non-sustained (640 ± 250 ms in post-MI mice vs. 395 ± 200 ms in shams).

Conclusion As in larger species and in humans, MI in mice is accom-

panied by remodeling of LV chamber. Although electrophysiological alterations associated with post-MI remodeling in murine heart could facilitate arrhythmogenesis, they differ significantly from those in other species. The results of murine experiments, therefore, should be carefully interpreted rather than directly extrapolated to humans.

ACUTE ELECTROPHYSIOLOGICAL EFFECTS OF OMEGA-3 FATTY ACIDS IN HUMAN ATRIAL MYOCARDIUM

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Purpose Little is known about the relationship of nutritional factors with atrial fibrillation (AF). The purpose of the present study was to evaluate in humans the acute effects of omega - 3 fatty acids on atrial electrophysiological properties.
Methods In 6 patients with paroxysmal atrial fibrillation, two electrophysiological studies, were performed, before and immediately after the infusion of 3,8 g, n-3 polyunsaturated fatty acids, (100 ml of omega-3 marine triglycerides, Omegaven, Fresenius- Kabi, Germany). Patients were free of antiarrhythmic drugs for five half-lives before their entry into the study.
Before and after infusion of n-3 polyunsaturated fatty acids, we measured AH and HV intervals, corrected sinus node recovery time (SNRT) and the Wenckebach point. Effective refractory period (ERP) at 3 cycle lengths (CL: 600,500,400ms) were evaluated in right atrial appendage and in right atrial low lateral wall.
During the ERP evaluation the presence or absence of AF induced as a response to the shortest extrastimuli resulted in atrial capture was recorded.
Results After the infusion of n-3 polyunsaturated fatty acids, corrected SNRT, AH, HV interval and Wenckebach point were not affected.
ERP in atrial myocardium increased significantly (right atrial appendage ERP at CL 500 ms, increased from 189±9 to 202±11 ms, $p<0.05$ and right atrial low lateral wall ERP at CL 500 ms, increased from 198±12 to 209±14 ms, $p<0.05$).
AF was induced in 5 of the patients during baseline atrial ERP determination. After the administration of n - 3 fatty acids AF was inducible in only 3 patients. In these patients the duration of AF induced after the infusion of n-3 fatty acids was significantly shorter and the mean fibrillatory cycle length interval was prolonged (156±9 ms compared to 134±15 ms, $p<0.05$).
Conclusions N-3 polyunsaturated fatty acids exert important electrophysiological effects on atrial myocardium. The increase in atrial refractoriness, the reduction of AF inducibility and the prolongation of fibrillatory cycle length interval may explain the correlation of fish intake with the reduction in the risk of AF observed in epidemiological studies.

ATRIAL MECHANOELECTRICAL PHENOMENA IN ATRIOVENTRICULAR NODAL REENTRANT TACHYCARDIA

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Purpose Atrial contraction against closed valves in patients with atrioventricular nodal reentrant tachycardia (AVNRT) could serve as a clinical model to study the effects of mechanical stretch in the electrical properties of the human atrial myocardium.
Methods We studied 14 patients (mean age 41±13 years, 8 female) with AVNRT. Peak, mean and minimal atrial pressures, atrial refractoriness (ERP) in the right atrial appendage and high right atrial lateral wall and monophasic action potential duration at 90% of repolarisation (MAPd90) in the right atrial appendage were assessed during atrial pacing at 500 and 400 ms and after 2 min of pacing at the tachycardia cycle length. Measurements were repeated from the same positions after ventricular pacing at the same cycle lengths and after 2 min of tachycardia. Susceptibility to atrial fibrillation (AF) was assessed by noting whether AF was induced during ERP evaluation.
Results Atrial pressure showed a statistically significant increase during ventricular pacing compared to baseline. This increase remained substantially unchanged when the tachycardia was induced. A significant reduction in atrial ERP and MAPd90 was also observed during ventricular pacing at all cycle lengths compared to atrial pacing. Two minutes of spontaneous tachycardia were enough to change the atrial ERP and MAPd90 to values significantly lower than those during atrial pacing at the cycle length of tachycardia. During the ERP evaluation AF was induced more often during the tachycardia (28%) than during ventricular (14%) and atrial pacing (0%).
Conclusion In AVNRT patients, ventricular pacing and reentrant tachycardia significantly increase right atrial pressures and subsequently shorten ERP and MAPd90, leading to an enhanced propensity for AF.

WIDE QRS COMPLEX TACHYCARDIAS

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We presented our experience in four patients with wide QRS complex tachycardias
First patient is 32-year old man with typical atrial flutter, severe mitral valve regurgitation and severe tricuspid valve regurgitation. Patient had proarrhythmia due to Amiodarone therapy, atrial flutter with 1:1 conduction and heart rate of 220 bpm with left bundle branch block. Tachycardia was terminated with Verapamil i.v. but atrial flutter with narrow QRS complex remained. Patient was in sinus rhythm after operation: mitral valve reconstruction and tricuspid valvuloplasty with reduction of left atrium dimension.
Second case is 19-year old man with Arrhythmic Right Ventricular cardiomyopathy and implanted cardioverter defibrillator who had ventricular tachycardia (VT) with heart rate of 125 bpm. We performed RF ablation of VT in right ventricular outflow tract.
Third patient is 65-year old man with dilated cardiomyopathy, left ventricular ejection fraction of 30%, left bundle branch block and tachycardias with 135 bpm frequency. We performed electrophysiology (EP) study, revealed Concealed Wolff-Parkinson-White syndrome (orthodromic atrioventricular reentry tachycardia) and RF ablation of left lateral accessory pathway has been done.
Fourth case is 62-year old women with wide QRS complex tachycardias and heart rate of 160 bpm which were terminated with Propaphenon i.v. EP study diagnosed left posterolateral accessory pathway and we performed RF ablation.

TEMPORARY ELECTRO-STIMULATION IN THE ACUTE MYOCARDIAL INFRACTION-TWO-YEAR EXPERIENCE

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The application of temporary electro-stimulation is necessary in acute myocardial infractions complicated by the appearance of symptomatic bradycardia, AV conduction disturbances and asystolia. During the last two years, out of 892 patients with the diagnosis of acute myocardial infraction with ST elevation, 38 (4.2%) required temporary electro-stimulation (27 with diaphragmal infractions and 11 with anterior infraction). The third degree AV block was diagnosed in 34 patients (89%). Further, 4 (11%) patients received prophylactic electro-stimulation due to de novo conduction disturbances (the second

degree AV block and block of the left bundle branch- 2 patients, and block of the left bundle branch-1 patient, and block of the right bundle branch-1 patient, and haemiblock-1 patient). The mortality in the group with anterior infarction was significantly higher than the mortality in the group with diaphragmal infarction (8/11 vs 5/27, p<0.05). In the group with anterior infarction and temporary electro-stimulation, patients with extensive infarcts had bad prognosis while the presence of right ventricular infraction significantly contributed to the unfavorable outcome in the group with diaphragmal infarction and temporary electro-stimulation. In the group with anterior acute myocardial infraction and temporary electro-stimulation, the duration of QRS complex on admission, expressed in milliseconds was significantly longer in the deceased patients than in the survivors.

PREDICTORS OF SUCCESSFUL CARDIOVERSION AND IMMEDIATE RECURRENCES IN PERSISTENT ATRIAL FIBRILLATION PATIENTS

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Background Cardioversion of persistent atrial fibrillation (AF) carries a high risk of relapse to AF within few minutes. The variables associated with successful cardioversion and immediate recurrences of AF (IRAF) after external biphasic direct current shocks are not well characterized.
Methods 269 patients with persistent AF (66±8 years, 56% male, mean duration: 13±22 months) underwent external biphasic cardioversion. 245 patients (91%) were defibrillated successfully. IRAF (recurrent AF after sinus rhythm within 1-20 mins) occurred in 54/388 (14%) cardioversion procedures. Uni- and multivariate analyses were performed on demographic, clinical and echo data, to determine predictors of successful cardioversion and IRAF. Left ventricular ejection fraction followed by left atrial diameter were the most significant independent predictors for conversion to sinus rhythm (p=0.012 and p=0.041 respectively). Age, sex, left atrial or left ventricular dimensions, ejection fraction, NYHA class and AF duration were not predictive of IRAF. IRAF occurred in patients with lower ventricular rates pre-cardioversion and was also associated with a history of hypertension and valvular heart disease. Pre-treatment with amiodarone was associated with lower IRAF.
Conclusions External biphasic cardioversion is a very effective method for the restoration of sinus rhythm in patients with persistent AF. Success rate is associated with higher ejection fraction and smaller left atrial diameter, independent of AF duration. Hypertensive and valvular heart disease are associated with higher IRAF but higher ventricular rates pre-cardioversion and pre-treatment with amiodarone are protective. These findings may be useful for the most appropriate selection of patients for cardioversion.

B-TYPE NATRIURETIC PEPTIDE AND RECURRENCE OF ATRIAL FIBRILLATION AFTER ELECTRICAL CARDIOVERSION: A PROSPECTIVE STUDY WITH ONE-YEAR FOLLOW-UP

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Background B-type natriuretic peptide (BNP) has been associated with atrial fibrillation (AF), but it is unknown whether BNP may predict risk of recurrence after electrical cardioversion.
Methods Sixty-two consecutive patients with successful electrical cardioversion for persistent AF were enrolled, with a mean follow-up of 12±6 months. BNP levels were divided into tertiles (T): T1=18.1-84.6 pg/dl, T2=85.1-168.4 pg/dl, T3=168.9-1114 pg/dl.
Results Patients with AF recurrence had higher BNP levels (226±209 vs. 116±86 pg/dl p=0.04), larger left ventricular diameter (57±9 vs. 50±13 mm p=0.04), lower left ventricular ejection fraction (45±18 vs. 51±9 p=0.10) and larger left atrial diameter (51±7 vs. 45±6 mm p=0.001). Recurrence rate at 6 months was 33% for T1, 65% for T2 and 71% for T3 (p= 0.02 for T1 vs. T2 or T3). In a multivariate Cox proportional hazard model, including age, gender, ejection fraction, end diastolic ventricular volume, left atrial size, use of amiodarone and BNP levels, only higher BNP levels (T2 or T3 vs T1) and larger left atrial diameter (>40 mm) were significantly associated with higher risk of AF recurrence, Hazard Ratio (HR) 1.87; 95% CI, 1.01-3.25 for BNP T2 or T3 vs. T1 and HR 3.83; 95% CI, 1.06-13.6 for atrial diameter respectively.
Conclusions Low BNP levels may identify patients with lower risk of AF recurrence after successful cardioversion.

ANGIOTENSIN CONVERTING ENZYME INHIBITORS AND ANGIOTENSIN RECEPTOR BLOCKERS MAY REDUCE RECURRENCE OF ATRIAL FIBRILLATION AFTER BIPHASIC TRANSTORACIC CARDIOVERSION

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Background Direct current cardioversion with biphasic waveform defibrillation (DCCV) is effective in restoring sinus rhytm in patients with persistent symptomathic Atrial Fibrillation (AF). Succes of external electrical cardioversion is from 94 to 97% of patients with AF, but treating before procedure of DCCV patients with lone AF may prevent recurrence of AF and reduce the intensity of current at DCCV.
Methods A total of 35 patients with persistent sympomathic atrial fibrillation underwent biphasic external cardioversion in our Day Hospital. 15 patients were treated 1 mounth before DCCV only with amiodarone and beta blockers for the rate control (group 1). 20 patients (group 2) were treated with association of amiodarone plus angiotensin-converting enzyme inhibitors (ACEIs) in 10 cases (group 2-A) or angiotensin receptor blockers (ARBs) 1 mounth before DCCV in (10 cases: group 2B). ACEIs used were: enalapril or ramipril; ARBs used were irbesartan (300mg), valsartan (160mg) or losartan (50mg). C-reactive protein (CRP) levels were collected as a marker of increased oxidative stress and inflammation.
Results In patients treated with beta blockers and amiodarone succesfull rate at the first voltage discharge of DCCV (70 Joules) was less than patients treated with ACEIs or ARBs: 12/15 (80%)versus 19/20 (95%) of group 2. The second biphasic discharge at 100 joules was efficacy in other 2 patients of group 1. On follow up patients treated with amiodarone plus ACEIs or ARBs (group 2) had fewer paroxysmal AF recurrences.
History of AF and duration of AF before DCCV, hypertension, left atrial diameter are not associated with arrhytmia recurrence. The results of this study showed that combining ACEIs or ARBs to amiodarone is more effective strategy for the prevention of AF recurrence. For a possible role of renin-angiotensin-aldosterone sysyem in arrhytmogenic responce, atrial inflammation and fibrosis, ACEIs and ARBs seems to suppress atrial structural and electrical remodelling.

CAVOTRICUSPID ISTHMUS DEPENDENT FLUTTER WITH NON-TYPICAL ECG PRESENTATION: A SINGLE-CENTRE EXPERIENCE

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Although the ECG patterns of cavotricuspid isthmus dependent flutters (CTFLA) have been thoroughly described, uncertainties persist about the correlation between the mechanisms of flutter and the corresponding ECG morphology.
Aim of this study has been to evaluate prevalence, and clinical and ECG features in CTFLA with a non-typical aspect at ECG, whose diagnosis was made only by electrophysiological (EP) manoeuvres.
Sixty-two consecutive patients (38 males and 24 females; mean age 69±10 y) were retrospectively found in our lab recordings, who had a stable tachyarrhythmia mapped at the EP study, whose mechanisms was a macroreentry involving CT isthmus as a critical part, submitted to successful RF catheter ablation. ECG tracings of the qualifying tachyarrhythmia, either persistent at baseline or reproduced at EP study, were blindly reviewed by two experienced cardiologists. In six patients (prevalence 9,6%) (group A) the concordant ECG diagnosis was non-typical flutter. In four pts RA activation was counterclockwise, in two clockwise. Clinical and EP parameters were compared between group A and all the remaining 56 patients (group B). No significant difference was found about any of the following variables: age (71±5 vs 69±11); FLA cycle length (280±105 vs 266±84); presence of structural heart disease; current antiarrhythmic treatment; echocardiographic left atrium dimensions; inducibility of atrial fibrillation (36% vs 33%); atrial effective refractory period (234±86 vs 220±97); RF time (26±16 vs 27±18 min.).
In conclusion, from our data CT isthmus appears to be the critical isthmus in a small but noticeable number of right atrium macroreentry consistent with CT FLA featuring non-typical ECG patterns.

SHORT-COUPLED VARIANT OF TORSADE DE POINTES

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Torsade de Pointes (TdP) is a polymorphic ventricular tachycardia appearing as a twist around the isoelectric line.TdP may degenerate into ventricular fibrillation. An unusually long coupling interval (600 to 800 milliseconds) of the initial beat of the torsade de pointes is a major electrocardiographic diagnostic criterion.
There is a very limited literature reporting the recurrence of typical TdP with an unusually short coupling interval (less than 300 msec) of the initialing beat. The QT interval is always normal. One possible explanation in an imbalance of autonomic nervous system with a predominance of simapathetic drive.
The only effective drug in the reduction of the number of TdP, even if not life-saving, is verapamil.
A 36-year old woman was referred to our intensive cardiac care unit for an episode of syncope occured while sleeping. During the hospitalization repeated episodes of TdP were recorded, not responsive to amiodarone, lidocaina, beta-blockers i.v, and MgSO4 i.v. Many episodes degenerated in ventricular fibrillation. No familiar history of sudden cardiac death, neither history of palpitations, chest pain, shortness of breath, alcohol abuse, or any drugs were reported. ECG at admittance demonstrated a sinus rhythm 90 bpm, with normal QT interval and QTc. Physical examination was unremarkable. No evidence of ionic disorders was found.
The main difference between this entity and the classic TdP is the fact that in our case the coupling interval of the first beat of the torsade de pointes was very short (200 to 300 msec), in contrast to the long coupling interval in the classic torsade de pointes.
According to previous limited experiences reported by literature, we treated the patient with verapamil e.v., with immediate disappearance of arrhythmic episodes.
A backup single lead ICD was implanted. No episode of VT-VF was recorded by the device after 9 months follow up, during oral therapy with verapamil 320 mg/die.

DEEP SEDATION WITHOUT ANESTHESIA PERSONNEL ASSISTANCE FOR CARDIAC PROCEDURES

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The purpose of this study was to determine the feasibility and safety of deep sedation directly administered by the cardiologist for cardiac procedures.
Methods intravenous sedation with midazolam (MID) alone or MID plus fentanyl (FENT) was administered by the cardiology personnel to 1200 patients during the years 2004-2006 for cardiac procedures such as ICD implantation and testing (40), RF catheter ablation of atrial fibrillation or flutter (260), external cardioversion (400) and transesophageal echocardiogram (500). The median dose of MID and FENT were 5 mg and 0.05 mg (maximal doses 7.5 mg and 0.1 respectively).
Results the desired level of sedation was obtained in all but 5 patients (0.4%). Complications were observed in 3 cases (0.25%): severe bradycardia and hypothension following external cardioversion in 2 cases, probably unrelated with the sedation protocol, and respiratory depression requiring respiratory assistance in 1. No death was observed.
Conclusions deep intravenous sedation with MID or MID+FENT can be safely administered directly by the cardiology staff without anesthesia-personnel assistance for cardiac procedures.

ELECTROPHYSIOLOGICAL GUIDED PACING SITE SELECTION STUDY

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Based on the results of previous studies, the hypothesis of the EPASS study is that patients with severe conduction delay may benefit from continuous interatrial septum pacing (IAS), while right atrial appendage pacing (RAA) might be associated with a pro-arrhythmic effect.
Methods Patients with Sinus Node Dysfunction (SND) and paroxysmal atrial fibrillation (AF) are enrolled in the study and intra-right atrial conduction delay is evaluated before implantation. Right intra-atrial conduction time is measured as the interval between the first intrinsic deflection of atrial electrogram recorded at the HRA and the first intrinsic deflection of atrial electrogram recorded at the ostium of the coronary sinus during straight atrial pacing from HRA and 10 ms above the atrial ERP. Patients are then assigned to the group with (study group) or without severe right atrial conduction delay (control group). The randomization of the pacing site for both groups is balanced for associated heart disease, sex and age. After implantation, a stabilization phase of 3-5 weeks is required: during this period the physician can optimize the device parameters. Neither the data regarding AF episodes nor cardioversion are collected. At the end of the stabilization phase, regular follow-ups and data collection are scheduled every 6 months for 2 years. Persistent atrial fibrillation recurrence documented either by serial ECGs or the device memory is the primary endpoint.
Results Till now 36 patients (17 M, 67.3±7.5 years) have been included in the study: 22 (61%) patients in the study group, 14 (39%) in the control group. At randomization 16 patients (44%) have been assigned to RAA and 20 (56%) to IAS.
Conclusion About 61% of patients with SND show severe intra-right atrial conduction delay. Enrollments will continue and data will be collected to evaluate the effect of pacing site and electrophysiology on persistent AF recurrence.

RELATION BETWEEN PACEMAKER RELATED INTERATRIAL CONDUCTION INTERVALS AND OPTIMAL AV DELAY IN BIVENTRICULAR CHF PACING

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Optimal AV delay (AVD) is the net effect of individual interatrial conduction (IACT) and electromechanical time intervals. Using the oesophageal electrogram of the ICS 3000 programmer, IACT can be measured separately in pacemaker patients irrespective of make and model.
Aims To study the fraction of pacemaker related IACT on total duration of optimal AV delay in congestive heart failure (CHF) pacing.
Methods AV interval was individulized by echo in 78 biventricular paced CHF patients. Interatrial conduction intervals were measured using the oesophageal left atrial electrogram (LAE) option of the Biotronik ICS3000 programmer. IACT in VDD and DDD pacing was calculated by the difference between programmed optimal AVD and the measured interval LA-Sv betweeen left atrial deflection (LA) and ventricular Stimulus (Sv).
Results In 74 of the 78 pts, mean optimal AVD in VDD pacing was 94,8±45,4ms with IACT fraction of 42,6±26,3ms (44,9±20,8%). In 78 pts, mean optimal AV delay in DDD pacing was 181,5±47,7ms with IACT fraction of 129,0±26,3ms (71,1±25,4%). At mean, total duration of optimal AV delay was 52,9±41,3ms longer than IACT in both modes.
Conclusions 1. Optimal AVD in VDD and DDD pacing is about 50ms longer than IACT. 2. It contains an IACT fraction of about 43% and 71%, in VDD and DDD pacing, resp.. Thus, 2. IACT is an essential part of optimal AV delay.

ACUTE EFFECT OF SEPTAL PACING 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 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 diference 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.
The study is supported with IGA MZCR no. NR 8553-3/2005.

PACEMAKER PREVENTION THERAPY FOR THE CONTROL OF DRUG REFRACTORY PAROXYSMAL ATRIAL FIBRILLATION. RELIABILITY OF PACEMAKER DIAGNOSTICS AND LONG TERM FOLLOW UP

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Introduction Non pharmacological therapies for atrial fibrillation (AF) involve today the use of algorithms to detect and prevent atrial arrhythmia that could be an onset for AF. Selection DDDRP pacemaker applies four new pacing therapies aimed at reducing the incidence of atrial arrhythmia events. Aim of the Study. To check atrial arrhythmia recording reliability to evaluate effectiveness of the new atrial fibrillation preventive pacing therapies.
Material and Methods 15 patients (9 males and 6 females, with a mean age of 71±5 years) implanted for a bradycardia tachycardia sick sinus syndrome, with or without atrioventricular conduction disturbances. We compared the number and duration of atrial arrhythmia episodes stored in the pacemaker with a contemporaneous 24h Holter recording in order to verify the reliability of pacemaker atrial arrhythmia episodes storing. We properly set pacemaker parameters for detecting an atrial arrhythmia. After this, we followed up all the 15 patients for 24±8 months in order to evaluate the possible reduction in PACs number and in atrial fibrillation episodes number and duration.
Results All the 59 atrial arrhythmia episodes detected by the Holter monitoring were correctly stored by the pacemaker, with a correlation coefficient of 0.96. During the successive follow up, there was a marked reduction in PACs number (from 83±12/day to 2.3±0.8/day), in atrial fibrillation episodes (from 46±7/day to 0.12±0.03/day) and in AF Burden (from 93%±6% to 0.3%±0.06%); contemporary, there was an increase in atrial pacing percentages (from 3%±0.5% to 97%±3%).
Conclusion The detection of atrial arrhythmia events through this implanted device is really reliable, thus making easiest a daily constant monitoring of heart rhythm especially in asymptomatic elderly patients. The follow up data referring a marked reduction of atrial arrhythmia episodes seems to confirm that these implantable devices could represent a turning point for an effective pacing preventive therapy of atrial fibrillation.

PACEMAKER ALGORITHMS FOR PREVENTION THERAPY OF DRUG REFRACTORY ATRIAL FIBRILLATION: 24 MONTHS EXPERIENCE WITH A DUAL CHAMBER DDDRP PACEMAKER

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Introduction Non pharmacological therapies for atrial fibrillation (AF) involve today the use of algorithms to detect and prevent atrial arrhythmia that could be an onset for AF. Aim of the Study. We checked atrial arrhythmia recording reliability of Vitatron Selection DDDRP 900E/AF2.0 pacemaker to evaluate effectiveness of the new atrial fibrillation preventive pacing therapies.
Material and Methods We enrolled 15 patients (9 males and 6 females, with a mean age of 71±5 years, NYHA class I or II) implanted for a bradycardia tachycardia sick sinus syndrome, with or without atrioventricular conduction disturbances. We compared the number and duration of atrial arrhythmia episodes stored in the pacemaker with a contemporaneous 24h Holter recording. We set an atrial rate upper than 180 beats per minute, lasting for at least 6 ventricular cycles and ending with at least 10 ventricular cycles in sinus rhythm. We followed up all the 15 patients for 24±8 months, in order to evaluate the possible reduction in PACs number and in atrial fibrillation episodes number and duration.
Results All 59 atrial arrhythmia episodes detected by the Holter monitoring were correctly stored by the pacemaker, with a correlation coefficient of 0.96. During the follow up, there was a reduction in PACs number (from 83±12/day to 2.3±0.8/day), in atrial fibrillation episodes (from 46±7/day to 0.12±0.03/day) and in AF Burden (from 93%±6% to 0.3%±0.06%); contemporary, there was an increase in atrial pacing percentages (from 3%±0.5% to 97%±3%).
Conclusion The detection of atrial arrhythmia events through this implanted device is really reliable, thus making easiest a daily constant monitoring of heart rhythm especially in asymptomatic elderly patients. Moreover, the follow up data referring a marked reduction of atrial arrhythmia episodes seems to confirm that these implantable devices could represent a turning point for an effective pacing preventive therapy of atrial fibrillation.

THE USE OF THERAPY ADVISOR TO IMPROVE THE EFFICIENCY OF FOLLOW-UPS: RESULTS OF THE EUROPEAN C-STAR REGISTRY

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The objective of the prospective multicenter C-STAR Registry was to evaluate appropriatess and usefulness of the messages delivered by the Therapy Advisor (TA), a programmer feature of Vitatron C-series pacemakers. In addition the relative speed and efficiency of pacemaker follow-ups when using these devices was assessed.
Materials and Method A total of 471 patients (mean age 73.4±10.4 years; 58.2%M) with indication for permanent DDD(R) pacing and implanted with C60 (DDDR) or C50 (DDD) were included in the registry. Patients were treated according to normal practice of the investigational centers and underwent follow-up at 2 month, 6 month, 1 year after implant.
The TA automatically analyzed all stored data by the pacemaker and provided diagnostic observation messages and programming advices. After each follow-up the physicians were asked to register about the appropriateness of the TA and the efficiency of the follow-up. At the end of the study, physicians were asked concerning the interrogation time and reprogramming time of the devices and if they considered the TA to reduce follow-up time.
Results According to 58% of physicians the messages of TA were helpful in the assessment of subject's condition during the 2-month follow-up. Their percentage increased at the 6-month (62%) and at 1 year follow-up (68%). The advices of TA improved follow-up efficiency, by reducing interrogation and reprogramming times, as reported by 65% of physicians at the 2-month follow-up. Their percentage increased at the 6-month (68%) and 1 year follow-up (72%).
Conclusion Physicians responded positively to the Therapy Advisor when assessing the patient's condition and the efficiency of the follow-up. Satisfaction increased with level of familiarity with the

Therapy Advisor. Furthermore, in their opinion the Therapy Advisor reduced follow-up time.

WHAT ARE DIFFERENCES OF HEART RATE TURBULENCE (HRT) IN PATIENTS WITH AND WITHOUT VENTRICULAR TACHYARRHYTHMIAS (VT) AND ICD IN STABLE STAGE OF CHRONIC HEART FAILURE (CHF)?

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Introduction The aim of study was to explain if HRT distinguished patients (pts) with and without VT among population CHF in stable stage.
Abnormal HRT are known as risk factor of mortality after myocardial infarction. There are not strong data suggesting the value of HRT as a risk factor of VT in CHF.
Method and material 83 pts in age 18-83 with CHF (NYHA II±III, mean 2,2±0,4) and left ventricular ejection fraction(LVEF) 15-50% and ventricular premature beats and sinus rhythm had 24-hour Holter recording.
20 pts had VT and ICD. Pts with ICD were older and had lower LVEF then pts without ICD. Characteristic of pts:

Group	Age (years)	Gender	LVEF			
	mean	*SD*	*male (n.)*	*female (n.)*	*%*	*SD*
all pts	51,2	14,9	60	23	34,7	10,7
pts without VT+ICD	49,8	15,6	47	16	36	10,4
pts with VT+ICD	55,4	11,6	13	7	30,7	10,8

24-hour Holter recordings were performed using digital recorders and analyzed using the Oxford Medilog System. HRT were calculated using free software from www.h-r-t.com. We estimated the turbulence onset (TO) and the turbulence slope (TS). TO<0% and TS>2.5ms/beat were considered as normal. We standed apart categories: HRT0 - TS+TO were normal, HRT1 - TS or TO were abnormal, HRT2 - TS+TO were abnormal.
Results *see table.*
Conclusions Abnormal HRT were found more frequent in pts with CHF and VT. TO was lower in pts with CHF and ICD, but difference was not statistical significant. TS did not differ between pts with and without VT.

COMPLICATIONS AND MORTALITY DURING REMOVAL OF CHRONICALLY IMPLANTED LEADS: DATA FROM A SINGLE-CENTER PROSPECTIVE REGISTRY

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Background Patients (pts) implanted with pacemaker (PM) or implantable cardioverter defibrillator (ICD) are increasing over time and the need of leads removal (LR) for different clinical reasons is increasing too. During LR severe complications and death are reported, regardless the method used.
Objective To verify the complications and mortality rate in our database.
Methods From jan/01 to jul/06, 75 pts underwent LR and were prospectively registered. Fifthy-three pts were male, the mean age was 68±12 yrs; 71 pts had an organic heart disease and the mean LVEF was 0.43±0.15. Hundred-twenty-six leads were considered for removal: 110 PM leads and 16 ICD leads. The mean implantation time was 76±67 months (range 2-278). Indications for LR were infection in 30 pts, malfunction in 23, device up-grading in 20, other in 2. From jan/01 to dec/03, 59 leads were approached with a mechanical traction only, using the lead locking device (LLD, Spectranetics®), while from jan/04 to jul/06, 67 leads were approached first mechanically and, in case of failure, with the excimer laser sheath facilitation (Spectranetics®). Definitions: success (S)= complete LR; partial success (PS)= <4cm lead retained; failure= no LR; clinical success (CS)= S+PS.
Results A mechanical S was achieved in 76/126 (60%) and a PS in 3/126 (2.4%); The excimer laser sheath facilitation was used on 44 leads. The S was achieved in 40/44 (91%) and a PS in 2/44 (4,5%);. The overall CS was 121/126 (96%). Ten/75 pts (13%) had complications and 2 of them (2.6%) died. Complications were unrelated to the removal approach used (4 vs 6 pts) and the age distribution was as follows: age <60 yrs: 1/16; 60<age<70 yrs: 2/12; 70<age<80 yrs: 5/32; age>80 yrs: 2/10.
Conclusions Major complications during chronically implanted LR are substantial and more frequent in older pts; therefore caution must be used in LR in elderly pts.

REDUCED VENTRICULAR STIMULATION DOES NOT INFLUENCE THE RATE OF ATRIAL FIBRILLATION

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Background A few randomized trials have compared atrial-based pacing with ventricular pacing in patients with bradycardia. Atrial fibrillation was more common in patients receiving ventricular pacing. However, it is unclear at the moment if atrial based pacing reduces atrial fibrillation (AF) in comparison to dual-chamber pacing with

Table

Group	TO mean number	TS SD %	HRT0 Mean number	HRT1 SD %	HRT2 number	%
all pts	-0,0093 23	0,0262 27,7	5,3599 15	5,1540 18,1	45	54,2
pts without VT+ICD	-0,0096 17	0,0281 27	5,3943 10	5,1353 15,9	36	57,1
pts with VT+ICD	-0,0081 6	0,0198 30	5,3710 5	5,3547 25	9	45

an optimized AV conduction time in patients with a DDD pacer.
Methods and results We randomly assigned 24 patients with sick sinus syndrome and implanted dual chamber pacer (Vitatron) in a cross over design to either a long AV interval for 6 months followed by a short AV interval for 6 months or vice versa. A long AV interval was programmed with an AV time of 300 msec. Short AV time was the shortest AV time that allowed optimal AV conduction as measured by PW-doppler echocardiography over the mitral valve. Patients on AV short had significantly less ventricular pacing than patients on AV long (median 3% vs. 99.5% ventricular pacing, p<0.001). However, atrial pacing was not changed in both groups. AF burden was measured by the Vitatron specific standard pacemaker algorithm. Over 12 months of follow up AF burden was not influenced by AV time programming (median 1.0 vs. 1.0%, p=0.70). However, the prevalence of AF was rather low.
Conclusion A reduction of ventricular stimulation in patients with sick sinus syndrome and a DDD pacer does not reduce the rate of atrial fibrillation.

INCREASING RELIABILITY OF VDD SINGLE LEAD PACING

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Aim of previous studies was to evaluate the reliability of VDD pacing mode in patients with advanced A-V block and normal sinus function. From april 1991 to february 2006, 603 patients (pts) with advanced A-V block were implanted, at our Institution, with single lead VDD/VDDR pacemakers (PMs). We retrospectively studied the outcome of 202 pts implanted with several brands of VDD/VDDR PMs between january 2000 and december 2003, evaluating the incidence of reprogramming because of atrial undersensing or occurrence of atrial fibrillation. In a mean follow-up of 30.5 months, 7.34% of pts needed to be reprogrammed to VVI/VVIR mode. Therefore, single lead VDD pacing mode proved to be reliable in pts with impaired A-V conduction and good sinus function. Nevertheless, we demonstrated a correlation between increasing age and low voltage of P wave at implant and need of reprogramming.
It is well known that one of the problems of VDD stimulation is the irregularity of cardiac cycle during nocturnal phases of bradycardia, due to incostant atrial tracking. In recent implants, we used Vitatron Clarity VDDR; this PM is provided with a specfic algorithm of mode-switching at low frequencies, determining loss of atrial tracking at appearance of pronounced sinus bradycardia and resumption of tracking after stable reapparance of sinus rhythm at a pre-determined frequency. This algorithm, as we could verify in 12 pts implanted with Clarity VDDR PM, determined regularization of cardiac cycle during phases os nocturnal bradycardia, avoiding negative hemodynamic effect of an irregular cycle.

ARRHYTHMIC RISK STRATIFICATION AFTER MYOCARDIAL INFARCTION IN THE MADIT II ERA: SHOULD WE CONSIDER INFARCT LOCALIZATION?

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Background The MADIT II study expanded the use of prophylactic defibrillator in patients with remote myocardial infarction (MI) and left ventricular (LV) dysfunction. However, the challenge remains to accurately identify patients most likely to benefit from the therapy. Studies focused on the «quantitative» issue of MI characterization as expressed by LV function or infarct size. To date, the question of a specific location of prior MI at higher risk of ventricular arrhythmias has not been addressed.
Objectives To evaluate the localization of prior MI in sustained ventricular tachycardia (VT) or ventricular fibrillation (VF) not triggered by an ischemic event.
Method Consecutive patients admitted for VT or VF related to ischemic heart disease over an 8-year period were included. Localization of prior MI was based on ventriculogram or echocardiogram.
Results 265 patients were identified. 145 had acute MI, 56 had coronary artery stenosis requiring revascularization and 17 had a prior MI but no coronary angiographic evaluation. Of the 47 patients without residual ischemia, localization of prior MI was combined inferior and anterior in 7 patients. In the 40 patients with a single localization of MI, the proportion of inferior MI was significantly higher than anterior MI (80% vs. 20%; absolute difference, -60; 95% confidence interval (CI), -37.2 to -74.7; P=<0.0001), though median ejection fraction was higher in inferior MI (0.38 (IQR 0.30-0.43) vs. 0.29 (IQR 0.22-0.33); P=0.027).
Conclusion Our study shows that in patients with remote MI and no residual ischemia as possible trigger to ventricular arrhythmias, an inferior compared to an anterior localization of prior MI may be associated with a higher risk of VT or VF. This association was found despite a better LV function in patients with prior inferior MI. These results suggest that the localization of prior MI should also be considered in future studies on arrhythmic risk stratification.

COMPARISON OF EFFECTIVENESS OF DIFFERENT RIGHT VENTRICULAR PACING SITES IN PATIENTS WITH PERMANENT ATRIAL FIBRILLATION AFTER AV NODE ABLATION

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Aim of our study was to evaluate the effect of different sites of right ventricular (RV) pacing in patients with permanent, drug refractory atrial fibrillation (PAF) after AV node ablation with different left ventricular disfunction.
Methods Since December 2003.to December 2005. 44 pts with permanent, drug not-controlled AFib AV node ablation with followed VVIR mode PM were performed. As optional pacing site was selected high-septal position. Criteria for pts. selection were PAF longer as 1 year, not effective rate control with pharmacotherapy, highly symptomatic AFib, QRS >100 ms (mean 120 ms+/-20 ms), ECHO-kg confirmed left ventricular disfunction (EF<50%), mean EF 43%+/-7% without direct indication for CRT. NYHA class III 24 pts. As electrods for pacing we used active fixation leads (y-60BP Biotronik) and (5072 Medtronic), VVIR mode PM. The optimal site for pacing was accessed by fluoroscopy, pacing treshold (PT) and ECG. Data were compared with early study with RV apex pacing in similar patients cochort. We analized pacing treshold immediately,24h, 72h, ECG, ECHO, 1 and 6 months after procedures, NYHA class and walking test (WT).
Results PT intraoperative were 1.8+/-0.6V, but after 2-4 hours decreased in 1.1+/-0.3V, after 24h 85% >1V and were stable in longer f-up time. NYHA changed from III cl.24 pts to 4 pts, ECHO data improved in short time to 48+/-5%, in 1 months and 51+/-3% after 6 months. Comparison data with apical pacing group shoved faster improvement in LV function (ECHO data p<0.05), better WT data (p<0.05), significant improvement in NYHA classes (p=0.009).
Conclusions High-septal pacing site is more physiological for RV pacing for patients after AV node ablation than RV apical pacing. This approache can give faster improvement in LV function, NYHA classes and is safe and effective for AFib patients, in wich AV node ablation were necessary

COST-EFFECTIVENESS ANALYSIS OF BIATRIAL VERSUS RIGHT ATRIAL APPENDAGE PACING IN BRADY-TACHY SYNDROME

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Atrial Fibrillation (AF) is a highly prevalent arrhythmia. It presents gross economic burden for health care payers and substantially worsens patients' quality of life. Atrial based pacing and later biatrial pacing (BiA) have been proposed as a modality of AF prevention in selected subsets of patients. The aim: cost-effectiveness analysis of AF prevention by biatrial versus right atrial appendage pacing (RAA) in patients with bradycardia-tachycardia syndrome. Methods: Case-control study: 125 pts (51 males, mean age - 67.9) with bradycardia-tachycardia syndrome and paroxysmal AF; 50 pts had biatrial pacing and 75 right atrial appendage pacing. Observation period - 1 year before pacemaker implantation to 3 years after. Costs were calculated from the public health care payer perspective. Primary clinical endpoints: chronic AF occurrence and patient reported outcome representing symptomatic AF episodes frequency at 4-point scale. Results. The frequency of symptomatic AF episodes significantly decreased in BiA group as measured on the scale (2.54 vs 1.28; $p<0.001$) but not in the RAA group (1.33 vs 1.55; NS). We observed 71.2% reduction of annual number of hospitalizations during BiA pacing and no significant change during RAA pacing as compared to pre-implantation period. At the end of the study 12.0% of patients in BiA group and 17.3% in the RAA group had chronic AF but the difference was not statistically significant. Incremental cost-effectiveness ratio for decrease of AF frequency episodes using BiA pacing instead RAA was 499.97 USD PPP (purchasing power parity) (95%CI - 272.5-1353.6) for one point on the scale. Conclusions. Biatrial pacing in contrast to RAA pacing is associated with reduction of symptomatic AF episodes frequency and hospitalizations. Biatrial pacing is a cost-effective method of treatment of symptomatic AF compared to right atrial appendage pacing.

SIMPLE MANOEUVRES CAN SIGNIFICANTLY REDUCE RADIATION DOSE DURING IMPLANTATION OF COMPLEX DEVICES

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Introduction Increasing numbers of complex devices are being implanted worldwide. Exposure to radiation presents a potential risk to both patients and operators. We assessed the efficacy of simple dose reduction manoeuvres on radiation dose for device implantation procedures at our institution.
Methods Radiation dose and screening time for device implantation procedures performed over a 30 month period were examined. Procedures were classified as BiV (biventricular pacemakers or defibrillators) or ICD (dual or single chamber implantable defibrillators). Lead repositioning or replacement and redo procedures were excluded. The following changes were made for procedures performed in the latter 15 months of this study: 1) reduced pulsed fluoroscopy rate; 2) removal of secondary radiation grids; 3) optimising use of collimation; 4) maximizing field of view; 5) halving frame rate for acquisitions to 6.25 frames per second. Results were analysed for the periods before and after dose reduction manoeuvres.
Results A total of 624 procedures (484 ICD insertions, 140 Biventricular device insertions) were analysed. Screening times were unchanged before and after dose reduction manoeuvres for both groups (ICD 7.1 ±0.6 min vs 7.7 ±0.9 min p=ns; BiV 29.0 ±2.0 min vs 30.9 ±3.1 min p=ns). Radiation exposure for ICD insertion was reduced by 51% after dose reduction interventions (667 ±88 vs 330 ±44 cGycm2, p=0.001) and by 45% for BiV device insertion (4245 ±555 vs 2353 ±365 cGycm2, p= 0.018).
Conclusion The safety of device implantation procedures can be improved by simple radiation protection manoeuvres. These measures significantly reduce radiation doses without increasing screening time.

CASE REPORT: ELEVATED DEFIBRILLATION THRESHOLD IN LEFT PRE-PECTORAL IMPLANTATION OF ICD IN A PATIENT WITH LEFT PNEUMONECTOMY

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A 56-YEARS-OLD MAN, WHO UNDERWENT LEFT PNEUMONECTOMY FOR A LEFT LUNG MALIGNANCY IN 1996, WAS ADMITTED FOR AN EPISODE OF HEART FAILURE RELATED TO A POST-ISCHEMIC DILATED CARDIOMIOPATHY. A SEVERE LEFT VENTRICULAR DYSFUNCTION (EF 25%) WAS DETECTED AT ECHOCARDIOGRAPHY. QRS DURATION WAS WITHIN NORMAL LIMITS. RECURRENT EPISODES OF NSVT WERE OBSERVED DURING TELEMETRIC MONITORING.
AN AUTOMATIC DUAL CHAMBER DEFIBRILLATOR WAS IMPLANTED USING THE STANDARD LEFT-SIDED PRE-PECTORAL APPROACH. TWO ELECTRODES WERE INTRODUCED THROUGH THE LEFT SUBCLAVIAN VEIN INTO THE RIGHT APPENDANGE AND THE RIGHT VENTRICLE AND THEN CONNECTED TO ICD. THE INITIAL DEFIBRILLATION ATTEMPT WITH 17 JOULE WAS INEFFECTIVE AND A SUBSEQUENT 31 JOULE SHOCK WAS NECESSARY. A VENTRICULAR TACHYCARDIA LASTING 11 BEATS WAS PRESENT BEFORE RESTORATION OF SINUS RHYTHM, THUS ICD INTERVENTION WAS CONSIDERED INEFFECTIVE. FEW DAYS LATER THE DEVICE WAS REPLACED BY A HIGH-ENERGY DEVICE THAT SUCCESSFULLY TERMINATED VF WITH 31 JOULE SHOCK. AS A CONSEGUENCE THE MAXIMUM VALUE OF ENERGY (41 JOULE) WAS PROGRAMMED AS VF THERAPY. IN THE FOLLOW-UP, NO THERAPY HAS BEEN DELIVERED WITHIN TWO YEARS AFTER THE PROCEDURE.
DISCUSSION PNEUMOTHORAX OR PNEUMONECTOMY ON THE SIDE OF DEVICE IMPLANTATION CAN ALTER DEFIBRILLATION THRESHOLDS DUE TO THE DIFFERENCE IN CONDUTION AND DISTRIBUTION OF THE DEFIBRILLATION FIELD. RIGHT-SIDED IMPLANTATION OF ICD MAY ALSO BE ASSOCIATED WITH HIGHER DEFIBRILLATION THRESHOLDS DUE TO LESS FAVOURABLE DISTRIBUTION OF THE DEFIBRILLATION FIELD. MOREOVER, IN A PATIENT WITH LEFT PNEUMONECTOMY RIGHT-SIDED IMPLANTATION MAY BE LIFE THREATENING IF THE PROCEDURE IS COMPLICATED BY PNEUMOTHORAX OR HEMOTORAX. IN THIS PATIENT, ICD WAS IMPLANTED WITHOUT COMPLICATIONS USING LEFT-SIDED VENOUS APPROACH. NEVERTHELESS THE DEFIBRILLATION THRESHOLD WAS FOUND TO BE ELEVATED.
THE PRESENT REPORT SUGGESTS THAT IN PATIENTS WITH LEFT PNEUMONECTOMY, THE LEFT PRE-PECTORAL IMPLANTATION OF ICD REQUIRES THE USE OF HIGH-ENERGY DEVICE FOR THE POSSIBILITY OF AN INCREASED VF THRESHOLD.

USE OF A DEFIBRILLATION COIL IN THE CORONARY SINUS TO REDUCE VENTRICULAR DEFIBRILLATION THRESHOLD

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INTRODUCTION Unsatisfactory defibrillation thresholds(DFT) is a porblem that can arise during ICD implant, usually overcome by changing lead configuration or shock-wave form. If that fails, introducting a sub-cutaneous array helps; but this is time-consuming, increases patient discomfort and can be prone to infection. We report use of shock coil in coronary sinus to resolve an unacceptably high DFT problem.
CASE-REPORT A 75 year old lady with syncopal ventricular tachycardia required ICD implant. Left brachiocephalic vein was occluded, hence implant was performed from right side. Right ventricular(RV) lead was satisfactory (threshold 0.3volts, R wave 13millivolts). However DFT was not, with failure to cardiovert at 25joules (device maxiumum 30joules). Reversing polarity, changing wave-form and removing superior vencava(SVC) coil didn't help. However instead of subcutaneous array, we tried positioning SVC coil in coronary sinus to improve the vector of shock field and make it more inclusive of the left ventricle. The procedure worked and DFT was reduced to <10joules. It is now over a year since implant, with no complications from shocks delivered or the lead itself.
DISCUSSION In right-sided ICD implants, the active can is intuitively on 'the wrong side' and the shock field is drawn away from rather than through left ventricle. Furthermore SVC coil is directly in line between RV coil and active can, hence doesn't add much to the shock field. Coronary sinus is an attractive site for shock coil as it would draw the shock field posteriorly and thus through the left ventricle from the anterior placed RV coil. Long-term safety of shock coils in coronary sinus have also been established from atrial defibrillator implants.
CONCLUSIONS Positioning defibrillation coil in coronary sinus is a simpler procedure and more convenient for both patient and operator than implanting sub-cutaneous array, thus presenting a better solution to the management of the problem of high DFT during ICD implant.

DYNAMIC CARDIOMYOPLASTY LONG TERM RESULTS

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The Dynamic Cardiomyoplasty procedure (DCMP) aims at supporting cardiac function in cases of chronic severe heart failure by wrapping the latissimus dorsi muscle around the failing ventricles and stimulating it in synchrony with ventricular function.
This analysis focuses on long-term survival and functional outcome of the French clinical experience consisting of 208 DCMP cases (53 +11y.) done in 6 centers. Mean preoperative LV EF was 22+9%. Mean NYHA Class at surgery time was 3.0 [II (17), III (169), IV (22)].
Results Longest follow up is 20 years. A cardiac procedure was associated in 51 pts (25%) [CABG (14), LV reconstruction (16), valve repair (15), and tumor resection (6)]. Early death (30 day) occurred in 29 cases (14%) [cardiac insufficiency (24), infarct (1), arrhythmia (3), other (1)].

Long-term survival results (179 pts) are in table below:

	1 y.	5 y.	10 y.	15 y.
Overall	78%	49%	31%	23%
LV failure	78%	48%	30%	23%
RV failure	80%	78%	70%	N/A
BiV failure	62%	39%	32%	23%

Causes of late death were: Heart Failure (44%), Sudden Death (37%),Non-Cardiac death (19%).
Among patients who died of sudden death or non-cardiac death (55 pts), 46 were in NYHA Class I-II before fatal outcome. The probability to be free of recurrent congestive heart failure defined as hospitalization for HF was 61%, 51% and 43% at 5, 10 and 15 years respectively. NYHA class of patients currently in follow up is 1.6. (mean FU: 10 y)
Conclusion DCMP has long lasting cardiac effects as documented by the non-recurrence of cardiac decompensation episodes in many patients (51% @ 10 y) and functional improvement (mean NYHA 1.6 @ 10 y.) vs. 3 (pre-op)
DCMP did not appear to reduce the incidence of sudden death (37%). Combination with ICD therapy is therefore warranted.

THE FIRST SURVEY OF PACEMAKER IMPLANTATION IN KOREA

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Cardiac pacing has been used widely as the main treatment for bradyarrhythmia. Yet there has been no data about the status of pacemaker implantation in Korea. The present study was done to determine the situation and trend of cardiac implantation in Korea. The information was obtained from the pacemaker manufacturers. The mean age at implant was 62.8 years and the male-to- female ratio was 1:1.43 in 2004. High grade atrioventricular block (49.2%) and sick sinus syndrome(37.3%) were the main indications for permanent pacing. 49.4% of the pacemakers were single chamber pacemakers (VVI, VVIR, VDD, AAI or AAIR) while 50.6% of pacemakers were dual chamber pacemakers (DDD or DDDR) and the number of new implants per million people was 27.2 in 2004. This number is very low compared to that of the Western countries. Yet the portion of dual chamber pacemakers is as high as that of those countries. This low number of implants in Korea is likely due to several reasons including socioeconomic condition, population profile, physician's attitude concerning pacemaker implantation, cultural aspects and reimbursement policy. There has been a gradual increase in pacemaker implantation from 2000 to 2004 (923/year to 1335/year). With an increasing life expectancy, the implantation rate will be expected to increase.

ADENOCARCINOMA OF THE LUNG IN A PACEMAKER POCKET

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Purpose To report the clinical case of a man with ischemic dilatative cardiomyopathy and adenocarcinoma of the lung in a pacemaker pocket
Clinical features A 75-yr-old man has been submitted at implantation of cardioverter defibrillator (Epic HF model V-339; Bipolar Tendril SDX 1688 active fixation leads; Defibrillation Lead Steroid Eluting by St Jude Medical). Three months later, the patient devel-

oped a non-septic decubitus. A biopsy was executed and showed a no-differentiation adenocarcinoma of the lung. A computed tomography scan demonstrated a large mass (7 cm maximum diameter) in para-ilar left lung. The patient has refused the surgical intervention and further diagnostic investigations and died three months later.
Conclusions The appearance of cancer in patients with pacemakers is probably coincidental and not related to material or electrochemical stimulation. Although the site of the generator pocket might be oncotactic. The concept of inflammatory oncotaxis is presented as a mechanism of cancer cell attraction and facilitation of transcapillary migration into tissue spaces. The irritation trap tumor cell provide disruption in the intracellular endothelial barrier allowing migration of the tumor cells into tissues. Possible causes and relationships are reviewed

NEW METHOD IN DIAGNOSTICS OF THE VENTRICULAR MYOCARDIUM INJURY

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The thermography (TG) used as a contact-free method for investigation of the myocardium ischemic injury. In coronary bypass surgery without artificial blood circulation it is important to know how the cut off in blood supply affects the myocardium. In the experiments on the working heart, TG allows monitoring temperature at the desired point of the epicardium. The aim was to investigate relations between myocardial ischemia and temperature and to prove that the ischemic tissue zones can be determined by TG. Experiments were performed on mongrel dogs. In the areas of induced ischemia, ventricular surface thermograms (T) and EG were recorded. The obtained data showed that the temperatures in the ischemic area and the border zone of myocardium were different from those in healthy myocardium. The analysis and evaluation of temperature changes in the ischemic zone were performed by using a specially created package of programs. A detailed analysis of the T of the ischemic area showed that between the ischemic and healthy myocardium a border zone is formed which is very important for arrhythmia genesis. The border zone is several millimeters wide, and its temperature is by 1oC higher than in healthy myocardium. The curve of the dynamics of temperature measured at all points of the ischemic zone is created. The correlation between myocardium temperatures and the characteristics of EG of ischemic zones are shown.
Conclusion The data show that TG is an appropriate method for determination of the ischemic area and the border zone in ventricular myocardium. Thermography gives a possibility to evaluate the functional status of myocardium in a contact-free way and may be applied for determination of the ischemic damage of myocardium during cardiosurgery.

ANTIPLATELET THERAPY DURING RADIOFREQUENCY ABLATION PROCEDURES: ROLE OF CLOPIDOGREL AND ASPIRIN

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Purpose To evaluate the activation of the coagulation system in relation to aspirin and clopidogrel pretreatment, during Radiofrequency Ablation (RFA) procedures.

Materials and Methods We studied 36 patients (17 men) who underwent RFA for supraventricular tachyarrhythmias in the right heart (atrioventricular nodal re-entry tachycardia n=24, atrioventricular reentry tachycardia due to accessory pathways n=10, isthmus dependent atrial flutter n=2). Eighteen patients were randomised to receive aspirin (325 mg loading, followed by 325 mg for one month) and eighteen to receive aspirin plus clopidogrel (300 mg loading, followed by 75 mg for one month). Platelet aggregation (PA) mediated by adenosine diphosphate (ADP) and activation of coagulation (by measuring thrombin-antithrombin complex, TAT) were assesed. Blood samples were collected at baseline, before sheath insertion (T1), on completion of the RFA procedure (T2), 24 hours later (T3) and after 1 month (T4).
Results A significant inhibition of PA ($p<0.001$) was observed in the aspirin plus clopidogrel arm. A non significant difference in TAT levels was demonstrated in all stages. (Table)
Conclusions In patients undergoing RFA procedures, the combination of aspirin and clopidogrel proved more effective than aspirin in inhibiting ADP-mediated platelet aggregation, whereas thrombin generation was not modulated by any antiplatelet agent.

Table. Values of PA (%) and TAT (ng/ml)

	Aspirin	*Combination*	*p value*
T1 ADP	67±7	30±11	<0.001
T2 ADP	73±8	40±7	<0.001
T3 ADP	77±6	43±7	<0.001
T4 ADP	67±9	38±8	<0.001
T1 TAT	2.2±0.5	1.8±0.5	NS
T2 TAT	17.1±8.6	17.4±6.8	NS
T3 TAT	9.1±4.5	7.9±4.4	NS
T4 TAT	1.7±0.9	1.6±0.7	NS

TRANSJUGULAR APROACH: A DIFFERENT ACCES IN LEFT ATRIUM FOR ISOLATION OF PULMONARY VEIN: CASE REPORT

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Case Report A 48- years- old man presented with a 4 year history of paroximal atrial fibrillation and in the last year the episodies increased until 5- 6 time in a month. Electrophysioogic study was prescribed, but right heart catheterization disclosed an accidental findings of anomalous venous drainage system (Fig1). Venogram also confirmed that the inferior vene cava drained directly into the azygos vein wich connected to the superior vena cava. After discussion, the patient decided to submit poulmonary vein isolation via transjugular approach. An aesophageal sound was positioned to see inter atrial septum.
A 7 french Mullin transeptal shesth was introduced into the right atrium.
After confirming needle entry in the left atrium, the septum were dilated by a 7 french dilator. After transeptal catheterizatin, sistemic anticoagulation was achieved with intravenous heparin to mantain an activated clotting time of 250 to 300 seconds.
Left Atrial Ablation A 4 mm irrigated Tip (Medtronic Sprinclr) was introduced into the left atrium. A 3D shel representing the left atrium was constructed by use of electroanatomic mapping sistem (Navx, Endocardial Solution). Left atrial ablation was performed 1 – 2 cm from the Pulonary veins (PV) Ostia to encircle the left and right sided PVs (Fig 14). Radiofrequency energy was delivered at a target pemperature of 450 C and a maximum power of 30 W (Atacr Medtronic).

Discussion The anomlies of the inferior vena cava (IVC), interrupted IVC with azygos continuation, has been reported in about 3% of children with congenital heart disease. The idea of transjugular approach in cathether ablation of atrial fibrillation, was generated to overcame the limitations of traditional transfemoral approach caused by venous drainage anomalies.

FLOATING LEFT ATRIAL THROMBUS IN PATIENT WITH ASYMPTOMATIC PERSISTENT ATRIAL FIBRILLATION

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Left atrial thrombosis is often revealed by echocardiography in patients (pts) with atrial fibrillation (AF), mitral valve disease and hypertrophic cardiomyopathy. Transoesophageal echocardiography (TEE) particularly is the first diagnostic technique to identify atrial thrombosis. Even if left atrial wall thrombosis or thrombi into left appendage have been frequently described in such kind of pts, the finding of a free-floating left atrial thrombus is a not common finding and it can give sudden occlusion of mitral valve causing cardiac arrest and peripheral or cerebral embolism.
We reported the case of a 56 years old woman suffered from severe mitral stenosis with a persistent AF admitted into our department for acute dyspnoea. She underwent to: cerebral TC which did not show presence of haemorrhage; Electrocardiogram which demonstrated AF with 50 b/min heart rate and left and right atrial enlargement; Chest radiography which revealed heart enlargement, lung congestion; Transthoracic echo (TTE) which showed severe mitral stenosis and mild regurgitation, left and right atrial remodelling with smoked like phenomenon and the presence of a large free-floating round ball of 3.2-3.6 cm diameter into the left atrium. The large ball bounced back the atrial wall, sometimes occluding mitral valve orifice. The pt was treated immediately with diuretic and oral anticoagulant therapy, antiepileptic drugs, ev heparin, which result in diminishing of symptoms and improvement of clinical outcome. Due to the severity of the pathology, a cardiac surgical intervention was hypothesized. TTE performed at 15 days showed complete disappearance of the left atrial thrombus but persistence of smoked like phenomenon that required a confirmation of the absence of others thrombi by TEE. We conclude that in our case the TTE evaluation allowed a correct diagnosis and represent, till now a successful diagnostic wide strategy to improve the detection of thrombi which can determine major clinical outcome

TRANSTELEPHONIC ECG WITH BLUETOOTH TECHNOLOGY: A NEW FRONTIER IN CARDIOLOGY

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BACKGROUND The number of Patients with cardiac disease increases with the age. Many Patients complained no specific symptoms. The present study analyze the impact of asymptomatic ECG events.
PATIENTS we enrolled 12 Pts; 8 males, 4 women, median age 65 (range 51-81), all with chronic ischemic heart disease on treatment and mostly without symptoms.
METHODS We used a Loop-Recorder with Bluetooth transmission (Loop-Recorder Vitaphone 3100BT). Each Patient had this device for 10 days. For the first time ever, with this equipment it is possible to record events with a single-channel ECG standard recording, to recognize automatically any pathological changes in the ECG and to transmit ECG data either with Bluetooth and mobile phone as well as acoustically. If the transmission is by Bluetooth connection it does not matter if recorder and phone are up to 10 meters apart. The multifunction buttons allow to adjust the Loop Recorder to the Patient's individual requirements. In any case, the ECG is passed on immediately by e-mail or fax to the hospital.
RESULTS ECG data were analyzed by a cardiologist and the following changes have been found: 7 Pts had supra-ventricular tachyarrhythmia ranging among 110 and 187 bpm; 1 Pt had supra-ventricular ectopic beats; 2 Pts had sinus tachycardia; 4 Pts had ventricular ectopic beats (1 monomorphic, 1 polymorphic, 1 couplets and 1 polymorphic couplets); 4 Pts had ST changes among 1 and 3 mm; 2 Pts had T waves changes. No Pt complained cardiac symptoms except one who had an angina-like pain with sinus tachycardia (110 bpm) without ST/T wave changes
CONCLUSION Our data show that the majority of Pts had asymptomatic ECG changes sometimes relevant.

CATHETER ABLATION OF ATRIAL FIBRILLATION: 8 MM OR COOL TIP CATHETER?

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Objectives Catheter ablation has become highly efficacious therapeutic alternative for patients (pts) with symptomatic atrial fibrillation (AF) refractory to antiarrhythmic drugs. At present, several ablation strategies have been developed. We report a comparison between the use of 8-mm tip and cool tip catheter employed in pulmonary vein (PV) isolation.
Methods 120 pts (107 men, mean age 54±9 years) with drug-refractory and symptomatic AF underwent electrical isolation of PV using the mapping lasso catheter, navigation by CARTO Merge (Biosense-Webster Inc., Diamond Bar, CA, USA) and intracardiac ultrasound (Acuson, Mountain View, CA, USA). In Group I (79 patients) 8-mm tip catheter was employed for PV isolation and in Group II (41 patients) we used cool tip catheter. We compared ablation and procedural parameters, efficacy and safety in both groups.
Results Total procedural time was slightly shorter in Group II: 244±57 min vs. 254±46 min in Group I, p=ns. There was no difference between the two groups in fluoroscopy time (27±8 vs. 26±8 min, p=ns) in Group II vs. Group I, respectively. However, the total ablation time and number of ablation points were significantly lower in Group II vs. Group I (2283±629 sec vs.2750±705 sec; 80±22 points vs. 108±32 points), p<0,01. After 6 months follow-up 65% of cases (45/69) in Group I are free of AF. The follow-up in Group II is markedly shorter (3±1 months) with the results of 70% of pts (21/30) without AF recurrence. There were no difference in the number of complications.
Conclusion The use of cool tip catheter was significant with lower number of ablation points and shorter total time of radiofrequency aplication. There was no significant difference between procedural and fluoroscopy time. The succsess rate of the procedure was higher in the group of patients, in which cool tip catheter was employed. However, longer follow-up is required.

SITES OF FOCAL ATRIAL ACTIVITY CHARACTERIZED BY ENDOCARDIAL MAPPING DURING ATRIAL FIBRILLATION

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Objectives The aim of the present study was to assess the feasibility of identifying sites of focal atrial activity by localized high-density endocardial mapping during atrial fibrillation (AF).
Background: Sites of focal activity in the left atrium have been demonstrated by epicardial mapping during AF.

Methods 24 patients (15paroxysmal, 3persistent, 6permanent AF) underwent endocardial mapping during AF. A 20-pole catheter with five radiating spines was used to map both atria for 30-seconds in each of ten pre-determined segments. A focal activity was defined as more 3 atrial cycles with activation spreading from center to periphery of the mapping catheter. Catheter ablation was performed independent of the mapping results.
Results Spontaneous focal activities were observed in 13 sites in the left atrium (9%; anterior 1, roof 2, posterior 6, inferior 4) in 12 patients (9 paroxysmal, 3 persistent). Focal activity was observed continuously (2 sites) or intermittently (11 sites, median 5 episodes), and associated with shortening of the cycle length (from 183plus minus33ms to 172plus minus29ms; P<0.05). The mean duration of an intermittent episode was 1.5 second (range: 0.4-7.1second). AF terminated without ablation at the foci in all of 12 patients, but in 2 of them, re-initiated arrhythmia was successfully ablated at these foci. Nine of these 12 patients (75%) were arrhythmia-free without anti-arrhythmic drugs during a follow-up period of 7.0plus minus3.1 months.
Conclusions Termination of AF without ablation at the sites of atrial focal activity suggests that this phenomenon may be triggered by impulses originating from other regions, such as the pulmonary veins.

BI-ATRIAL SUBSTRATE PROPERTIES IN PATIENTS WITH ATRIAL FIBRILLATION: IMPLICATION FOR CATHETER ABLATION OF ATRIAL FIBRILLATION

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Introduction The atrial substrate plays an important role in the maintenance of atrial fibrillation (AF). Further investigation of the properties of the bi-atrial substrate in patients with AF may be helpful for understanding the mechanism of AF.
Methods Bi-atrial electroanatomic mapping using a 3-dimensional mapping system (NavX) was performed in 114 consecutive patients with paroxysmal (n=99) and persistent (n=15) AF. The bi-atrial bipolar voltage and total activation time were obtained during sinus rhythm.
Results The LA had a lower voltage (1.6±0.5 vs. 1.9±0.7 mV, P<0.001) and higher coefficient variant of the voltage (1.10±0.25 vs. 0.97±0.22, P<0.001) compared to the RA. The total activation time correlated with the voltage (r=-0.57, P<0.001). Patients with persistent AF had a lower atrial voltage, higher coefficient variant of the LA voltage, and longer LA total activation time compared to those with paroxysmal AF. Comparison in the regional atrial voltage between paroxysmal and persistent AF, the decrease in voltage was observed in LA substrate, not in the PV-LA junction. Patients with recurrent AF after catheter ablation had a lower LA voltage and high incidence LA scarring compared to those without recurrence. Lower anteroseptal wall had a higher incidence of scar formation in patients with recurrence of AF compared to those without recurrence (28% vs. 8%, P=0.008).
Conclusion The LA voltage was lower than the RA, and the atrial voltage correlated with the total activation time. Electroanatomical remodeling of atria, such as decreased voltage, prolonged atrial conduction, and enlarged atrial size may promote and stabilize AF. LA substrate property plays an important role in the recurrence after catheter ablation of AF. Different scar distribution may be related to the genesis of recurrent AF.

HIGH-FREQUENCY ACTIVITY ON SPECTRAL ANALYSIS CAN PREDICT THE EFFICACY OF CAVOTRICUSPID ISTHMUS CATHETER ABLATION FOR ATRIAL FLUTTER-FIBRILLATION

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In patients with atrial flutter-fibrillation, the identification of sites of dominant activation frequency during atrial fibrillation and the relationship between dominant frequency and effect of cavotricuspid isthmus catheter ablation (IVC-TA CA) have not been reported.
Purpose The aim of this study was to investigate the relationship between dominant frequency and the clinical outcome of IVC-TA CA for atrial flutter-fibrillation.
Materials and Methods The Subjects were 13 patients (9 paroxysmal, 4 persistent) with atrial fibrillation and atrial flutter who underwent IVC-TA CA. Electroanatomic mapping of right atrium was performed during ongoing atrial fibrillation. At each point, 10-second electrograms were obtained to determine the highest-amplitude frequency on spectral analysis and to construct 3D dominant frequency maps. Ablation was performed with the operator blinded to the dominant frequency maps. 1) We investigated the recurrence of atrial fibrillation and atrial flutter and divided into two groups (group I without recurrent atrial fibrillation, group II with recurrent atrial fibrillation). 2) We divided the right atrium into ten areas(superior vena cava-right atrial junction, inferior vena cava-right atrial junction, lateral wall, septum, posterior wall, anterior wall, right atrial appendage, cavotricuspid isthmus, tricuspid annulus, coronary sinus ostium) and investigated the relationship between dominant frequency of each area and the clinical outcome of IVC-TA CA for atrial flutter-fibrillation.
Results 1) At the 9±4 months follow up, 4 patiens were free of arrhythmia(group I). However, 9 patients continued to have recurrent atrial fibrillation(group II). All patients had no recurrent atrial flutter. 2) Group I had significantly higher dominant frequency comparing to group II in lateral wall (6.6±0.9 vs 5.0±0.6 Hz: p<0.01), septum (6.6±0.7 vs 5.2±0.7Hz:p<0.01), cavotricuspid isthmus (6.7±0.9 vs 4.7±0.8Hz: p<0.01) and tricuspid annulus (7.2±0.6 vs 5.1±0.6Hz: p<0.0001).
Conclusions High-frequency activity in the area adjacent to cavotricuspid isthmus may predict the efficacy of IVC-TA CA for atrial flutter-fibrillation.

RADIOFREQUENCY CATHETER ABLATION OF SUPRAVENTRICULAR AND VENTRICULAR TACHYARRHYTHMIAS USING THE NON-CONTACT MAPPING SYSTEM

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Purpose Radiofrequency catheter ablation (RFA) with new mapping systems is being used in treatment of complex supraventricular (SVT) and ventricular tachyarrhythmias (VT). We evaluated the results of the non-contact mapping system (Ensite) guided RFA of 57 patients with SVTs or VTs that could not be treated with conventional RFA methods.
Materials and methods 39 of the 57 patients (mean age: 45.1±16.0 years) were male. Thirty-one patients (18 male) had SVT whereas 26 patients (21 male) had VT. Thirty-four patients had organic heart disease while 23 patients had primary electrical disease. Electrophysiological study was done with conventional multi channel BARD device and non-contact mapping system (Ensite®). Programmed stimulations were obtained by a Medtronic® stimula-

tor. Medtronic AtakrII® device was used for radiofrequency energy. Heat controlled or irrigated type catheters were used.
Results The overall success rate (SR) was 91% (52/57) with a complication rate of 5.2% (1 hemoptysis, 1 thrombophlebitis, 1 hemopericardium). During a mean 27.2±14.5 months of follow, recurrence rate (RR) was 7.6% (4/52); 3 of them were successfully treated with reablation. For the SVTs, successful ablation was performed in 2 of the 3 patients with atrial tachycardia associated with dilated cardiomyopathy, in all 5 patients with atrial flutter (AFL) associated with organic heart disease and 13 patients with common AFL, in 6 of the 9 patients with scar-related SVT, and in 1 patient with AVNRT. The overall SR was 87% with a RR of 11%. For the VTs, successful ablation was performed in 11 of the 12 patients with ischemic VT, both 2 patients with ARVD and 2 patients with dilated cardiomyopathy, 1 patient with scar-related VT and in all 9 patients with RVOT. The overall SR was 96% with a RR of 4%.
Conclusion RFA guided by non-contact mapping system can be used safely in treatment of complex arrhythmias with high SR.

THE EFFICACY OF INDUCIBILITY TEST: IMPLICATION FOR CATHETER ABLATION OF ATRIAL FIBRILLATION

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Introduction Recently, some conflicting results in the efficacy of inducibility test in catheter ablation of atrial fibrillation (AF) were reported. The aim of the study was to investigate the efficacy of inducibility test and the relationship with left atrial (LA) substrate property.
Methods and Results This study consisted of ninety-four patients with paroxysmal AF who underwent catheter ablation. Electroanatomic mapping using a NavX system was performed, and the LA voltage were obtained during sinus rhythm. After successful isolation of all four PVs and/or LA additional line, inducibility test was performed with high current (3-5 times of pacing threshold) stimulation from the proximal and distal coronary sinus for 3-5 times (pacing cycle length 250-150 ms). Patients with positive inducibility test (n=19) had a higher recurrence rate of AF compared to those with negative inducibility test (n=75) (74%, vs. 17%, P<0.001). The LA voltage is significantly lower in patients with positive inducibility (1.4±0.4 vs 1.8±0.5 mV, P = 0.03). Patients with positive inducibility test and recurrence have the lower LA voltage compared to those patients with negative inducibility test and no recurrence (1.3±0.4 vs. 1.9±0.4 mV, P=0.008). RA voltage has no relationship with inducibility test.
Conclusion The positive inducibility test is related with the recurrence of AF. The mechanism of inducibility after AF ablation may be related with the LA substrate property.

A NURSING FORM SHARED ALIKE CARDIOLOGY WARD AND INTERVENTISTIC CARDIOLOGY: EVALUATION OF 20 MONTHS OF EXPERIENCE

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AIMS On January the 1st 2005 a new Interventistic Cardiology staff started its activity. This structure is composed from an Haemodinamic and an Electrophisiology Laboratory managed by a proper Medical and Nursing staff. Since the beginning of activity was born the necessity of a complete document containing all useful informations about patients submitted to haemodinamic or electrophisiologic procedures. The form should permit a clear, univocal and quick informations exchange between lab and ward Nurses. Aims of this study are: to confirm that for each procedure a Nursing Form has been completely filled in, to reveal possible improvements in different parts of the Form, and the presence of critical aspects about information exchange.
METHODS Nursing Form is the same for electrophisiology and haemodinamic procedures. The form is divided in three different parts: the first one is dedicated to ward-nurses as the last one, to fill in before and after procedures; while the second part must be fill in by lab-nurses during procedures.
Since January the 1st 2005 till 31 August 2006, 1134 Forms were filled in the ratio of one to three between electrophisiologic (electrophisiology study, radiofrequency ablation PM and ICD implantation) and hamodinamic procedures (coronary angiography and angioplasty).
RESULTS AND CONCLUSIONS After 2 months of application, parts of the Form were changed to optimize its usefulness.
Our opinion about Nursing Form is positive because we observed:

- no difference between numbers of procedures and Nursing Forms
- communicative mistakes decrease
- almost careful and precise compilation
- improvement of patient assistencial process during invasive procedures
- awareness and professional competence increase
- beginning of educational effect between all cardiology team components.