1043-111 Dual-Site or Bi-Atrial Pacing Does Not Enhance Atrial Activation as Compared to Pacing From Novel Single Right Atrial Sites in Humans

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Introduction: Atrial based pacing for prevention of atrial fibrillation using standard and novel pacing configurations is under investigation. A possible anti-arrhythmic mechanism of pacing is to enhance bi-atrial activation and decrease dispersion of refractoriness. To determine whether dual site pacing (pacing from the distal right atrial (RA) appendage plus coronary sinus os), or bi-atrial pacing (pacing from the distal RA appendage plus distal coronary sinus) results in shortened atrial activation time (AAT) as compared to pacing from single RA sites, 19 patients (age 50±19 y) undergoing standard catheter ablation procedures were studied.

Methods: Pacing at 600 ms was accomplished in each subject from the proximal RA appendage, distal RA appendage, high RA septum, coronary sinus os, and using dual site and bi-atrial pacing. AAT was assessed by measuring P-wave duration from high-resolution (50-400 mm/s; 1-5 mV/cm) 12-lead rhythm strips.

Results: AAT during sinus rhythm (116.7±13.2 ms, mean±S.D.), and during single site pacing from the high septum (118.1±13.3), proximal appendage (116.4±11.2), coronary sinus os (118.9±15.9), and using dual site (110±12.8) or bi-atrial (107.9±14.1) pacing was the same (ANOVA, p>0.07). AAT during pacing from the distal RA appendage (129.4±21.6) was significantly greater than with pacing from any other site (ANOVA, p=0.001, T-test P=0.01). Dual site or bi-atrial pacing did not result in significantly shorter atrial activation times compared with pacing from the 'best' single site (P=0.54, 0.22 respectively).

Conclusions: 1) There is no significant enhancement of AAT using multi-site pacing in these individuals with normal intra- and inter-atrial conduction compared to RA pacing from a single site that yields rapid atrial activation. 2) A map-guided single RA pacing site can provide the benefits of multi-site pacing on atrial activation in such individuals without the need for multiple RA pacing leads. 3) Further studies are required to determine whether multi-site pacing provides added antiarrhythmic benefit compared to pacing from selected single RA pacing sites in individuals with atrial fibrillation and intact atrial conduction.

1043-111A Multisite or Septal Pacing for Arrhythmia Suppression in an Experimental Model of Paroxysmal Atrial Fibrillation?

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Methods: To investigate whether multisite and septal pacing suppress paroxysmal atrial fibrillation (AF) in an experimental model, sterile right atrial pericarditis was induced in 12 foxhounds to provide an anatomical substrate. As a trigger mechanism, atrial extrasystoles were simulated by constant asynchronous pacing at a cycle length (CL) of 1000 ms from randomly selected right or left atrial electrodes, contained within a custom-designed epicardial multielectrode with 128 bipoles. Additionally, a transvenous pacing lead was screwed into the interatrial septum. Four electrodes located in the high and low right (HRA/LRA) and left atrium (HLA/LLA) were selected for multisite stimulation. Constant pacing at a CL 30 ms below sinus rate was applied from the following pacing site(s) in random order: 1) HRA, 2) HRA + LRA, 3) HRA + LLA, 4) HRA + LRA + LLA, 5) HRA + LRA + HLA + LLA, and 6) septal. Number and duration of AF episodes with or without preventive pacing were studied during 10 min intervals, separated by 5 min pauses, respectively.

Results: The efficacy in suppressing AF increased with the number of pacing sites. Single-site septal pacing was as efficient as quadruple-site pacing. The data are summarized in the table below (*=p<0.05 vs. HRA; Tukey Kramer HSD test).

Conclusion: In this experimental model, preventive atrial pacing reduced the number of AF episodes, most efficiently with an increasing number of simultaneously paced sites or with a single pacing site located septally.

Pacing site(s)	AF episodes (n)	Episode duration (s)
HRA	14.3±10.2	24±38
HRA+LRA	7.5±8.3	22±27
HRA+LLA	8.4±7.4	19±52
HRA+LRA+LLA	7.1±6.5	12±19
HRA+LRA+HLA+LLA	3.9±4.2*	37±81
Septal	3.7±3.6*	37±75

POSTER SESSION

1066 Atrial Fibrillation: Thromboembolism and Stroke

Sunday, March 17, 2002, 3:00 p.m.-5:00 p.m.
Georgia World Congress Center, Hall G
Presentation Hour: 4:00 p.m.-5:00 p.m.

1066-103 Left Atrial Appendage Ligation During Mitral Valve Surgery May Increase the Risk of Late Thromboembolic Events

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Background: The need for non-pharmacological treatment to prevent thromboembolic events (TE) in atrial fibrillation (AF) is increasing. Left atrial appendage (LAA) ligation during mitral valve (MV) surgery was suggested as an alternative treatment to anticoagulation with warfarin, but the role of this surgical procedure is still controversial. Methods: Between 5/93 and 11/98 136 patients (pts) underwent LAA ligation during MV surgery. Complete follow up was available on 114 pts, There were 67 (58.8%) females and 47 (41.2%) males with a mean age of 61.1 ± 12.3 yrs and a mean LVEF of 46.7 ± 12.3%. The MV was replaced with bioprosthetic valve in 36 (31.6%) pts or mechanical in 27 (23.7%) pts and repaired in 51 (44.7%) pts. A control group of 146 pts who underwent MV surgery without LAA ligation were selected randomly and found to match for age, sex, LVEF, type of valve surgery, left atrial size, HTN, DM, and smoking history. Late TE was defined as stroke, transient ischemic attack, or peripheral embolism occurring 48 hours after the surgery. Cardiothoracic surgery database and telephone contact were used to assess the incidence of late TE. Results: Over a follow up period of 1318 ± 481 days 14 (12.3%) pts had TE in LAA ligation group vs 9 (6.2%) pts in the control group over a follow up period of 1705 ± 650 days. Late TE by Kaplan-Meier curves for the two groups differed significantly for the entire follow up period with a p value of 0.034. The one year rate of TE in LAA ligation group was 8.8 ± 2.7% vs. 2.7 ± 1.4% in the control group. No warfarin therapy or subtherapeutic anticoagulation was found in 23 pts out of 24 pts during TE. Among pts who were not prescribed warfarin prior to discharge home 6/40 (15%) pts had TE in LAA ligation group compared to 2/60 (3.3%) in the control group (p=0.023). There was no difference in late TE between the two groups among patients who were prescribed warfarin prior to discharge home 7/67 (11.5%) pts in LAA ligation group vs. 7/70 (10%) in control group (p=0.66). Conclusion: In this group of patients LAA ligation does not provide adequate protection from late thromboembolic events in the absence of effective anticoagulation with warfarin.

1066-104 Prevention of Post-Cardiac Surgery Atrial Fibrillation Is Not Associated With Decrease in Post-Operative Stroke: Meta-Analysis

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Post-operative atrial fibrillation (POAF) has been associated with increased rate of post-operative stroke. However, it is far from certain that the POAF is an actual cause of post-cardiac surgery stroke, because other intra- and extra-cardiac sources of embolism are common. No study has convincingly demonstrated that a decrease in POAF prevents post-cardiac surgery stroke. Therefore, we performed meta-analysis of randomized controlled trials on POAF prevention by drugs (beta-blockers, sotalol and amiodarone) and pacing, with the end-point of in-hospital post-operative stroke. The identification of trials and data derivation were performed in accordance to Cochrane group methodology.

Results. The data regarding stroke were available in 12 randomized control trials, with the total population of 2683 patients. Most of trials excluded patients with low left ventricular ejection fraction and other groups at increased peri-operative risk. 1064 pts were randomized to amiodarone, 347 to sotalol, 1077 to other beta-blockers and 195 to the pacing or control treatment. The control groups received routine care, or placebo. The occurrence of POAF decreased significantly from 39% in control group to 25% in treatment group (OR 0.45, 95%CI 0.35, 057). The incidence of post-operative stroke was 1.2% in control vs. 1.2% in intervention group (OR 0.94 ,95%CI 0.46, 1.92).

Conclusion. The enrolled population had low risk of peri-operative stroke. In this meta-analysis, decrease in occurrence of POAF was not associated with change in the rate of post-operative stroke, although the power of this study was still insufficient to prove differences in range below 1%.

1066-105 Predictors of Warfarin Use in Atrial Fibrillation: Insights From the FRACTAL Registry

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Background: Warfarin is underused for stroke prevention in atrial fibrillation (AF). Previous studies have shown that some stroke risk factors such as prior stroke or congestive heart failure (CHF) are predictive of warfarin use, while other stroke risk factors are not. Prior studies have lacked longitudinal observation, and little is known about whether anticoagulation rates vary by physician specialty type.

Methods: We analyzed warfarin use in 1005 subjects enrolled in the Fibrillation Registry Assessing Costs, Therapies, Adverse events, and Lifestyle (FRACTAL), an observational cohort study of new onset atrial fibrillation. Possible determinants of warfarin use at enrollment and 12 months later were evaluated using logistic regression.

Results: Initially, 65% of subjects received warfarin, but only 49% were on warfarin at 12 months. Hypertension, CHF, valvular heart disease and a rate control strategy were predictors of initial warfarin use; age<55 years, female gender, and history of coronary artery or ulcer disease were negative predictors. Predictors of warfarin use at 12 months are shown in Table 1. Hypertension, ulcer disease, gender, and physician specialty were not predictive. The strongest predictor of warfarin use at 12 months was recurrence of AF.
Conclusions: Predictors of warfarin use in AF patients include stroke risk factors and potential warfarin contraindications. In addition, AF recurrence is a potent predictor for warfarin use 12 months after initial diagnosis.

Table 1. Predictors of warfarin use at 12 months

Variable	Odds ratio (95% CI)	P value
AF recurrence	2.27 (1.51-3.42)	0.0001
Prior stroke/TIA	2.09 (1.15-3.79)	0.02
CHF	1.89 (1.25-2.87)	0.003
Valvular disease	1.78 (1.16-2.66)	0.008
Age <55	0.49 (0.33-0.74)	0.0008

1066-106 Comparison of Transesophageal Echocardiography-Detected Thromboembolic Risk Markers in Patients With Chronic Atrial Fibrillation and Atrial Tachycardia According to the SPAF Clinical Risk Stratification: A Prospective Study

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The thromboembolic (TE) risk of atrial flutter and tachycardias (AFT) has been reported as lower than atrial fibrillation (AF). Current guidelines suggest the need for a similar anticoagulant strategy in both groups. This attitude could be balanced by a risk stratification using SPAF clinical criteria and TE echocardiographic markers.
Objective : We sought to compare the frequency of TE risk markers in patients (Pts) with chronic AF and AFT according to the SPAF clinical criteria for TE risk stratification.
Methods : As part of an ongoing prospective study, we evaluated 212 Pts in chronic AF and 77 Pts in AFT using transthoracic and transesophageal echocardiography (TEE). Pts were divided into high (n=113 and 43, respectively) and moderate/ low (n=99 and 34, respectively) SPAF clinical risk groups. The following parameters were evaluated : left atrial (LA) and LA appendage (LAA) areas, spontaneous echo contrast (SEC), LAA end diastolic emptying velocity (Vel), LA thrombus (Thr) and thoracic aorta atheroma (TAA).
Results : The main results are summarized in the table

	Chronic AF High risk (n=113)	Chronic AF Moderate/ low risk (n=99)	AFT High risk (n=43)	AFT Moderate/ low risk (n=34)
Mean age (years)	75 ± 11	63.1 ± 11.5	70.9 ± 14.2	63.7 ± 12.9
LA area (cm^2)	24.7 ± 6.3	24.3 ± 6.0	23.7 ± 7.2	22.3 ± 6.9
LAA area (cm^2)	5.4 ± 2.3	5.9 ± 2.6	5.8 ± 2.6	5.4 ± 2.4
LAA Vel ≤25 cm/s (n,%)	55 (50.9)*	32 (34.7)	9 (21.9)	8 (25.0)
LA SEC (n,%)	75 (73.5)*	60 (63.8)	18 (45.8)	12 (44.4)
LAA Thr (n,%)	6 (5.3)	1 (1.0)	2 (4.6)	0
TAA ≥ 4 mm (n,%)	18 (17.3)	10 (10.4)	10 (23.8)	4 (13.3)

*p< 0.05, high risk AF vs high risk AFT ; ** p< 0.05, moderate/low AF vs moderate/low risk AFT.
Conclusion : LA TE risk markers are more frequent in high risk Pts with AF. However, LA and LAA dilatation and TAA are equally frequent in both high risk Pts. AFT should be stratified using the SPAF criteria, similarly to AF, to help the accurate anticoagulant strategy.

1066-119 A Risk Profile for Stroke or Death in Atrial Fibrillation: The Framingham Heart Study

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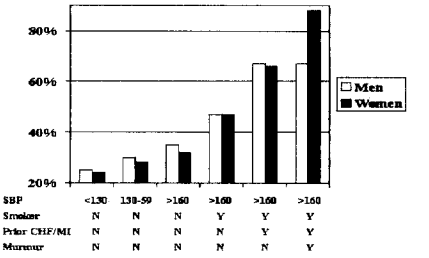
BACKGROUND: Individuals with atrial fibrillation (AF) are at increased risk of both stroke and death. Risk factors for stroke in AF have been studied, but mainly in subjects enrolled in randomized trials. We developed a clinical risk profile, and examined whether it could stratify risk among individuals with AF in the community.
METHODS: We studied 870 subjects (mean age 74, range 55 to 94 years, 48% women) from the original and offspring cohorts of the Framingham Heart Study who developed AF after 1960. Stepwise Cox proportional hazards models were used to examine clinical predictors (obtained from history, physical exam, or ECG) of stroke or death during 5 years of follow up. Subjects who had a stroke or died within 30 days of AF diagnosis were excluded.
RESULTS: The 5-year event rate was 49%. The following predictors were significant in multivariable models: age, systolic blood pressure, smoking, prior myocardial infarction or heart failure, and heart murmur. Men in the lowest decile of predicted risk had a 5-year event rate of 9.4%, while those in the highest decile had an event rate of 83.9%. The corresponding values for women were 30.4% and 93.5%. Sex-specific predicted event rates for a representative 70 year old are shown (Figure).
CONCLUSION: Using a risk prediction model, it is possible to identify subjects with AF who are at particularly high or low risk of stroke or death.



1066-120 Embolic Event Rates After Direct Current Cardioversion in Patients With Atrial Fibrillation and Ineffective Anticoagulation: Results of the Ludwigshafen Observational Atrial Fibrillation Study

Karlheinz Seidl, Monika Rameken, Margit Vater, Harald Schwacke, Andreas Brandt, Caroline Bergmeier, Ralf Zahn, Jochen Senges, *Heart Center, Ludwigshafen, Germany.*

The Ludwigshafen atrial fibrillation (AF) study is a prospective single center observational study on an intention to cardiovert basis, including 1269 consecutive unselected patients (pts) with AF. Aim of this substudy was to evaluate the embolic event rate in pts with AF and ineffective anticoagulation (IA), in whom electrical cardioversion (CV) was intended . IA was defined, if warfarin was given, however INR was < 2, or if no anticoagulation was performed. Reasons for performing CV in pts with IA were AF of < 48 h, hemodynamic instable AF, or contraindication for anticoagulation. After cardioversion an overlap of warfarin therapy and intravenous heparin was given to maintain adequate anticoagulation after CV in pts without contraindications for anticoagulation.
Results: In 193 pts (15%) anticoagulation therapy was ineffective at the time of the intended CV. Transesophageal echocardiography (TEE) was performed in 126 pts, in the remaining 67 pts transthoracic echo was performed. A thrombus was found in 10 pts (7.9%) of the 126 pts with AF and ineffective anticoagulation. In 53 of the 126 pts (42%) TEE revealed spontaneous echo contrast. The grade of spontaneous echo contrast was mild in 74%, moderate in 19% and severe in 9%. In 150 of the 196 pts (78%) CV was performed, in the remaining 43 pts no CV was performed. In 2 of 150 pts (1.3%) with AF and IA a transient ischemic attack occurred in the first 4 weeks after CV. In both pts TEE was performed before CV, none of the pts had evidence of left atrial thrombus. In none of the 43 pts without CV a thromboembolic complication occurred. In comparison the rate of thromboembolic complications in the first 4 weeks after CV was 0.8 % (9/1076 pts) in pts with AF and effective anticoagulation at least 3 weeks prior to CV.
Conclusion: 1) In our AF outpatient clinic 15% of the pts with AF had ineffective anticoagulation prior to CV. 2) The rate of embolic events in the first 4 weeks after the intended CV was 1.3 in pts with ineffective anticoagulation compared to 0.8 in pts with effective anticoagulation.

POSTER SESSION

1067 Implantable Cardioverter Defibrillator Therapy: Clinical Observations

Sunday, March 17, 2002, 3:00 p.m.-5:00 p.m.
Georgia World Congress Center, Hall G
Presentation Hour: 4:00 p.m.-5:00 p.m.

1067-107 Changes in R-R Intervals During Ventricular Tachyarrhythmia Storms in Patients With Implantable Cardioverter-Defibrillator

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BACKGROUND: Ventricular tachyarrhythmia (VT/VF) storms, defined as greater than or equal to 3 episodes within 24 hours, have been reported in patients with implantable cardioverter-defibrillator (ICD). The study objective was to determine whether predisposition to VT/VF storms could be assessed from changes in episode related cardiac cycle lengths. METHODS: ICD patients (n=220) with coronary artery disease were followed for 6.9±3.6 months post-implant. Stored electrograms were retrospectively reviewed and all true VT/VF episodes, each of which was successfully terminated, were identified. Two types of changes in mean R-R interval (R-R) were calculated: (1) Delta-RR1, {[(mean R-R immediately prior to an episode)-(baseline mean R-R)]/(baseline mean R-R)}*100%, and (2) Delta-RR2, {[(mean R-R immediately after an episode)-(mean R-R immediately prior to an episode)]/(mean R-R immediately prior to an episode)}*100%. Baseline mean R-R was obtained at office visit and the mean R-Rs immediately prior to and immediately after an episode were obtained from ICD electrograms (excluding premature contraction). RESULTS: There were a total of 629 episodes in 72 patients. Forty-one patients had all discrete episodes (total 91 episodes, group 1) without storms. Thirty-one patients experienced at least one storm and had a total of 538 episodes (group 2). Of 538 episodes in group 2, 405 episodes (75%, group 2a) occurred in 57 storms and the remaining 133 episodes were discrete (25%, group 2b). Each VT/VF storm consisted of 7.1±5.7 episodes (median = 5). The Delta-RR1 was -10.7±23.6% for group 1 and -27.3±15.4%