Conclusion: Levels of PF1+2 in the peripheral blood are raised in patients with NVAF compared to patients in sinus rhythm reflecting increased thrombin generation in these patients. Warfarin therapy results in a significant decrease in these levels. There is no detectable evidence of endothelial activation suggesting that the endothelium does not play a significant role in the generation of thrombin in this condition.

1149-168 P Wave Duration Is Shortened After Open Heart Surgery

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Background: Atrial fibrillation (AF) occurs in 30% of patients that undergo open heart surgery (OHS). The wavelength hypothesis of AF states that slow conduction velocity and a short atrial refractory period facilitate the initiation and maintenance of AF. It has been postulated that OHS may slow intra-atrial conduction by ischemic or other mechanisms. We investigated the effect of OHS on atrial conduction velocity by signal averaging P waves in patients before and after OHS.

Methods: 42 patients had P wave triggered P wave signal averaging done before and again 2.2 ± 1 days after surgery. Echo for atrial size was done before and after surgery in 22 of these patients.

Results: Residual noise after signal averaging was the same before and after surgery (0.28 ± 0.1 vs. 0.28 ± 0.09). Unfiltered and filtered P wave duration were significantly shorter after compared to before surgery (unfiltered 104 ± 13 vs. 115 ± 13 ms $p < 0.001$, filtered 116 ± 15 vs. 129 ± 19 ms $p < 0.001$). Atrial size by echo did not change (post op 4.17 ± 0.6 vs. pre op 4.14 ± 0.5 cm $p = 0.76$).

Conclusion: A shortening of P wave duration with unchanged atrial size suggests that OHS results in acceleration of atrial conduction an effect that would be expected to reduce the likelihood of AF. There must be effects of OHS on the atrial refractory period, the dispersion of atrial refractoriness, or other aspects of atrial electrophysiology that counter balance the conduction velocity and lead to the high incidence of AF observed after OHS.

1149-169 Clinical Utility of Right Atrial Electric Potential Measurement to Predict the Success in Defibrillation in Patients With Atrial Fibrillation

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Purpose: To evaluate the mechanism of atrial fibrillation (Af), we measured the right atrial electric potential in patients with chronic Af, and also assessed the clinical utility of these measurements in predicting the success in atrial defibrillation.

Methods: The endocardial electric potential was recorded at 12 sites within the right atrium (high, middle, and low sites of the anterior, posterior, lateral, and medial atrium) using an electrode catheter in 33 patients with Af. The duration and polar displacement of the atrial waves were measured at a site with the maximum atrial electric potential. The ratio of the maximum to minimum atrial electric potential (A wave ratio; Amax/Amin) was calculated. Patients were classified into the two groups according to the success (n = 10) or failure (n = 23) in atrial defibrillation. Electrophysiologic data were compared between the two groups, and the relationships between the electrophysiologic data and the maximal left atrial diameter obtained by M-mode echocardiography were investigated.

Results: There were no significant differences in the duration and polar displacement of the atrial waves between the two groups. However, the A wave ratio was significantly lower ($p < 0.001$) in the success group (5.3 ± 3.0) than in the failure group (19.1 ± 11.0). The success in atrial defibrillation was also significantly less ($p < 0.005$) in the patients with an A wave ratio > 10. The A wave ratio correlated positively with the maximal left atrial diameter ($r = 0.683$, $p < 0.0001$).

Conclusion: As the A wave ratio increased, it became more difficult to make a success in defibrillation in patients with Af. The right atrial electric potential measurements can be used as a good predictor for successful atrial defibrillation in patients with Af.

1149-170 Evidence of Atrial Remodeling in Patients With Chronic Atrial Fibrillation: Observations Following Internal Cardioversion

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Experimental studies in animal hearts have shown that the normal relation between atrial rate and action potential duration (APD) changes following prolonged periods of atrial fibrillation (AF) (remodeling). The purpose of our study was to evaluate if these changes also occur in patients with AF. The APD_{90} was measured in 11 pts (mean age: 61 ± 7 year) with chronic AF following internal cardioversion and compared to 6 controls (C) with no history of AF but with RF ablation for AVNT (3 pts) or an accessory pathway (3 pts) (mean age: 55 ± 8 year). The APD_{90} was measured at paced cycle lengths of 600 and 430 ms. Measurements were obtained at 3 different levels in the right atrium along the crista terminalis (CT): high (H), mid (M) and low (L). The studies were performed 10 minutes after cardioversion to sinus rhythm.

Results:

Location	CL (ms)	AF	P-value	Controls	P-value
HCT	600	232 ± 56	NS	263 ± 35	0.04
	430	239 ± 53	NS	233 ± 14	0.04
MCT	600	243 ± 31	NS	277 ± 19	0.01
	430	233 ± 32	NS	250 ± 17	0.01
LCT	600	249 ± 50	NS	251 ± 27	0.05
	430	251 ± 42	NS	227 ± 17	0.05

Conclusions: In pts with AF, in contrast to C pts, we found lack of rate-related shortening of APD_{90} consistent with atrial remodeling.

1149-171 Intracardiac Ultrasound Guidance of Linear Lesion Creation for Ablation of Atrial Fibrillation

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Poor fluoroscopic visualization of specific cardiac landmarks such as the pulmonary veins hinders the effective creation of complete linear lesions in those anatomic locations required for elimination of atrial fibrillation. Therefore, to determine the utility of anatomic imaging with intracardiac ultrasound for effectively guiding the placement of linear lesions, 15 dogs underwent ablation for the creation of linear lines of block. The optimal imaging vantage point for left atrial structures was also assessed. A 7.5 mHz phased-array intracardiac ultrasound device delivered on a 24 Fr rigid probe or 10 Fr deflectable catheter was used to visualize the relevant anatomy for guiding lesion placement. Imaging from the right heart at the level of the tricuspid annulus provided the best imaging of the right superior and inferior pulmonary veins and the posterior LA wall. In contrast, imaging from the aortic root was required to specifically isolate the left superior and inferior pulmonary veins. Both imaging vantage points were equally effective in delineating the mitral annulus, interatrial septum, and left atrial appendage. The linear lesions, between the SVC and IVC or between pulmonary veins, or a pulmonary vein and other structures were created with either multielectrode catheters or single pole drag techniques as guided by this longitudinal imaging capability. Gross pathologic examination demonstrated the accuracy of placing the lesions at the targeted anatomy. Based on this, we conclude that anatomy relevant to ablation of atrial fibrillation is readily visualized by intracardiac ultrasound. This approach may be useful in guiding catheter deployment for the placement of left and right atrial lesions between specific anatomic barriers of interest, which could be helpful in the ablation of atrial fibrillation in man.

1149-172 The RR Interval Distribution Pattern as a Predictive Factor of the Outcome of Atrioventricular Conduction Modification in Patients With Atrial Fibrillation

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Background: Slowing of the ventricular rate (VR) in patients (pts) with chronic atrial fibrillation (AF) and rapid ventricular response can be achieved by eliminating dual atrioventricular node (AVN) physiology with radiofrequency (RF) energy delivered at the slow pathway area. However, the presence of dual AVN physiology can not be confirmed in chronic AF.

Methods: Since a bimodal (B) RR distribution pattern may suggest the presence of dual AVN physiology, we studied 43 pts with chronic AF and rapid ventricular response who required modification of AVN conduction in order to control the VR. The analysis of RR intervals that were derived from 24 hour ambulatory ECG recordings (AECGs) resulted in construction of heart rate stratified histograms. RF energy was delivered at the posterior-medial septum of the tricuspid annulus. AECGs were again obtained one month after the procedure and the RR interval analysis was repeated. The mean and max heart rates were estimated from 24 hour AECGs.

Results: Twenty two pts presented a B pattern and 21 pts presented a unimodal (U) one. Both groups were comparable for age, sex, arrhythmia duration, underlying heart disease and LV ejection fraction. Because of failure of the AVN modification or recurrence, 3 pts of B pattern and 5 pts of U pattern underwent His bundle ablation with pacemaker implantation. RF modification of AVN was repeated successfully in one pt with B pattern who relapsed to rapid VR while one pt with U pattern and recurrence underwent DC cardioversion.