1091-120 **Effects of Candesartan to Prevent Fatal Arrhythmias Following Acute Myocardial Ischemia and Reperfusion: An Electrophysiological Study Using Canine Hearts**

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This study aimed to examine whether angiotensin II type 1 receptor antagonist (candesartan) would be preventable against acute arrhythmias through its electrophysiological effects following acute myocardial ischemia and reperfusion in dogs. Forty dogs were divided into two groups: the candesartan group (n=20) and the control group (n=20). The candesartan group received an intravenous infusion of candesartan (1 mg/kg) 10 minutes prior to the left anterior descending coronary artery (LAD) ligation. The LAD was ligated for 10 minutes. Changes in hemodynamic parameters, the effective refractory period (ERP) and intramyocardial conduction time (ICT) of the ischemic myocardial regions during ligation of the LAD and reperfusion were compared between the two groups. There were no significant differences in all hemodynamic parameters before, during and after the ligation between the two groups. However, the shortening of the ERP due to ischemia was significantly suppressed in the candesartan group as compared to the control group [maximum shortening: 104.7±4.7 vs 88.5±6.5% (baseline value=100), p<0.01]. The prolongation of ICT during ischemia and reperfusion also was significantly suppressed in the candesartan group (maximum prolongation: 100.1±2.8 vs 137.7±9.6%, p<0.01). The frequency of ventricular fibrillation was significantly lower in the candesartan group than in the control group [25% (5/20) vs 75% (15/20), p<0.01]. These results suggest that candesartan prevents critical electrophysiological changes during acute ischemia and reperfusion, resulting in decreases in fatal arrhythmias.

POSTER SESSION

1092 Implantable Cardioverter Defibrillator Therapy: Implantation and Programming Techniques

Monday, March 18, 2002, 9:00 a.m.-11:00 a.m.
Georgia World Congress Center, Hall G
Presentation Hour: 10:00 a.m.-11:00 a.m.

1092-112 **Are Programmable Shock Vectors Required to Optimize Atrial Defibrillation?**

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Background: Ventricular defibrillation is optimized by shocking from the distal right ventricular (RV) coil to the proximal right atrial (RA) coil and left pectoral emulator (Can). We hypothesized that for atrial defibrillation, shocking from the RA might reduce defibrillation thresholds (DFTs). To assess this, a randomized study comparing these two shock vectors was performed in 25 patients (pts) with a dual coil lead.
Methods: Paired randomized comparisons of the atrial DFTs were made in the ventricular triad (RV->RA+Can) and atrial triad
(RA->RV+Can) configurations in pts undergoing ICD implantation. Sustained atrial fibrillation (AF) was induced with ramp pacing and DFTs were measured with a step-up protocol starting at 0.5J. The biphasic waveform had 60/50% tilts and a 150 F capacitance.
Results: The pts had a mean age of 65+/-12 yr. and 88% were male. The mean ejection fraction was 34+/-16% and 24% had a history of AF. A total of 191 R-wave synchronized shocks were delivered in AF with no ventricular arrhythmias induced. There was no significant difference in atrial DFTs or peak current, although shock impedance was lower with the atrial triad configuration (Table). In 10 pts (40%) the DFT was lower with the atrial triad, in 8 pts (32%) the DFT was lower with the ventricular triad and in the remaining 7 pts (28%) DFTs were the same.
Conclusions: Low atrial DFTs are obtained with a standard dual coil, active pectoral ICD system. Programmable shock vectors may not be required to optimize atrial defibrillation.

	DFT(J)	Impedance(Ohms)	Current(A)
Ventricular Triad	3.6 +/-3.0	40.0 +/-6.3	5.0 +/-2.5
Atrial Triad	3.4 +/-2.8	35.0 +/-8.4 *	5.5 +/-2.7

* p < 0.01

1092-113 **The Atrial Defibrillation Threshold of the Standard Biatrial Configuration Is Markedly Reduced When Followed by a Second Shock Along the Atrial Septum**

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This study assessed the benefit in atrial defibrillation threshold (ADFT) reduction afforded by an additional shock pathway whose vector was along the atrial septum between the proximal coronary sinus (pCS) and superior vena cava (SVC), SVC→pCS, following the standard right atrium (RA) to distal coronary sinus (dCS) shock, RA→dCS. **Methods**: Atrial fibrillation was induced in 8 closed-chest sheep by burst atrial pacing and maintained by continuous pericardial infusion of acetyl-β-methylcholine. A custom-made defibrillation catheter was positioned so that its three coils lay in the dCS (3 cm long), pCS (2 cm), and lateral RA (3 cm). Also, a 6-cm coil was situated at the SVC just rostral to the RA. The ADFTs of 2 lead configurations were determined according to a multiple-reversal protocol in random order. Single and dual 3/1 ms biphasic truncated exponential waveforms was employed on single (RA→dCS) or sequential (RA→dCS / SVC→pCS) configurations, respectively. With sequential shocks, the leading edge voltage of the second shock equaled the trailing edge voltage of the first shock. **Results**: Table. **Conclusion:** The standard RA→dCS shock with a sequential shock directed from pCS to SVC significantly reduce the ADFT. Since some combined atrial/ventricular implantable defibrillators already employ RA, SVC and dCS electrodes, the sequential configuration can be implemented by adding the pCS electrode to the CS catheter, without requiring placement of an additional catheter.

ADFT Energy, leading edge voltage and current

Configurations	Energy (J)	Voltage (V)	Current (A)
RA→dCS	0.86±0.29	160±30	2.42±0.39
RA→dCS/SVC→pCS	0.56±0.18	112±22	1.61±0.41
p value	<0.05	<0.05	<0.05

1092-114 **Incidence and Causes of Commited Shocks in Noncommited Implantable Defibrillators**

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Background: Non-committed behavior in modern ICDs usually prevents delivery of shocks for nonsustained arrhythmias. However, many non-committed ICDs operate transiently in a committed mode when "conservative" algorithms designed to prevent undersensing and withholding of appropriate shocks are invoked. We sought to identify the incidence and causes of committed shocks in ICDs from 2 manufacturers.
Methods: We analyzed all spontaneous shock episodes with stored electrograms from pts implanted with recent-generation Guidant and Medtronic ICDs. Non-committed function was enabled routinely. The incidence and causes responsible for committed behavior (i.e., shocks delivered after termination of the triggering rhythm) were identified and tabulated.
Results: A total of 358 delivered shocks in 61 pts were analyzed [255 (71%) appropriate and 103 (29%) spurious]. Eleven (11%) of the spurious shocks (3% of total) were committed shocks for nonsustained ventricular arrhythmia. Committed behavior was also responsible for 2 shocks delivered for nonsustained atrial arrhythmias and 1 due to intermittent oversensing of myopotentials. The causes of committed shocks in Guidant ICDs were: a) tachyarrhythmia redetection within the 10 sec required for declaration of end of episode after a diverted shock (4 shocks); and b) asystole during the 2 sec quiescent confirmation window after capacitor charge (1 shock). Committed shocks in Medtronic ICDs resulted from: a) supraventricular rhythm or atrial or ventricular ectopy at a cycle length faster than tachycardia detection interval (TDI) + 60 ms during the synchronization window after capacitor charge (6 shocks); or b) second (or subsequent) shocks for continuing episodes detected in the VF zone (3 shocks). In 3 instances (21%), a committed shock resulted in ventricular proarrhythmia that required additional shock(s) for termination.
Conclusions: Despite their low incidence, committed shocks remain a shortcoming of ICD therapy. Because their causes are device-specific they can, in part, be prevented by tailoring the device and its programming to the individual pt. Highly specific reconfirmation algorithms that do not compromise safety remain desirable.

1092-115 **Subthreshold Test Pulse Versus Shock Delivery to Evaluate High Voltage Impedance in ICD Patients**

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High voltage impedance (HVI) measurements are an important tool for ICD lead failure detection. In the past, low energy test shocks had to be delivered to determine HVI. Novel ICDs provide subthreshold HVI testing. We prospectively compared the reproducibility of HVI measurements using test pulses versus low energy shocks and evaluated their correlation to HVI measurements using high energy shocks.
Methods: The study included 29 patients (pts) with conventional ICD indications (22 male, 66±10 y.). All pts were implanted with a PRIZM ICD (Guidant, USA) that allows HVI testing with a subthreshold (0.4 microJ) pulse. Upon implant, HVI was determined with 5 consecutive test pulses, 5 low (1.1 J) and 2-3 high (16±4.5 J) energy shocks.
Results: According to high energy shocks, mean HVI was 42.0±7.3 (27-64) Ohm. HVI obtained by test pulses (42.4±7.1 Ohm) or low energy shocks (46.5±8.1 Ohm) did not differ significantly. Concordance correlation coefficient (CC) was higher for test pulse vs. high energy shock (CC=0.92, 95% CI 0.82 to 0.96) than for low energy vs. high energy