1186-108 Left Bundle Branch Block Reduces the Specificity of T-Wave Alternans Testing

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Background: Several noninvasive tests are available to risk stratify pts for sudden cardiac death but are limited by the need for a normal QRS duration for accurate interpretation. T-wave alternans (TWA) has been proposed as a noninvasive test that can be used in pts with left bundle branch block (LBBB). The purpose of this study was to compare and contrast the sensitivity and specificity of TWA in pts with and without LBBB.
Methods: We prospectively evaluated 154 pts (101 men, mean age 62 ± 23 yrs) referred for EPS. All pts underwent EPS using programmed stimulation at two ventricular sites with up to triple extrastimuli with and without isoproterenol or dobutamine. At the time of EPS, all pts underwent TWA testing during rapid atrial pacing with the Cambridge Heart CH2000 or HearTwave system. TWA was interpreted according to standard protocol. Indeterminate tests were excluded from further analysis (31 pts, 20%). Positive EPS was defined as the induction of sustained monomorphic ventricular tachycardia with up to triple ventricular extrastimuli or ventricular fibrillation with up to double ventricular extrastimuli.
Results: 16 pts (13%) had LBBB on ECG and 107 pts (87%) had a normal QRS duration. There was no difference between the two groups with regard to gender, age, indication for EPS, presence of CAD, or use of beta blockers. However, LBBB was associated with a lower LVEF (28% ±8 vs. 40% ±15, p<0.001). 6 pts (38%) with LBBB and 34 pts (32%) with a normal QRS had positive EPS (p=0.78). In comparison, the positivity rate of TWA was 81% in pts with LBBB vs. 43% in pts with a normal QRS (p=0.006). The sensitivity of TWA for predicting inducibility at EPS was 83% in pts with LBBB and 47% in pts without LBBB (p=0.19). However, the specificity was only 20% in the pts with LBBB compared with 59% in the pts with normal QRS (p=0.04).
Conclusions: The presence of a LBBB on ECG was associated with a trend towards increased sensitivity, but also a marked reduction in specificity of TWA for predicting inducibility at EPS. This should be considered when interpreting the results of TWA in pts with LBBB.

1186-109 The Role of Isoproterenol During Electrophysiologic Evaluation of Patients With Nonsustained Ventricular Tachycardia

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Background: Based on the results of MADIT and MUSTT, patients (pts) with coronary artery disease (CAD), depressed LV function and non-sustained ventricular tachycardia (NSVT) who have inducible VT at electrophysiologic (EP) testing benefit from an ICD. However, in these prior studies, isoproterenol (ISO) was not given to facilitate induction of VT in non-inducible pts. Therefore, we sought to determine the incremental yield of ISO in non-inducible pts and to evaluate their long-term outcome.
Methods: We evaluated consecutive pts with CAD, LVEF ≤ 40% and NSVT who underwent EP testing between 1997-2000. Programmed stimulation was performed with up to 3 ventricular extrastimuli (VES) from 2 right ventricular (RV) sites; in pts in whom sustained VT was not inducible, repeat EP testing with up to 3 VES from 1 RV site during infusion of ISO (titrated to increase the heart rate by 20% from baseline) was performed. Patients with inducible sustained VT received an ICD and were followed every 3-6 months in our ICD clinic.
Results: EP testing was performed in 238 patients (194 M, LVEF 29 ± 8%, 11 ± 8 beats NSVT with a cycle length of 373 ± 69 ms). Sustained VT was inducible at baseline in 103 (43%) pts. Of the 135 (57%) pts who were non-inducible, 40 (30%) did not undergo repeat EP testing during ISO infusion, most commonly because VF had been induced with 3 VES in these patients during EP testing in the baseline state. The remaining 95 (70%) non-inducible pts underwent repeat testing during ISO infusion; sustained VT was inducible in 8/95 (8%) pts. One of these 8 pts died peri-ICD implant from non-cardiac complications. The remaining 7 pts were followed for 31 ± 18 months during which time 2/7 (29%) of these pts received an appropriate ICD therapy for monomorphic VT.
Conclusions: In pts with CAD, LVEF ≤ 40% and NSVT who undergo EP testing for risk stratification, 8% of non-inducible pts have inducible VT during ISO infusion, which appears to be of prognostic significance.

1186-110 Type and Reproducibility of Symptoms in Genotyped Congenital Long QT Patients

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Background: Studies have emphasized specific associations between genotype and symptoms (sx) in Long QT Syndrome (LQTS) patients (pts). **Methods:** We studied 60 sx, genotyped LQTS pts (20 LQT1, 31 LQT2, 9 LQT3) from 28 genetically distinct families using direct interviews with pt and/or family members regarding 103 episodes of syncope, aborted cardiac arrest, or sudden death. All data were cross-referenced with physician and medical charts. Fifty-one pts (80%) were female with average age at presentation of 22 ± 13 yrs. Multiple sx were manifest in 33/64 pts (52%), range = 2-5 per pt. Sx (103 episodes) were classified as during exercise (n=29, 28%), emotional upset (n=14; startle (4), anger (6), pain (1), and severe psychosocial distress (3); 14%), auditory stimulus (n=8, 8%), with sleep (10, 10%), and with no provocative stimulus (NPS) (n=42, 41%). **Results:** No provocative stimulus was a trigger more commonly in LQT2 pts (p < 0.0001). Exercise as a trigger was more commonly seen in LQT1 pts (p < 0.001), while sleeping stimuli were more frequently seen in LQT3 pts (p < 0.01). In 33 pts with multiple events, 3/7 LQT1 pts (43%) had sx in the same category over time, as compared with 9/20 LQT2 pts (45%) and 0/5 LQT3 pts (0%) (NS). **Conclusions:** (1) No obvious trigger was found for sx in many LQTS pts, especially for LQT2 pts. (2) Exercise was a more common trigger in LQT1 pts, while sleeping-associated stimuli were seen more frequently in LQT2 and LQT3 pts. (3) A given symptom complex was a poor predictor of subsequent similar symptoms.

Cardiac symptoms in 60 pts by genotype (n=103 episodes)

	LQT1	LQT2	LQT3
Exercise (n=29)	20/29 (69%)	5/29 (17%)	4/29 (14%)
Emotion (n=14)	6/14 (43%)	7/14 (50%)	1/14 (7%)
Auditory (n=8)	2/8 (25%)	5/8 (63%)	1/8 (13%)
Sleep (n=10)	0/10 (0%)	6/10 (60%)	4/10 (40%)
NPS (n=42)	5/42 (12%)	32/42 (76%)	5/42 (12%)

1186-111 Procainamide Challenge Significantly Increases the Yield of Electrophysiologic Testing for Risk Assessment Without Loss of Positive Predictive Value

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Background: Electrophysiologic (EP) testing is used to stratify patients with coronary artery disease (CAD), depressed ejection fraction (EF), and non-sustained ventricular tachycardia (VT) for risk of clinical arrhythmic events. However, even those patients with a negative test have a high risk of cardiac arrest, as confirmed by the MUSTT registry. We hypothesized that intravenous procainamide (PA) in patients with a negative EP study in the baseline state (BS) would identify additional patients with the substrate for re-entrant VT who are at increased risk for sudden death.
Methods: Using the Yale EP database we identified 58 consecutive patients with CAD, depressed EF, and non-sustained VT who underwent EP testing for risk assessment, who received a 3rd generation ICD (Guidant) between 11/92 and 5/00, and for whom >2 months f/u was available. Mean f/u was 22 +/- 18 months. ICD records including intra-cardiac electrograms and event details were reviewed to determine the occurrence of ventricular arrhythmias resulting in ICD therapy.
Results: 39 patients were inducible in the BS and 19 were inducible only following intravenous PA. This increased the yield of EP risk assessment by 49%. There was no difference in age, sex, beta-blocker use, anti-arrhythmic treatment, EF, or f/u time between the two groups. Ventricular arrhythmias resulting in ICD therapy occurred in 14 patients inducible in the BS and in 7 patients inducible only with intravenous PA. Positive predictive values of EP testing in the BS and with PA were 36% and 37% (p=ns). There was no difference in survival between the two groups.
Conclusion: The provocative use of intravenous PA during EP risk assessment increases the detection rate for risk of sudden death with no loss of positive predictive value.

ORAL CONTRIBUTIONS

868 Catheter Ablation: New Methods

Tuesday, March 19, 2002, 2:00 p.m.-3:30 p.m.
Georgia World Congress Center, Room 364W

2:00 p.m.

868-1 Cryoablation for Pulmonary Vein Isolation to Treat Atrial Fibrillation

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Background: Unlike hyperthermic injury, cryothermal tissue injury preserves underlying tissue architecture and associated thrombus formation is less likely. These characteristics may be beneficial in pulmonary vein (PV) ablation. We thus investigated the safety and feasibility of PV isolation using a percutaneous 7F cryoablation system in patients with atrial fibrillation (AF).
Methods: We performed 23 consecutive PV cryoablation procedures in 20 pts (16 M, age 55.5+/-9.7 yrs) with paroxysmal AF (15), persistent AF (4) and atrial tachycardia (1). Pre-ablation transesophageal echocardiography was performed to assess PV anatomy and to exclude the presence of left atrial (LA) thrombus. After trans-septal puncture each target PV was mapped near its ostium, with a circumferential "Lasso" catheter. After DC cardioversion when required, cryoablative lesions (-75°C for ≤ 4min) were applied to each LA-PV connection, proximal to the Lasso during sinus rhythm or coronary sinus pacing using a Cryocath "Freezor" catheter. PV isolation was defined as either the dissociation of PV from LA electrograms or their elimination. Venograms of all target PVs were performed before and after ablation.
Results: Twenty-nine PVs (diameters 1.7 +/- 0.4cm) were targeted. Eighteen (62%) of the treated PVs were completely isolated. In the other 11 (38%) there was prolongation of LA to PV conduction time, altered PV activation sequence and PV electrogram attenuation. Procedure and fluoroscopy times were 282 +/- 95 (165-560) and 61.1 +/- 30.8 (7.9-120) min respectively. The number of cryoablation applications and the cryoablation time per PV were 19 +/- 12.7 (2-52) and 63.6 +/- 38.4 (7-157.3) min respectively. There was no acute PV stenosis and no thromboembolic event. There was no late PV stenosis 102-121 days after cryoablation in all 4 cryothermy treated PVs of the 3 pts who returned for second procedures.
Conclusion: Percutaneous cryoablation appears safe and effective for focal AF ablation.