Background: Heart rate turbulence (HRT) is a de novo powerful risk predictor for patients (pts) surviving acute myocardial infarction. However, little is known about its underlying physiological mechanisms.

Methods: Hypothesizing that HRT be baroreceptor reflex related, we studied the HR and blood pressure fluctuations at rest and following systematically introduced ventricular premature beat (VPB) in 16 pts without structural heart disease (10 male, 6 female, mean 45±13 yr), before and after sequential sympathetic (esmolol, 4mL/min followed by 120mg/kg/min iv), parasympathetic (atropine, 0.04 mg/kg iv) and total autonomic blockade (esmolol plus atropine). Turbulence onset (TO), and turbulence slope (TS, ms/beat) were averaged from 10 respective VPBs. Spontaneous baroreflex sensitivity (BRS, mV/mmHg) was calculated from 5 minutes of sinus rhythm recording. The results showed that TS decreased after atropine (0.71±0.50 ms/beat, p<0.001) and total autonomic blockade (1.23±0.12 ms/beat, p=0.05). TO increased after atropine (0.32±0.39%, p<0.450±0.94% at baseline, p=0.05) and total autonomic blockade (0.58±0.86%, p<0.05). TS was positively correlated with BRS at baseline (r=0.78, p<0.01) and after esmolol (r=0.68, p<0.05) and total autonomic blockade (r=0.31, p<0.05). TO was negatively correlated with BRS at baseline (r=-0.81, p<0.05) and after esmolol (r=-0.80, p<0.01). However, TO remained correlated with BRS after atropine (r=-0.53, p<0.05).

Conclusions: Heart rate turbulence of both TO and TS parameters is critically vagel-dependent and highly correlated with spontaneous baroreflex sensitivity, which underscores its clinical importance in cardiovascular risk stratification.

11:45 a.m.
years. HRT slope was calculated from the first twenty beats. Fractal scaling coefficients, \( C_{\text{FC}} \) and \( C_{\text{PV}} \), were computed using a detrended fluctuation analysis of the first thirty beats. The HRT slope and degree of prematurity were not well understood.

Methods: In 23 dogs (16-25 kg), we compared epicardial (Epi, n=7) versus endocardial (Endo, n=7) using fluoroscopy-guided, standard techniques (70°C/90 sec, 60 W). Further, epicardial RF delivery was assessed during catheter-tip irradiation (n=3) and with a holder to assure optimal electrode-tissue contact (n=6). In the latter, thermally-insulated (TI) electrodes (50% tip surface) were also used (n=3). The Endo group, pericardial structures were used. In the Epi group, a monorathorax was made and a sheath was placed in the pericardial space.

Results: Power (16 vs 11 W), catheter-tip temperature (68 ±5°C) and impedance (157 ±15.6 Ohm) during RF delivery, and lesion dimensions were similar in Epi and Endo groups. In Endo, 11/21 (52%) lesions were transmural, compared to 2/25 (8%) in Epi (p<0.001). With optimal electrode-tissue contact, power outputs (>16 W; p<0.001) and pacing thresholds (0.2 vs 3.7 mV; p=0.004) were lower than Epi. However, lesion dimensions were similar and transmural lesions did not occur (depth 3.0±1.5 mm). Catheter irrigation (13 mL/min) allowed delivery of high power outputs (42 W; 40°C) and consistently produced transmural lesions, 5/11 (55%), depth 6.5±2.1 mm. At constant power (20 W), catheter-tip temperature (52 vs 27°C; p<0.001) and lesion dimensions were similar for conventional and TI electrodes. However, damage to pericardium and lungs occurred with conventional electrodes only. RF delivery directly to these structures without contact the epicardium was not possible due to high impedance.

Conclusion: Cathereal RF ablation is not suitable of producing deep, transmural lesions and is associated with a significant energy loss due to poor electrode-tissue contact. The lack of cooling effect limits power delivery in the pericardial space. Damage to adjacent structures results from passive heat conduction from catheter tip and not from reactive heating of tissue. TI electrodes may prevent damage to these structures.

Epicardial Ablation of Ventricular Tachycardia: Location of Successful Ablation Site and Long-Term Follow-Up

Nassir F. Marrouche, Robert Schweikert, Walid Saliba, Christopher Cole, Andrea Natale, Cleveland Clinic, Cleveland, Ohio.

Background: We describe results and location of epicardial ablation to treat ventricular tachycardia refractory to endocardial ablation.

Methods and Results: Nineteen patients (mean age 46±21 years, 16 men) presented for epicardial mapping and ablation of monomorphic VT. Of these 19 VTs, 17 appeared to originate from the epicardium. Of these 17 patients, 5 had coronary cardiomyopathy, 1 had congenital long QT syndrome, and 11 had normal hearts. Twelve of these patients were successfully ablated with epicardial lesions after endocardial lesions both with 4 mm tip and cooled-tip catheters were delivered without effect. The location of the successful ablation sites in all 12 patients was along the main branches of the coronary arteries. After a mean follow-up of 13±5 months, no recurrence of VT was observed. One patient had transient symptoms of pericarditis that resolved quickly within 48 hours with nonsteroidal anti-inflammatory agents. No other complications were observed.

Conclusion: In our preliminary experience epicardial mapping and ablation of VT is safe and feasible. The majority of successful ablation sites appeared located along the epicardial course of the coronary arteries.

Is Noncontact Mapping Associated With a Higher Complication Rate Than Conventional Mapping in Catheter Ablation of Complex Arrhythmias?

Karthein Selid, Monika Rameken, Margaret Vater, Harald Schwecke, Andreas Brandt, Jochen Senges, Heart Center, Ludwigshafen, Germany.

Non-Contact Mapping (NCM) provides high density endocardial mapping of arrhythmias. Its usefulness for mapping of complex arrhythmias to guide catheter ablation has been demonstrated. Aim of this study was to evaluate the safety of NCM in 108 patients (pts) in whom catheter ablation was guided by NCM, 2) to compare the complication (C) rate of catheter ablation guided by NCM with the C rate observed with conventional mapping (CM) in 213 pts. Catheter ablation was performed in 321 consecutive pts with complex arrhythmias (56 ectopic atrial tachycardias, 104 atrial flutter, 19 atrial fibrillation, 75 ventricular tachycardia, 68 ventricular tachypnoe). CM was performed in the first 213 pts, NCM was used in the following 108 consecutive pts. All consecutive pts (< 4 weeks) were registered. Main C categories are listed below. Using a logistic regression model determinants which were associated with a higher C rate were evaluated (adjusted to clinical and procedure parameters). The only independent predictor which was associated with a higher C rate was an impaired left ventricular function with ejection fraction >40% (OR 4, CI 1.08 - 14.8). NCM was associated with a higher C rate with n=59 (55%) vs 62/164 (38%) (p=0.002). Conclusion: The C rate in catheter ablation with NCM was 5.3% compared to 6.6% with conventional mapping. Using a logistic regression model NCM was not associated with a higher C rate. The only independent risk factor associated with a higher C rate was an impaired left ventricular function.

Complications (C): Comparison CM vs NCM

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<th>P-Value</th>
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<td>CM</td>
<td>14  pts (6.6%)</td>
<td>10  pts (9.3%)</td>
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<tr>
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<tr>
<td>Total</td>
<td>14  pts (6.6%)</td>
<td>10  pts (9.3%)</td>
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Differential 12 Lead Electrocardiographic Manifestations of Arrhythmogenic Right Ventricular Dysplasia Versus Right Ventricular Outflow Tract Ventricular Tachycardias


Background: The differential diagnosis for left bundle/interior axis right ventricular tachycardia (VT) includes arrhythmogenic right ventricular dysplasia (ARVD) and idiopathic right ventricular outflow tract (RVOT) ventricular tachycardias. Since they differ due to different mechanisms, it should be possible to distinguish between the two conditions using the 12-lead ECG during spontaneous VT. Methods: Nine patients with a definite diagnosis of ARVD and eighteen patients with RVOT VT were identified from the Mayo Foundation database. Patient age for the ARVD group was 43 ± 22 years and for the RVOT group was 45 ± 27 years. None of the ARVD patients had underlying heart disease. In the RVOT group, one patient had hyperthyroidism, one had coronary artery disease and two had mitral valve prolapse. 12-lead ECGs of spontaneous VT were analyzed for over 60 parameters including morphologic, amplitudes, duration of Q to nadir, transition points and the presence of notching. Results: There were significant differences (using Fisher's Exact Test and 2-tailed p-value) in the 12-lead VT ECGs between the two groups. 9/9 (100%) ARVD patients had onset of Q to nadir of S duration (Lead V1 or V2) equal or greater than 86 msec versus 7/18 (39%) RVOT patients (p = 0.0178). 11/18 (61%) RVOT patients had deep S waves (lead aVL) versus 3/3 (33%) ARVD patients (p = 0.0017). 9/9 (100%) ARVD patients had QR duration (Lead V1 or V2) equal or greater than 140 msec versus 6/18 (33%) RVOT patients (p = 0.0027). 11/18 (61%) RVOT patients had deep S waves (Lead I) versus 9/9 (100%) ARVD patients had R-wave notching (Lead I) versus 5/18 (28%) RVOT patients (p = 0.037). Conclusion: The 12-lead ECG of VT in ARVD is significantly different from that of RVOT. Specific characteristics of the 12-lead ECG in VT discriminate between ARVD and RVOT VT. This information may be useful in determining the underlying disease process to reduce the risk of misclassifying ARVD as benign RVOT VT.

Is Catheter Ablation of Hemodynamically Unstable Ventricular Tachycardia Feasible Using Noncontact Mapping?

Karthein Selid, Monika Rameken, Margaret Vater, Harald Schwecke, Andreas Brandt, Jochen Senges, Heart Center, Ludwigshafen, Germany.

Hemodynamic collapse precludes extensive catheter mapping to identify the target region in patients with ventricular tachycardia (VT) with conventional catheter mapping. However, the non-contact mapping system (NCM) computes virtual electrograms simultaneously at more than 3000 ventricular sites. A single beat of the VT seems to be sufficient to map the VT. Therefore, the aim of this study was to assess the clinical utility of NCM for mapping and ablating unstable VT. Methods: We evaluated 29 patients (pts) with an implantable cardioverter defibrillator (ICD) with drug refractory monomorphic and hemodynamically unstable VT (24 pts had ischemic VT and 5 pts had nonischemic VT, ejection fraction 33±15%). All pts had a < 2 second episode of unstable VT (mean cycle length 295±75 ms) during the month before treatment. Catheter ablation was performed with a linear lesion at the diastolic pathway just before the exit site. Radiofrequency energy was delivered during sinus rhythm and efficacy was assessed by programmed ventricular stimulation. All pts had a regular follow up in our ICD clinic.