Electrophysiological and mechanical parameters of left ventricle after myocardial infarction using transthoracic echocardiography and bipolar voltage map based on CARTO system

Kutowice, Poland; 2 Silesian Academy of Medicine, 1 st. Dep. of Cardiology, Kutowice, Poland

Background: Nonfluoroscopic 3-dimensional electroanatomical mapping system CARTO is a novel method using to evaluate electrical activities within regions of the heart muscle. Transthoracic echocardiography estimates global and regional function of the left ventricle (LV). Low ejection fraction (EF) is an independent risk factor of sudden cardiac death.

Aim of study: The aim of this study was to compare global function and segmental wall motion of LV in echocardiography with segmental electrical activity in CARTO in patients with ventricular tachycardia after myocardial infarction.

Methods: A comparative analysis was performed in 30 patients (23 males, 65±18 years old) qualified to radiofrequency catheter ablation using CARTO system. There was assessed the global function and 12 segmental wall motion by two echocardiographists 24-48 hours before procedure. Bipolar voltage map was made during electroanatomical mapping. It was compared with LV echocardiogram using special computer program. There was analyzed contraction of 340 segments in echo and bipolar voltage of 2725 points of electroanatomical maps.

Results: Mean EF equaled 31.7%±4-10.4 and mean wall motion score index (WMSI)=1.75±0.33. There was a significant difference regarding bipolar voltage between all groups of segments (Table 1).

Table 1. Mean bipolar voltage for the specific groups of LV segments

<table>
<thead>
<tr>
<th>Contraction</th>
<th>Number of points</th>
<th>Mean bipolar voltage (mV)</th>
<th>Standard deviation</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - normokinetics</td>
<td>1126</td>
<td>2.05</td>
<td>2.40</td>
<td>p&lt;0.01</td>
</tr>
<tr>
<td>2 - hypokinetics</td>
<td>854</td>
<td>1.58</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>3 - akinesis</td>
<td>369</td>
<td>1.08</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>4 - dyskinesis</td>
<td>157</td>
<td>1.57</td>
<td>2.12</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion: Normo-, hypo- and dyskinetic segments differ from one another regarding electrical activity. However the presence of the points with higher bipolar voltage in akinetic and dyskinetic region can show preserved electrical function in spite of advanced contraction dysfunction.

Efficacy and safety of short time radiofrequency energy delivery as a treatment for atrioventricular nodal reentrant tachycardia (AVNRT)

C. Alonso Martin, A. Moya, F. Guad, M. Patete, J. Soler-Soler
San Juan del Olmo, Spain; 2 Hospital Valle Hebrón, Cardiology, Barcelona, Spain

Introduction: catheter ablation of atrioventricular nodal reentrant tachycardia (AVNRT) is usually performed by delivering radiofrequency (RF) energy at the slow pathway region during 60 to 90 seconds. The efficacy of shorter applications has not been assessed.

Aim: to assess the efficacy and safety of radiofrequency energy delivered during 20 seconds.

Methods: sixty one consecutive patients with AVNRT (22 males, age 49±17) underwent RF ablation between june 2003-august 2004. Following an anatomical approach, RF energy was delivered to the slow pathway region for a maximum of 20 seconds. If junctional beats were obtained, electrical stimulation was repeated to assess inducibility of AVNRT. If not, ablation catheter was repositioned and an additional 20 seconds application was performed. Only if despite obtaining junctional beats AVNRT remained inducible, RF delivery was prolonged for a maximum of 60 seconds. The procedure was considered successful if AVNRT remained not inducible under programmed stimulation isoprenal and for a watching period of 30 minutes. Patients were followed at 3, 6 and 12 months after the procedure.

Results: AVNRT ablation was considered successful in 57/61 (93%) pts and unsuccessful in 4 pts. 51/57 pts required RF delivery for 20 seconds or less (average 17±0.6 sc) (Group I). In 5/57 pts RF delivery was prolonged more than 20 seconds (52±8 sc) (Group II) p<0.003. The average of RF pulses for each group was 2.9±2 and 9.1±7 respectively (p=0.045). A mean of 14±1 junctional beats were obtained during the RF delivery in group I and 17±3 in group II (p=0.5). Twenty two out of 57 pts (38%) had less than 10 junctional beats during the application. Fluoro time was 7±1 minutes in group I and 21±6 in group II (p=0.05). There were no complications. After a follow-up of 6±4 months all patients remain asymptomatic.

Conclusion: AVNRT can be successfully ablated with short pulses of RF energy. Few number of junctional beats obtained during the application can be enough marker of success and assessment of inducibility is recommended after the application. This approach may be beneficial in reducing the risk of AV block.

Electroanatomical voltage mapping in patients with right ventricle outflow tract arrhythmia

1 University Hospital Silesian Med. Acad, 1st Dept. of Cardiology, Kutowice, Poland; 2 Silesian Medical Academy, I Department of Cardiology, Kutowice, Poland

Background: Although ECG, echocardiogram and angiography are generally normal in patients (pts) with right ventricular outflow tract (RVOT) arrhythmia, cardiac MRI may identify areas of focal thinning, hypokinesis or fatty infiltration. Magnetic electroanatomical voltage mapping provides insight into the size and location of endocardial abnormalities and identifies regions of scar. Therefore, the purpose of our study was to analyze voltage maps of RV recorded in pts with RVOT arrhythmia and correlate endocardial abnormalities to the site of origin of arrhythmia.

Methods and results: Between 2000 and 2004 37 consecutive pts (29 females, mean age: 42 ± 25) with severely symptomatic RVOT arrhythmia (sustained ventricular tachycardia - VT, non-sustained VT and/or frequent premature beats) underwent catheter ablation with the use of electroanatomical CARTO system. All pts had arrhythmia with left bundle branch block morphology and an inferior axis. Three out of 37 pts had sustained polymorphic VT (pVT), cardiac arrest and ICD implantation, pVT was triggered by RVOT premature beats which could be abolished by catheter ablation. No structural heart disease was detected by physical examination, ECG and echocardiogram. A three-dimensional voltage map of the RV was obtained and the scar area was defined as a region of bipolar electrograms <0.5mV. Low voltage area was found only in 2 of 37 pts (5,5%) – in 1 pt with fast monomorphov VT (0,2 cm², anterior RVOT) and 1 pt with pVT (1,5 cm², anterior RVOT). In this 2 cases arrhythmia triggers identified by mapping the earliest electrical activity were localized in scar area.

Conclusions: In pts with RVOT arrhythmia dysplastic regions characterized by abnormal low amplitude electrograms are seldom but correspond to VT site of origin, especially in pts with malignant outcome.