Catheter Ablation of Post MI VT: Should Be Performed After the First Shock? “Pro”

Gamal Shaban, MD, FESC, FHRS, FSCAI
Head of Heart Rhythm, NHI

Ventricular Tachycardia and Ventricular fibrillation after discharge from hospital post Myocardial Infarction

- CARISMA STUDY Thomeson et al.; Circulation 2010
  Patients with EF< 40% Followed for 2 y. after myocardial infarction
  - Sustained VT 3%
  - VF 2.7%
Ventricular Tachycardia and Ventricular fibrillation after discharge from hospital post Myocardial Infarction

ICDs terminates VT after it occurs by shocks or ATP (antitachycardia pacing)
ICD shocks reduce quality of life in patients

SCD-HeFT: spontaneous VT predicts increased risk of Death

Heart Failure + IHD + ICD shocks 37% one year survival
Poole JE et al.; NEJM 2008
Episodes of VT/VF predict increased mortality and heart failure despite ICD therapy – MADIT II

The need for a prophylactic treatment to prevent VT/VF
OPTIC TRIAL

• 412 receiving ICD
  - spontaneous VT
  - LVEF > 40% and cardiac arrest and/or inducible VT
  - 80% previous MI
• Randomized to
  - amiodarone
  - sotalol
  - amiodarone and β-Blockers
OPTIC trial: adverse events of the 3 treatments

Connolly SJ. et al. JAMA 2006

<table>
<thead>
<tr>
<th>Adverse Event</th>
<th>(β-Blocker n = 138)</th>
<th>Amiodarone + β-Blocker n = 140</th>
<th>Sotalol n = 134</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>2 (1.4)</td>
<td>6 (4.3)</td>
<td>4 (3.3)</td>
<td>.36</td>
</tr>
<tr>
<td>Arrhythmic death</td>
<td>1 (0.7)</td>
<td>2 (1.4)</td>
<td>1 (0.8)</td>
<td>.60</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>1 (0.7)</td>
<td>1 (0.7)</td>
<td>0</td>
<td>.62</td>
</tr>
<tr>
<td>Heart failure</td>
<td>0 (0.0)</td>
<td>12 (8.6)</td>
<td>14 (10.4)</td>
<td>.14</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>1 (0.7)</td>
<td>1 (0.7)</td>
<td>0</td>
<td>.62</td>
</tr>
<tr>
<td>Pulmonary adverse event</td>
<td>0 (0.0)</td>
<td>1 (0.7)</td>
<td>0</td>
<td>.62</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>0 (0.0)</td>
<td>7 (5.0)</td>
<td>3 (2.3)</td>
<td>.20</td>
</tr>
<tr>
<td>Hyperthyroidism</td>
<td>0 (0.0)</td>
<td>6 (4.3)</td>
<td>0</td>
<td>.01</td>
</tr>
<tr>
<td>Symptomatic bradycardia</td>
<td>1 (0.7)</td>
<td>8 (6.0)</td>
<td>2 (1.5)</td>
<td>.009</td>
</tr>
<tr>
<td>Torsades de pointes</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0</td>
<td>&gt;.99</td>
</tr>
<tr>
<td>Skin adverse event</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0</td>
<td>&gt;.99</td>
</tr>
<tr>
<td>Device infection</td>
<td>2 (1.5)</td>
<td>6 (4.3)</td>
<td>3 (2.3)</td>
<td>.72</td>
</tr>
<tr>
<td>Hospitalized during follow-up</td>
<td>60 (43.6)</td>
<td>49 (36.9)</td>
<td>40 (30.1)</td>
<td>.32</td>
</tr>
</tbody>
</table>

OPTIC trial: outcome events

Connolly SJ. et al. JAMA 2006

<table>
<thead>
<tr>
<th>Outcome</th>
<th>(β-Blocker n = 138)</th>
<th>Amiodarone + β-Blocker n = 140</th>
<th>Sotalol n = 134</th>
<th>Amiodarone vs β-Blocker</th>
<th>Sotalol vs β-Blocker</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any shock</td>
<td>41</td>
<td>12</td>
<td>27</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Appropriate shock</td>
<td>26</td>
<td>8</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic shock</td>
<td>26</td>
<td>8</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any shock, complicating HF</td>
<td>41</td>
<td>8</td>
<td>23</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Appropriate shock or ATR*</td>
<td>26</td>
<td>8</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate shock or asymptomatic death</td>
<td>26</td>
<td>8</td>
<td>17</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*P values are calculated using appropriate statistical tests.
Amiodarone toxicity
meta-analysis of trials of sudden
cardiac death prevention

- Drug withdrawal: 29%
- Serious toxicities
  - Lung: 2.9%
  - Liver: 1.9%
  - Thyroid: 3.6%
  - Bradyarrhythmia: 2.8%

ICD – Antiarrhythmic Drugs
Interactions

- Slower VT
  - Slow incessant VT
- Bradyarrhythmias
  - the need for ventricular pacing
- Efficiency of ATP/defibrillation threshold
Catheter ablation of VT: approach and efficacy depends on arrhythmic substrate

- Monomorphic VTs can be targeted for ablation
  - Scar related reentry
  - Purkinje fiber

Catheter ablation of VT: approach and efficacy depends on arrhythmic substrate

- Polymorphic VT
  - Substrat ablation of low voltage bridges and/or LAVA
Catheter ablation guided by electroanatomical mapping of recurrent VT after myocardial Infarction
Stevenson at al. Circulation 2008

53% achieved primary endpoint: at 6 months no VT, or absence of recurrent incessant VT

Ablation for VT late in myocardial Infarction

• Reduces ICD therapies in > 70% of patients
  - Mortality 3% (mostly due to incessant VT after procedure failed)
  - Stroke 0 – 2.7%
  - Vascular Complications 10%
SMASH VT: prophylactic ablation after one episode for ICD recipients after MI
Reddy et al. NEJM 2007

133 patients randomized to substrate guided ablation vs no ablation

- Reduced VT episodes
- No effect on mortality
- No negative impact on LV function

SMASH VT: No impact on LV function
Reddy et al. NEJM 2007
VANISH trial
Sapp J. et al.; NEJM 2016

259 patients with ICM and previous VT randomized to substrat-guided catheter ablation vs no ablation

EHRA/HRS expert consensus on catheter ablation of Ventricular arrhythmias

- Indications of catheter ablation of VT:
  1. Symptomatic sustained monomorphic VT (SMVT), including VT terminated by ICD, that recurs despite medical treatment or when medical treatment is not tolerated or not desired
  2. For control of incessant VT or VT storm that is not due to a reversible transient cause
EHRA/HRS expert consensus on catheter ablation of Ventricular arrhythmias

• Should be considered
  1. One or more episodes of SMVT despite one or more AADs
  2. Recurrent SMVT due to prior MI and EF > 30; with life expectancy > 1 year, ablation can be an alternative treatment to amiodarone
  3. For hemodynamically tolerated SMVT due to prior MI with reasonably preserved EF > 35, even if AADs have not failed

There was consensus among the Task Force members that catheter ablation for VT should generally be considered early in the treatment for recurrent VT

Heart Rhythm 2009
Europace 2009
Learning points

- VT increases risk of death, mortality and heart failure
- AAD sideeffects
- ICD – AAD interaction
- Catheter ablation treats the VT substrate without affecting either mortality or LVEF