Recurrent VT in ICD patients: Do antiarrhythmic drugs help?

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Adjunctive antiarrhythmic therapy is administered to 49% - 69% of patients who have an ICD
Adjunctive antiarrhythmic therapy

1) Suppression of “appropriate” shocks
   • by suppressing VT
   • slowing VT to improve effectiveness of ATP

2) Suppression of “inappropriate” shocks
   • suppression of atrial fibrillation

3) Suppress symptomatic arrhythmias
   • that are neither fast enough nor sustained to the degree that they trigger ICD intervention
   • CRTD: suppress VPBs to improve resynchronization
65 y.o patient
Previous MI, ACB, EF 30%, NYHA I
1st VT episode, hemodynamically stable, terminated by amiodarone
ICD follow-up after 1 ICD shock
ICD follow-up after 2 ICD shocks
Prevention of ICD shocks: Sotalol

Pacifico, NEJM 1999

N=302

Proportion of Patients

Days after Randomization

NO. AT RISK
Placebo  151  129  114  101  90  84  84  77  70  70  69  65  49
Sotalol   151  136  123  119  115  109  104  101  99  95  91  90  70

P<0.001
Prevention of ICD shocks: The OPTIC study

Randomized controlled trial
VT/VF & EF<.40
Inducibility & EF<.40

Conolly, JAMA 2006
Guidelines

Adjunct to ICD therapy

Class I

Amiodarone, sotalol, and/or other beta blockers are recommended pharmacological adjuncts to ICD therapy to suppress symptomatic ventricular tachyarrhythmias (both sustained and nonsustained) in otherwise optimally treated patients with HF.

AHA/ESC/ACC guidelines
Effect of amiodarone on scar-related VT

- ↑ refractory period
- ↓ conduction velocity
- ↓ excitable gap
- ↑ excitable gap
- ↑ VT cycle length ≈25%
- ↑ induction window
- Stabilization of circuit?
- ↓ VES triggering VT
Incessant VT

VT/VF Episode #55 Report

<table>
<thead>
<tr>
<th>ID#</th>
<th>Date/Time</th>
<th>Type</th>
<th>V. Cycle</th>
<th>Last Rx</th>
<th>Success</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>55</td>
<td>Feb 12 13:43:02</td>
<td>VT</td>
<td>420 ms</td>
<td>VF Rx 2</td>
<td>Yes</td>
<td>13 min</td>
</tr>
</tbody>
</table>

V-V Interval (ms)

V:V = 370 ms  FVT = 280 ms  VT = 600 ms

Ramp  28.8 J  15.2 J  29.5 J  30.3 J
Ramp+  29.8 J  29.5 J

Time (sec) [0 = Detection]  (Entire episode not shown.)
Adverse effects of AAD in ICD patients

• Arrhythmogenic:
  - Torsades de pointes
  - Stabilize VT circuit (? stabilization of otherwise nonsustained VT / ? Incessant VT)

↓ VT rate: below cutoff / discrimination from SR difficult

↑ defibrillation threshold (amiodarone, Ic)
AAD in ICD patients: Trade-offs

Discontinuation is common
- Optic: amio 18%, sotalol 24%, b-blocker 5%)
- Pacifico: 34% (lack of efficiency in 27%)

Higher frequency of adverse events
(4.3% hypothyroidism, and 1.4% hyperthyroidism)
Effects of AAD on DFT

Hohnloser, Circulation 2006
From the OPTIC study
Recurrent VT in ICD patients

Drug therapy or ablation?
Catheter ablation of scar-related VT

Isthmus exit: QRS onset

VT isthmus

Slow conduction during diastole

End of the QRS

Display: LV

Y+

LAT:IC3–IC4

184m

-179m

RA
Time from ICD implant to first VT/VF

Survival free of VT/VF [%]

<table>
<thead>
<tr>
<th></th>
<th>ICD only</th>
<th>ICD + Ablation</th>
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<tbody>
<tr>
<td>12M</td>
<td>40,4</td>
<td>58,7</td>
</tr>
<tr>
<td>24 M</td>
<td>28,8</td>
<td>46,4</td>
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</table>

p = 0.045 (Log-Rank)

Kuck, Lancet 2010
Time from ICD Implant to First VT/VF

Kaplan-Meier Analysis

P = 0.045 (log-Rank-test)
Number of Adequate ICD Therapies per Patient and Year of FU

\[ \text{Median} \]

\[ \text{Mean} \]

\[ p=0.013 \text{ (Wilcoxon)} \]

Kuck, Lancet 2010
Indication for ablation in post MI VT?

1. Patient with recurrent VT triggering ICD shocks or causing symptoms despite AAD
2. As alternative to AAD in those ICD patients
3. As alternative to ICD implantation in patients with EF > 35-40%

VT ablation should generally be considered early in the treatment of patients with recurrent VT

EHRA/HRS VT ablation consensus document
Heart Rhythm & Europace 2009
27 y.o. pt with HCM, severe hypertrophy
Brother died suddenly
ICD as primary prevention
Inappropriate ICD intervention

- Potentially dangerous
- Shocks: strong negative impact on QOL

Ventricular tachycardia triggered by inappropriate burst pacing of AF
Effects of AAD in ICD patients

↓ recurrent VT

↑ VT cycle length – improve success of ATP

↓ risk of inappropriate shock

↓ defibrillation threshold (sotalol)
AAD in ICD patients

Whenever an AAD is administered to a patient with an ICD, the effect on device function must be considered.