Can successful Abl of VT replace the ICD?

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Disclosure Conflict of interest

- **Advisory board**: Daiichi-Sankyo, Magnetecs, Merck, Sanofi-Aventis

- **Research grants**: Medtronic, Boston Scientific, Sorin Group

- **Educational contracts**: St Jude Medical
VT Ablation
The Guidelines
ACC/AHA/ESC Guidelines

ACC/AHA/ESC 2006 guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

A report of the American College of Cardiology/American Heart Association Task Force and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Develop Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death)

Developed in collaboration with the European Heart Rhythm Association and the Heart Rhythm Society

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Class I

(1) Ablation is indicated in patients who are otherwise at low risk for SCD and have sustained predominantly monomorphic VT that is drug resistant, who are drug intolerant, or who do not wish long-term drug therapy. *(Level of Evidence: C)*

(2) Ablation is indicated in patients with bundle-branch reentrant VT. *(Level of Evidence: C)*

6.6.4. Structural heart disease
VT is a common complication of structural heart disease and carries significant risk for mortality in CHD patients with low EF. In those with extensive structural abnormalities, especially those with prior MI, multiple morphologies of VT are often present. As a result, ablation of a single VT morphology can provide palliation but not eliminate the need for device or antiarrhythmic therapy. In these patients, VT

Class I

1. ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes. (*Level of Evidence: A*)\(^{16,319–324}\)

2. ICD therapy is indicated in patients with structural heart disease and spontaneous sustained VT, whether hemodynamically stable or unstable. (*Level of Evidence: B*)\(^{16,319–324}\)

Class IIa

2. ICD implantation is reasonable for patients with sustained VT and normal or near-normal ventricular function. (*Level of Evidence: C*)
Class III

6. ICD therapy is not indicated when VF or VT is amenable to surgical or catheter ablation (e.g., atrial arrhythmias associated with the Wolff-Parkinson-White syndrome, RV or LV outflow tract VT, idiopathic VT, or fascicular VT in the absence of structural heart disease). (Level of Evidence: C)

7. ICD therapy is not indicated for patients with ventricular tachyarrhythmias due to a completely reversible disorder in the absence of structural heart disease (e.g., electrolyte imbalance, drugs, or trauma). (Level of Evidence: B)
EHRA/HRS Expert Consensus on Catheter Ablation of Ventricular Arrhythmias

Developed in a partnership with the European Heart Rhythm Association (EHRA), a Registered Branch of the European Society of Cardiology (ESC), and the Heart Rhythm Society (HRS); in collaboration with the American College of Cardiology (ACC) and the American Heart Association (AHA)

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Table 2  Indications for catheter ablation of ventricular tachycardia

<table>
<thead>
<tr>
<th>Patients with structural heart disease (including prior MI, dilated cardiomyopathy, ARVC/D)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Catheter ablation of VT is recommended</strong></td>
</tr>
<tr>
<td>1. for symptomatic sustained monomorphic VT (SMVT), including VT terminated by an ICD, that recurs despite antiarrhythmic drug therapy or when antiarrhythmic drugs are not tolerated or not desired;*a</td>
</tr>
<tr>
<td>2. for control of incessant SMVT or VT storm that is not due to a transient reversible cause;</td>
</tr>
<tr>
<td>3. for patients with frequent PVCs, NSVTs, or VT that is presumed to cause ventricular dysfunction;</td>
</tr>
<tr>
<td>4. for bundle branch reentrant or interfascicular VTs;</td>
</tr>
<tr>
<td>5. for recurrent sustained polymorphic VT and VF that is refractory to antiarrhythmic therapy when there is a suspected trigger that can be targeted for ablation.</td>
</tr>
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<tr>
<th>Catheter ablation should be considered</th>
</tr>
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<tbody>
<tr>
<td>1. in patients who have one or more episodes of SMVT despite therapy with one of more Class I or III antiarrhythmic drugs:*a</td>
</tr>
<tr>
<td>2. in patients with recurrent SMVT due to prior MI who have LV ejection fraction &gt; 0.30 and expectation for 1 year of survival, and is an acceptable alternative to amiodarone therapy:*a</td>
</tr>
<tr>
<td>3. in patients with haemodynamically tolerated SMVT due to prior MI who have reasonably preserved LV ejection fraction (&gt;0.35) even if they have not failed antiarrhythmic drug therapy:*a</td>
</tr>
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**Table 2** Indications for catheter ablation of ventricular tachycardia

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<tr>
<th><strong>Patients without structural heart disease</strong></th>
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<td><em>Catheter ablation of VT is recommended for patients with idiopathic VT</em></td>
</tr>
<tr>
<td>1. for monomorphic VT that is causing severe symptoms.</td>
</tr>
<tr>
<td>2. for monomorphic VT when antiarrhythmic drugs are not effective, not tolerated, or not desired.</td>
</tr>
<tr>
<td>3. for recurrent sustained polymorphic VT and VF (electrical storm) that is refractory to antiarrhythmic therapy when there is a suspected trigger that can be targeted for ablation.</td>
</tr>
</tbody>
</table>
The Evidences
ICD Secondary Prevention Trials

DP Zipes

Canadian Implantable Defibrillator Study (CIDS)
A Randomized Trial of the Implantable Cardioverter Defibrillator Against Amiodarone
James T. Connolly, MD, FRCPC, Michael Gass, MD, Helmer K. Roberts, MD, Belch, Fred, MD, FACC, Ralph L. Roberts, MD, FACC, E. Royal Block, MD, FACC, Jeffrey S. Zipes, MD, FACC, Thomas C. Siegel, MD, FACC, Charles F. Hunt, MD, FACC, for the CIDS Investigators.

ABSTRACT
The Canadian Implantable Defibrillator Study (CIDS) was conducted to compare the efficacy of the implantable cardioverter defibrillator (ICD) with secondary prevention of ventricular tachycardia or fibrillation in patients with coronary heart disease and left ventricular dysfunction. The study population consisted of 209 patients with left ventricular ejection fractions of less than 35% who were randomized in a 1:1 ratio to implantation of a cardioverter defibrillator or to treatment with amiodarone. The cardioverter defibrillator group received gocarduride and sotalol as required. The median duration of follow-up was 32 months. The primary end point, death from any cause, was statistically significant in favor of the ICD group (8 of 105 patients vs. 20 of 104 patients; 0.0319). All-cause death, cardiac arrest, and heart failure were significantly lower in the ICD group. The incidence of atrial fibrillation was significantly higher in the ICD group. The rate of appropriate ICD therapy at 32 months was 0.39 events per patient-year. The ICD appeared to be a safe and effective device for secondary prevention of sudden cardiac death. (Circulation 1997; 95: 1279-1287)

SJ Connolly

Randomized Comparison of Antiarrhythmic Drug Therapy With Implantable Defibrillators in Patients Revascularized From Coronary Artery Stenosis
The CARE-Heath Study (Canadian Antiarrhythmics Research Evaluation of Health Outcomes and Survival)

KH Kuck

ICD Secondary Prevention Trials

Connolly-Hallstrom-Cappato

Meta-analysis

Meta-analysis of the implantable cardioverter defibrillator secondary prevention trials
S. J. Connolly, A. P. Hallstrom, R. Cappato, D. R. Solomon, M. Kuck, D. P. Zipes, H. L. Cramer, A. Shabetai, M. Verheugt, F. M. Polak, J. Hallstrom, G. B. Deloche, on behalf of the investigators of the AVID, CASH and CIDS studies.
A COMPARISON OF ANTIARRHYTHMIC-DRUG THERAPY WITH IMPLANTABLE DEFIBRILLATORS IN PATIENTS RESUSCITATED FROM NEAR-FATAL VENTRICULAR ARRHYTHMIAS

THE ANTIARRHYTHMICS VERSUS IMPLANTABLE DEFIBRILLATORS (AVID) INVESTIGATORS* 1997
AVID

- Sudden death / VF
- Syncopal VT
- Poorly tolerated VT \textit{AND} LV EF \leq 40%

“Regardless of cause”
“No Transient / Correctable Cause”

\textit{AVID N Engl J Med 1997}
\textit{AVID Registry Circulation 1999}
Transient / Correctable causes

- New AMI: 56.0%
- AAD: 6.5%
- Electrolyte imbalance: 9.4%
- Cocaine: 1.4%
- Ablation: 2%

AVID invest AHA 1998
Antiarrhythmic Vs Implantable Defibrillator*  

**AVID**

- **1016 ptes:**
  - VF
  - VT syncopal
  - VT poorly tolerated & EF ≤40%

- **F-U: 18 months**

- **Results:**
  - ↓ total mortality (3 y) 31% (p<0.02)
    - ICD = 25%
    - Conventional = 36%

*N Engl J Med 1997;337:1576-83*  

* Aleatorizado
CIDS

- Sudden death / VF
- Syncopal VT
- Poorly tolerated VT & LV dysfunction
- Syncope & inducible VT

ICD vs AAD  \( P = 0.07 \)

Connolly et al. Circulation 2000; 101: 1297
Subanalysis & Other studies
AVID Trial
Group analysis

AVID

Cumulative survival

LVEF <0.20
LVEF 0.20-0.34
LVEF >0.34

47% of total
39% of total

14% of total

No ICD benefit if LV EF ≥ 35%

LVEF >35%

- amiodarone
- ICD

% mortality vs years of follow up

LVEF ≤35%

- amiodarone
- ICD

% mortality vs years of follow up

Figure 1. Event-free survival function according to class (recurrences—including sudden death). —— = class A: complete success; —— = class B: partial result; ····· = class C: failure.
Figure 3. Survival function according to left ventricular ejection fraction (death from heart failure). —— = ejection fraction $\geq 30\%$; --- = ejection fraction $<30\%$.

$P = 0.0001$
Risks of ablation:

- Data from Thermocool study
  - 1 death 0.43% - cardiac perforation/tamponade
  - 6 death from uncontrolled VT
  - Heart Failure 2.6%
  - Femoral pseudoaneurysm 1.7%
  - Overall non-fatal complication rate 10.4%

Stevenson WG et al. Circulation 2008;118:2773-2782
Secondary prevention: in the absence of a treatable cause, have:

1. cardiac arrest (VT or VF)

2. spontaneous sust VT (syncope or significant haemodynamic compromise)

3. sustained VT and LVEF <35% (NYHA class ≤III)
Final thoughts
Incidence

- Ischemic Cardiomyopathy: 5%
- Idiopathic Dilated Cardiomyopathy: 36%
- Aortic Valve Surgery: 41%
- Myotonic Dystrophy: 100%
- Idiopathic: ?%

Caceres et al. Circulation 1989
Narasimhan et al. Circulation 1997
Merino et al. Circulation 2001

BBR
VT
SMASH-VT

Incidence

General population

High-risk subgroups

Any prior coronary event

EF less than 30% or HF

Cardiac arrest survivor

Arrhythmia risk markers, post MI

Events

MADIT II

SCD-HeFT

AVID, CIDS, CASH

MADIT I, MUSTT

Percent

Absolute Number

0 10 20 30

0 150,000 300,000
Evidence Base Medicine

- MADIT I & II: EF<35% ➔ ICD

But...

The patient already ablated is not the same:
- Arrhythmia substrate modification
- Survivor of sustained arrhythmia
  (selection bias)
New technologies
Conclusions

- Limited data about the benefits of ICD in tolerated VT
- No study has ever compared Abl vs ICD in a VT population
- Guidelines leave the role of Abl without ICD implantation unclear
- At present, time:
  - Non-tolerated VT → ICD
  - Tolerated VT & LV EF <35%
  - Tolerated VT & LV EF >35%
“Stable” Ventricular Tachycardia Is Not a Benign Rhythm
Insights From the Antiarrhythmics Versus Implantable Defibrillators (AVID) Registry

Log rank p = 0.0001

(Circulation. 2001;103 244-252.)