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 Infartion

- 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 Infartion

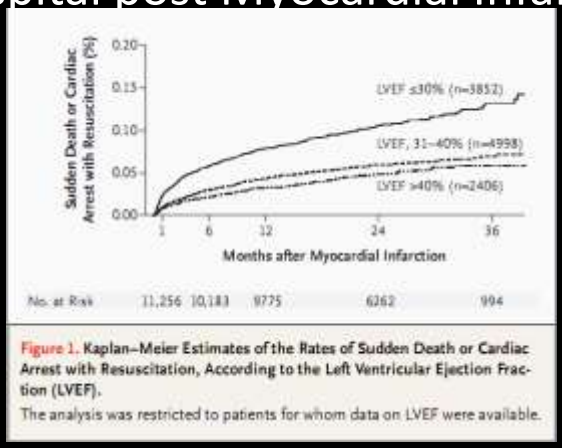


Figure 1. Kaplan–Meier Estimates of the Rates of Sudden Death or Cardiac Arrest with Resuscitation, According to the Left Ventricular Ejection Fraction (LVEF).

The analysis was restricted to patients for whom data on LVEF were available.

VALIANT TRIAL – Solomon et al. NEJM 2005

ICDs terminates VT after it occurs by shocks or ATP (antitachycardia pacing)

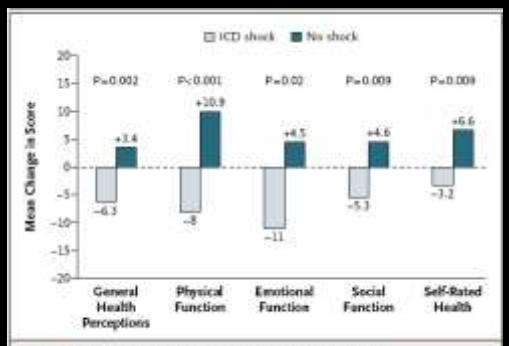


Figure 3. Effect of ICD Shocks on Patients' Quality of Life.

Patients in the implantable cardioverter–defibrillator (ICD) group who had received an ICD shock within 1 month before a scheduled quality-of-life follow-up assessment were compared with patients who had not received a shock. Changes in scores on the Medical Outcomes Study 36-Item Short-Form (SF-36) scale for patients who had received an ICD shock were calculated as the value after the shock was delivered minus the most recent value before the shock was delivered. Changes in scores for the comparison groups were the quality-of-life values at 3 months minus the values at baseline. The results were similar when other follow-up time points (i.e., 12 months and 30 months) were used to calculate the changes in scores in the no-shock subgroup. A positive change indicates better function.

ICD shocks reduce quality of life in patients

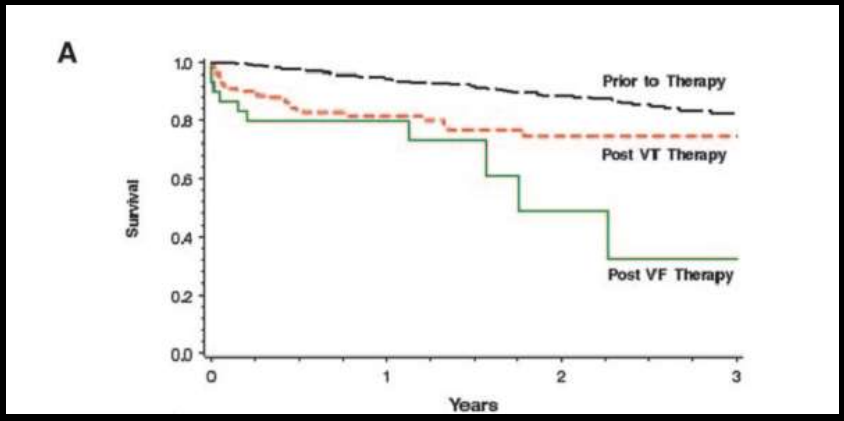
SCD-HeFT: spontaneous VT predicts Icreased risk of Death

Table 2. Time from ICD Shock to Death among Patients Who Received at Least One Shock.*

Type of Shock	All Patients	Patients Who Died	Time from Shock to Death			Kaplan–Meier Survival Rate 1 Year after Shock
			Median	Interquartile Range	Full Range	
			days			%
Any shock	269	77	204	1–630	0–1872	82.5±2.4
One or more inappropriate shocks only	87	10	294	28–509	0–735	94.9±2.5
One or more appropriate shocks	182	67	168	1–797	0–1872	76.9±3.2
NYHA class II	117	31	206	1–977	0–1872	84.0±3.5
NYHA class III	65	36	168	7–626	0–1343	64.2±6.1
Ischemic heart failure	93	49	96	0–443	0–1872	62.6±5.2
Nonischemic heart failure	89	18	622	204–908	1–1785	91.6±3.0
First shock for ventricular fibrillation	77	33	3	0–622	0–1872	74.6±5.0
First shock for ventricular tachycardia	105	34	258	59–797	0–1785	78.3±4.2

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



Moss et al. Circulation 2004

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 B-Blockers

OPTIC trial: adverse events of the 3 treatments

Table 4. Adverse Events of the 3 Treatment Assignments

Adverse Event	No. of Patients (%) β-Blocker (n = 138)	Amiodarone + β-Blocker (n = 140)	Sotalol (n = 134)	*P* Value*
Death	2 (1.4)	6 (4.3)	4 (3.0)	.36
Arrhythmic death	1 (0.7)	2 (1.4)	1 (0.8)	.80
Myocardial infarction	1 (0.7)	1 (0.7)	0	.62
Heart failure	9 (6.5)	12 (8.6)	14 (13.4)	.14
Atrial fibrillation	6 (4.4)	1 (0.7)	6 (4.5)	.13
Pulmonary adverse event	0	7 (5.0)	4 (3.0)	.09
Hypothyroidism	0	6 (4.3)	1 (0.8)	.01
Hyperthyroidism	0	2 (1.4)	0	.14
Symptomatic bradycardia	1 (0.7)	9 (6.4)	2 (1.5)	.009
Torsades de pointes	0	0	0	>.99
Skin adverse event	2 (1.5)	4 (2.9)	3 (2.2)	.72
Device infection	1 (0.7)	2 (1.4)	4 (3.0)	.34
Hospitalized during follow-up	60 (43.3)	49 (34.9)	40 (30.1)	.32

Connolly SJ. Et al. JAMA 2006

OPTIC trial: outcome events

Table 2. Outcome Events of the 3 Treatment Assignments*

Outcome	β-Blocker (n = 138)	Amiodarone + β-Blocker (n = 140)	Sotalol (n = 134)	*P* Value: Amiodarone + β-Blocker vs β-Blocker	*P* Value: Sotalol vs β-Blocker
Any shock					
No. of events	41	12	26		
Annual event rate, %	36.5	10.3	24.3		
HR (95% CI)	1.00	0.27 (0.14-0.53)	0.61 (0.37-1.01)	<.001	.055
Appropriate shock					
No. of events	26	8	17		
Annual event rate, %	22.0	6.7	15.1		
HR (95% CI)	1.00	0.30 (0.14-0.66)	0.68 (0.36-1.24)	.004	.18
Inappropriate shock					
No. of events	18	4	11		
Annual event rate, %	15.4	3.3	9.4		
HR (95% CI)	1.00	0.22 (0.07-0.64)	0.61 (0.29-1.30)	.006	.20
Any shock, censoring first 21 d					
No. of events	41	8	23		
Annual event rate, %	33.2	6.6	20.6		
HR (95% CI)	1.00	0.19 (0.08-0.37)	0.52 (0.31-0.88)	<.001	.01
Appropriate shock or ATP					
No. of events	48	16	38		
Annual event rate, %	45.0	13.0	35.9		
HR (95% CI)	1.00	0.30 (0.17-0.53)	0.85 (0.55-1.31)	<.001	.46
Appropriate shock or arrhythmic death					
No. of events	28	9	19		
Annual event rate, %	22.0	7.5	16.0		
HR (95% CI)	1.00	0.34 (0.16-0.74)	0.69 (0.37-1.28)	.006	.24

Abbreviations: ATP, antitachycardia pacing therapy; CI, confidence interval; HR, hazard ratio.
*In the β-blocker and sotalol groups, some patients had both appropriate and inappropriate shocks.

Connolly SJ. Et al. JAMA 2006

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

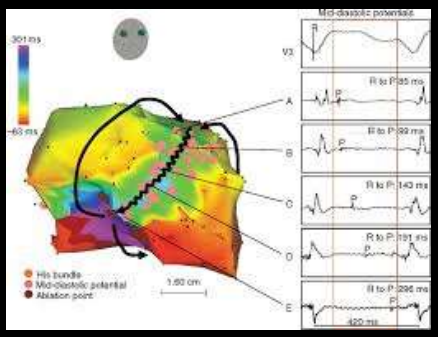
- Slower VT
  - Slow incessant VT
- Bradyarrhythmias
  the need for ventricular pacing
- Efficiency of ATP/defibrillation threshold

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

- Monomorphic VTs can be targeted for ablation

  Scar related reentry

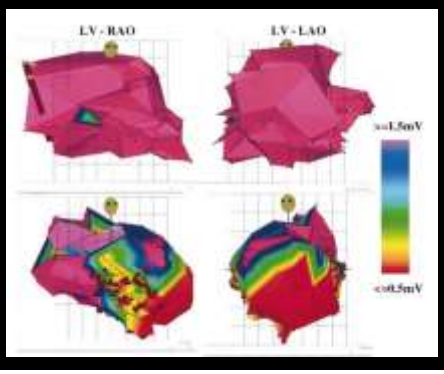
  Purkinjie fiber



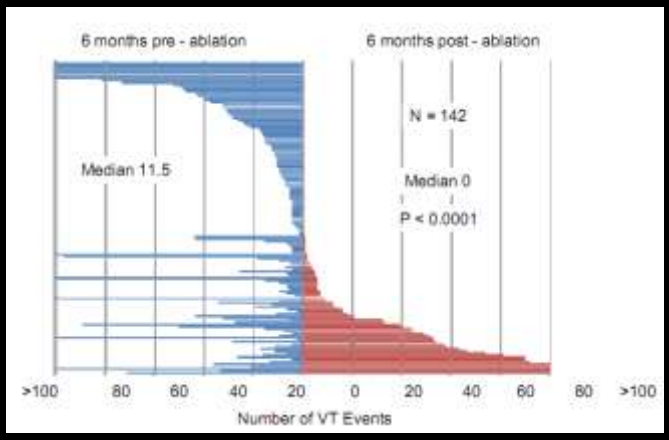
Catheter ablation of VT: approach and efficacy depends on arrhythmic substrate

- Polymorphic VT

  Substrat ablation of low voltage bridges and/or LAVA



Catheter ablation guided by electroanatomical mapping of reccurent VT after myocardial Infarction Stevenson at al. Circulation 2008



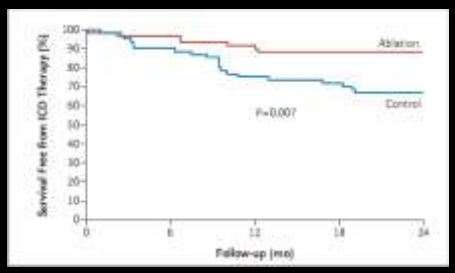
53% achieved primary endpoint: at 6 months no VT, or abscence of reccurent incessant VT

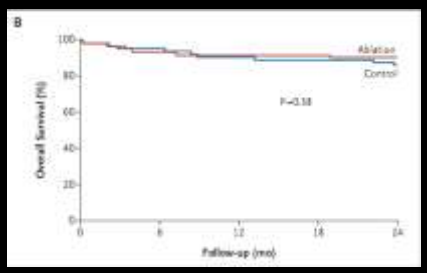
Ablation for VT late in myocardial Infarction

- 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

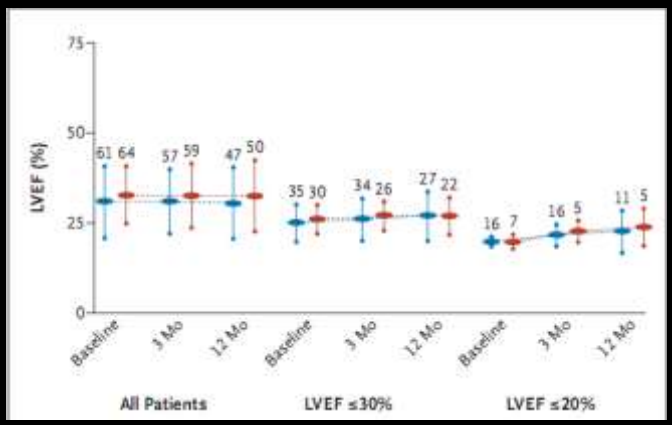
133 patients randomized to substrate guided ablation vs no ablation





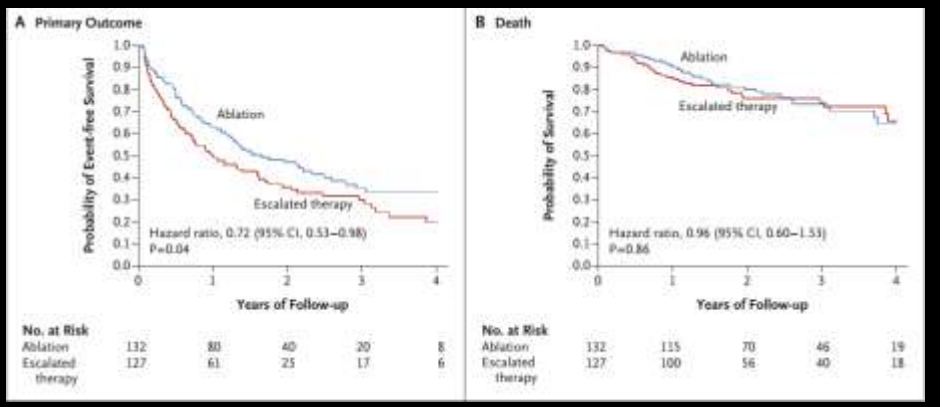
- Reduced VT episodes
- No effect on mortatlity
- No negative impact on LV function

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. Reccurent SMVT due to prior MI and EF> 30; with life expectancy > 1 year, ablation can be an alternative treatment to amiodarone
3. For hemodynamicaly tolerated SMVT due to prior MI with reasonably preserved EF >35, even if AADs have not failed

EHRA/HRS expert consensus on catheter ablation of Ventricular arrhythmias

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