Uygunsuz ICD şoklarının önlenmesi

Uygunsuz şoklarının önlenmesinde cihaz programlamanın prensipleri ve ablasyon

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Güven Hastanesi, Ankara
13.02.2015, Antalya

Ani Kardiyak ölüm (AKÖ)

	İnsidans vaka/yıl	Yaşam
Dünya	3,000,000[1]	<1%
Amerika	450,000[2]	5%
Avrupa	400,000[3]	<5%

- Türkiye: 70,000 vaka/yıl??

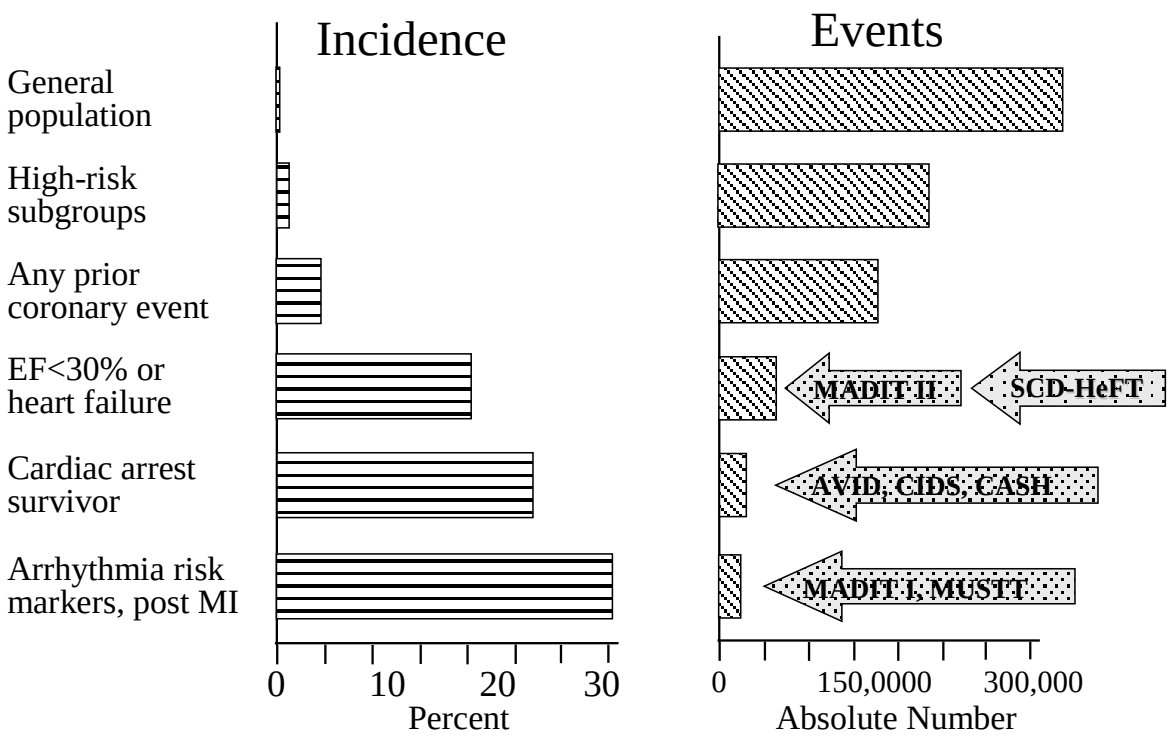
[1] Myerberg RJ, Catellanos A. Cardiac Arrest and Sudden Cardiac Death. In: Braunwald E, ed. *Heart Disease: A Textbook of Cardiovascular Medicine*. 5th Ed. New York: WB Saunders. 1997: 742-779.

[2] Circulation. 2001; 104: 2158-2163.

[3] Vreede-Swagemakers JJ et al. J Am Coll Cardiol 1997; 30: 1500-1505.

VA & SCD: Epidemiyoloji

Ani kardiyak ölüm insidansı

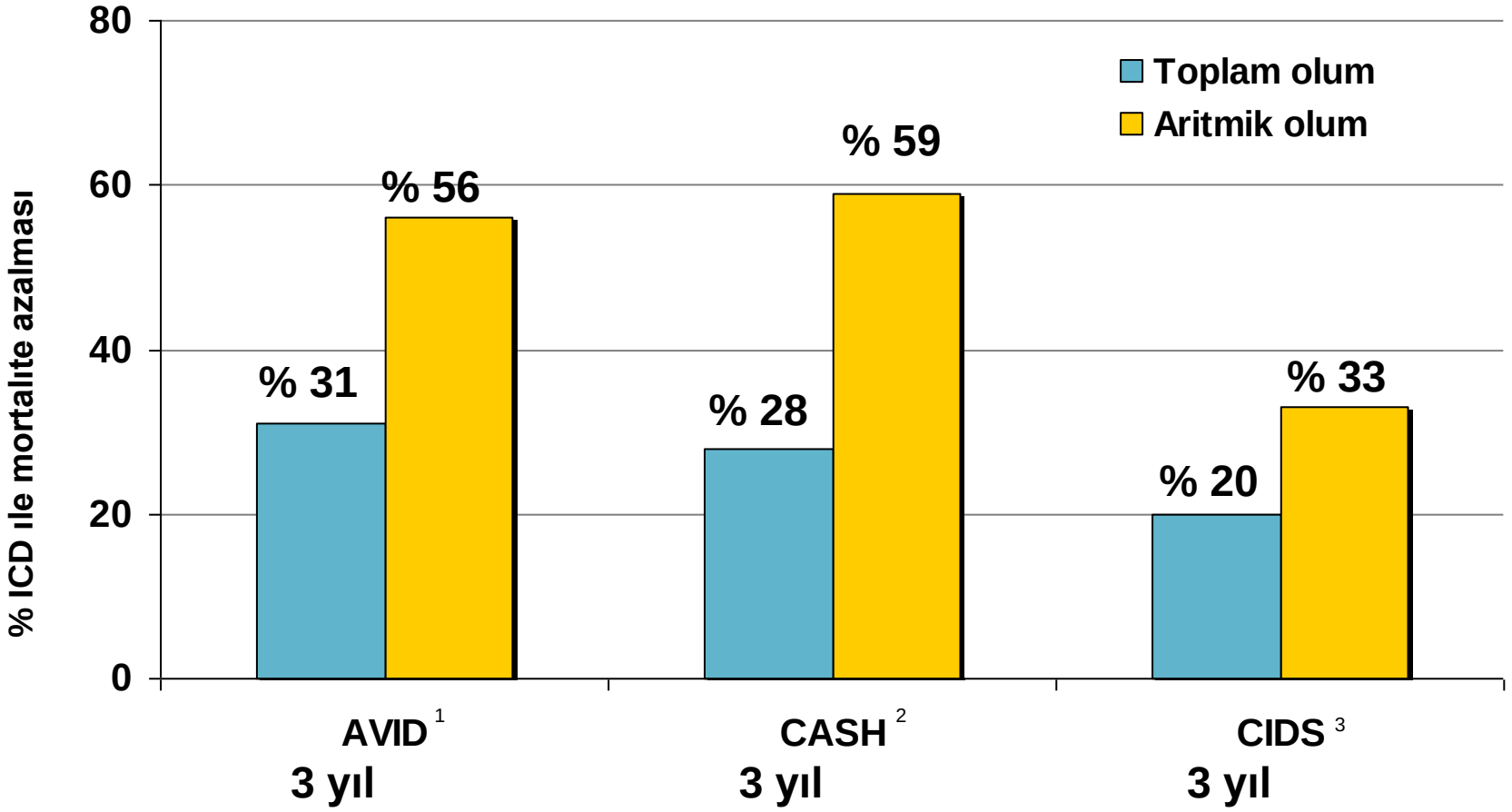


Reused with permission from Myerburg RJ, Kessler KM, Castellanos A. Circulation 1992;85:12-10.

- Hikaye başladı

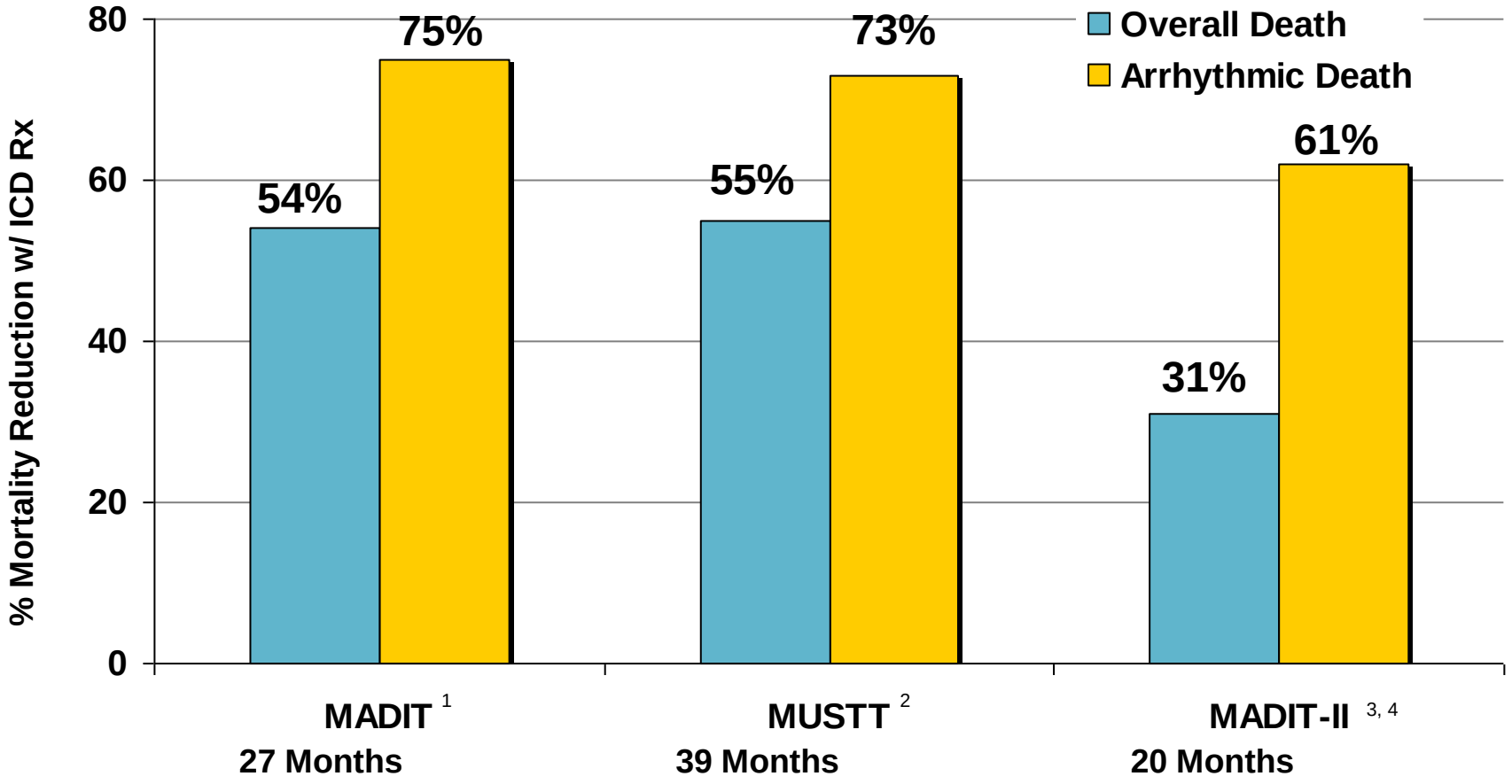
- Haydi ICD takalım ölümü engelleyelim …..

Sekonder korunmada ICD çalışmaları: Toplam ölüm ve aritmik ölüm



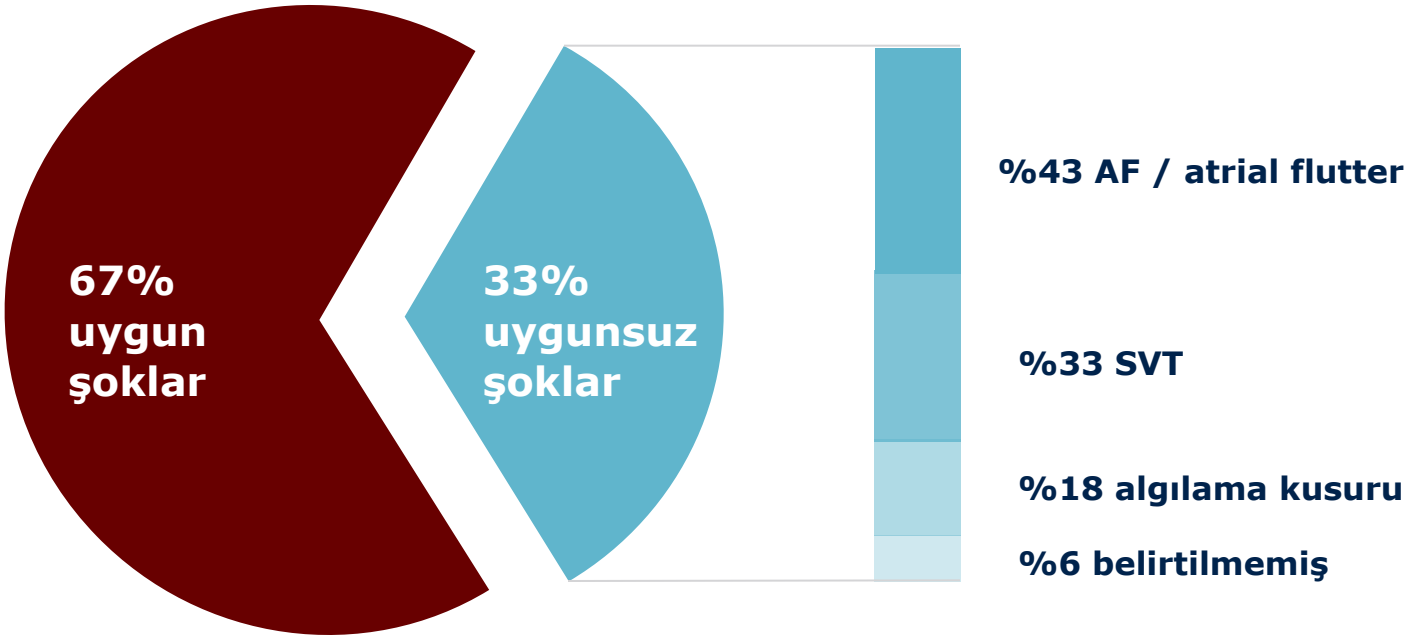
[1] The AVID Investigators. N Engl J Med. 1997;337:1576-83.
[2] Kuck K. *Circ.2000;102:748-54.*
[3] Connolly S. *Circ*. 2000;101:1297-1302.

Primer korunmada ICD çalışmaları: Toplam ölüm ve aritmik ölüm



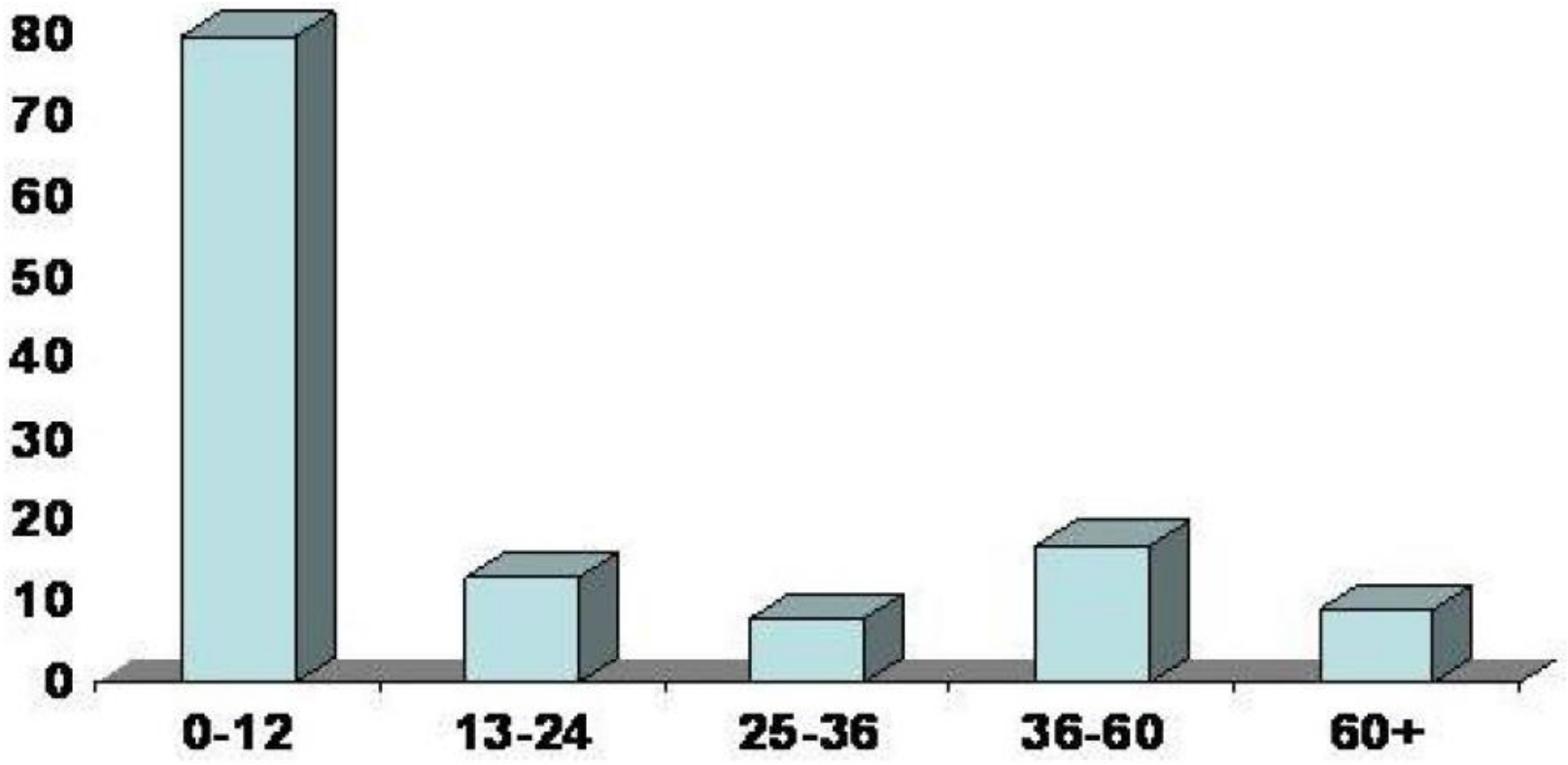
[1] Moss AJ. *N Engl J Med*. 1996;335:1933-40.
[2] Buxton AE. *N Engl J Med.* 1999;341:1882-90.
[3] Moss AF. *N Engl J Med.* 2002;346:877-83.
[4] Moss AJ. Presented before ACC 51st Annual Scientific Sessions, Late Breaking Clinical Trials, March 19, 2002.

ICD iyi ama?



* Daubert, JP et al., Inappropriate implantable cardioverter-defibrillator shocks in MADIT II, JACC 2008, 51: 1357–65.

Uygunsuz şokların zamanlaması



Nanthakumar KM et al. J Interv Card Electrophysiol. 2003;8:215-220.

SCD HEFT çalışması

- Mortalite artışı
- Yaşam kalitesinde
- Anksiyete
- Kardi %3-7

Peki ne yapalım?

1. Sweeney MO. Circulation 2010;122:2638–2641.
2. Wilkoff BL, ET AL. J Am Coll Cardiol 2008;52:541–550.
3. Larsen GK, et al. Heart Rhythm 2011;8:1881–1886.
4. Poole JE, et al. N Engl J Med 2008;359:1009–1017.

ICD takılmış hastalarda şok azaltıcı yaklaşımlar

- Altta yatan – eşlik eden durumların tedavisi
- Antiaritmik tedavi
- **ICD'nin uygun programlanması**
- Ablasyon

ŞOK YERİNE ATP YAPALIM

- 2001 yılı
- PainFREE Rx II çalışması
  - Şok vs. ATP
    - ATP %73 hastada hızlı VT'yi başarılı sonlandırdı
    - Senkop veya VF'ye dejenerasyon çok az
- ADVANCE III çalışması
  - Uzamış aritmi tanıma ayarlamada bile ATP ile VT sonlanması hala yüksek
  - %44

PainFREE Rx II trial. Circulation. 2004;110:2591–6.
ADVANCE III trial. JAMA. 2013;309:1903–11.

NSVT veya stabil yavaş VT şokları? Detection süresi/sayısını arttıralım

- PainFREE Rx
  - 18/24 tanıma algoritması 12/16 kadar güvenli
- PREPARE /ADVANCE III çalışması
  - 30/40 tanıma
  - SVT ayrım kriterlerinin 250 hıza kadar kullanımı
  - VF > 250 hız
  - Uygun ve uygunsuz şoklarda azalma
    - % 9 vs %17

PainFREE Rx II trial. Circulation. 2004;110:2591–6.
PREPARE study. J Am Coll Cardiol. 2008;52:541–50.

NSVT veya stabil yavaş VT şokları? Detection süresi/sayısını arttıralım

MADIT–RIT

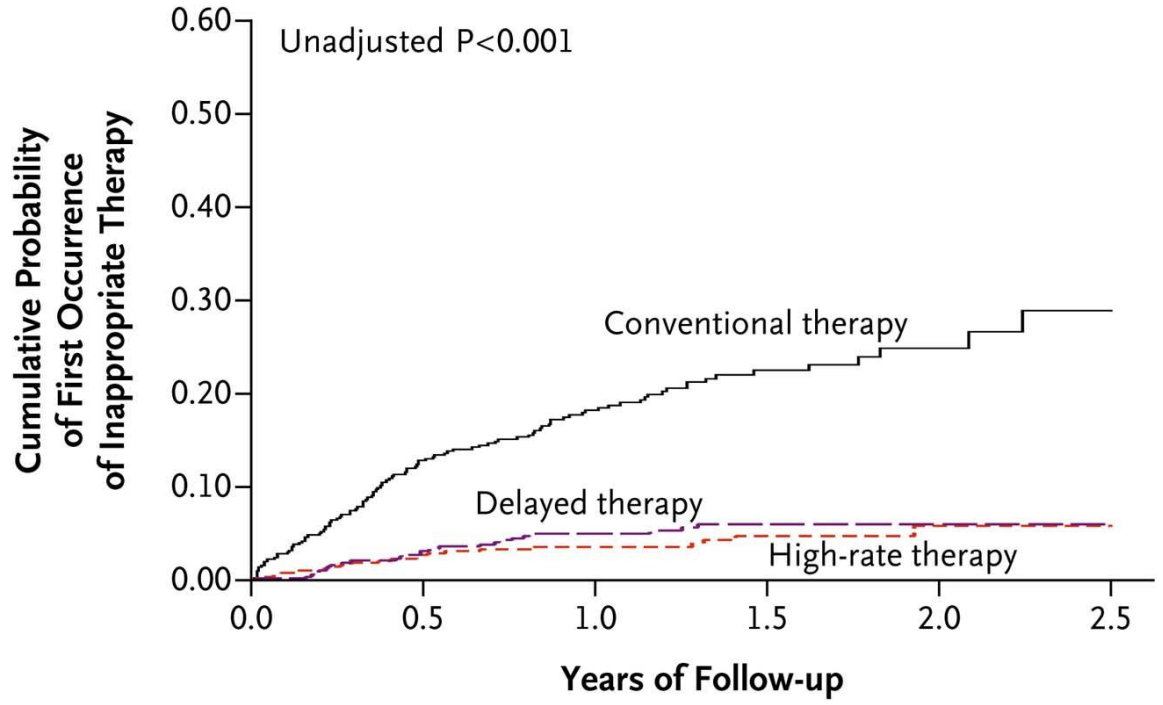
Three Treatment Arms (abbreviated)*

Arm A (Conventional)	Arm B (High–rate)	Arm C (Duration–delay)
Zone 1:	Zone 1:	Zone 1:
≥170 bpm, 2.5s delay	170 bpm	≥170 bpm, 60s delay
Onset/Stability Detection Enhancements ON	Monitor only	Rhythm ID® Detection Enhancements ON
ATP + Shock		ATP + Shock
SRD 3 min initial		SRD Off
Zone 2:	Zone 2:	Zone 2:
≥200 bpm, 1s delay	≥200 bpm, 2.5s delay	≥200 bpm, 12s delay
Quick Convert™ ATP Shock	Quick Convert™ ATP Shock	Rhythm ID® Detection Enhancements ON
		ATP + Shock
		SRD Off
		Zone 3 :
		≥250 bpm, 2.5s delay
		Quick Convert™ ATP + Shock

-AA NOV2012

Moss AJ et al. N Engl J Med 2012;367:2275-2283

NSVT veya stabil yavaş VT şokları? Detection süresi/sayısını arttıralım

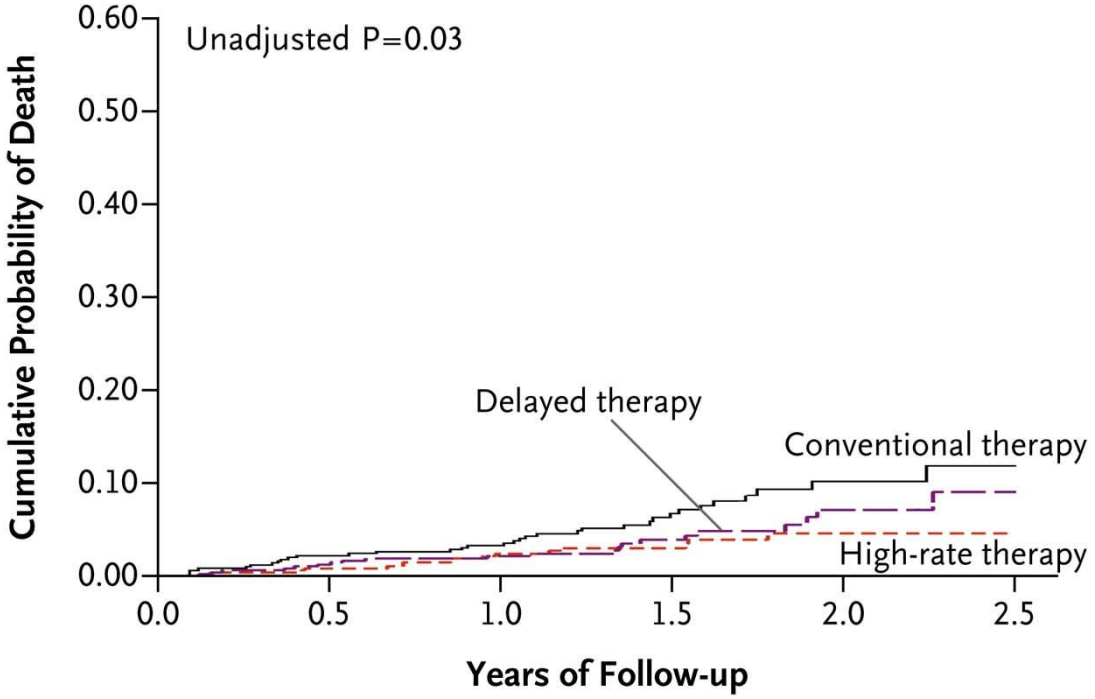


No. at Risk

Conventional therapy	514	420 (0.13)	305 (0.18)	149 (0.22)	56 (0.25)	8 (0.29)
High-rate therapy	500	454 (0.03)	339 (0.04)	191 (0.05)	70 (0.06)	17 (0.06)
Delayed therapy	486	445 (0.03)	342 (0.05)	177 (0.06)	82 (0.06)	13 (0.06)

Moss AJ et al. N Engl J Med 2012;367:2275-2283

NSVT veya stabil yavaş VT şokları? Detection süresi/sayısını arttıralım



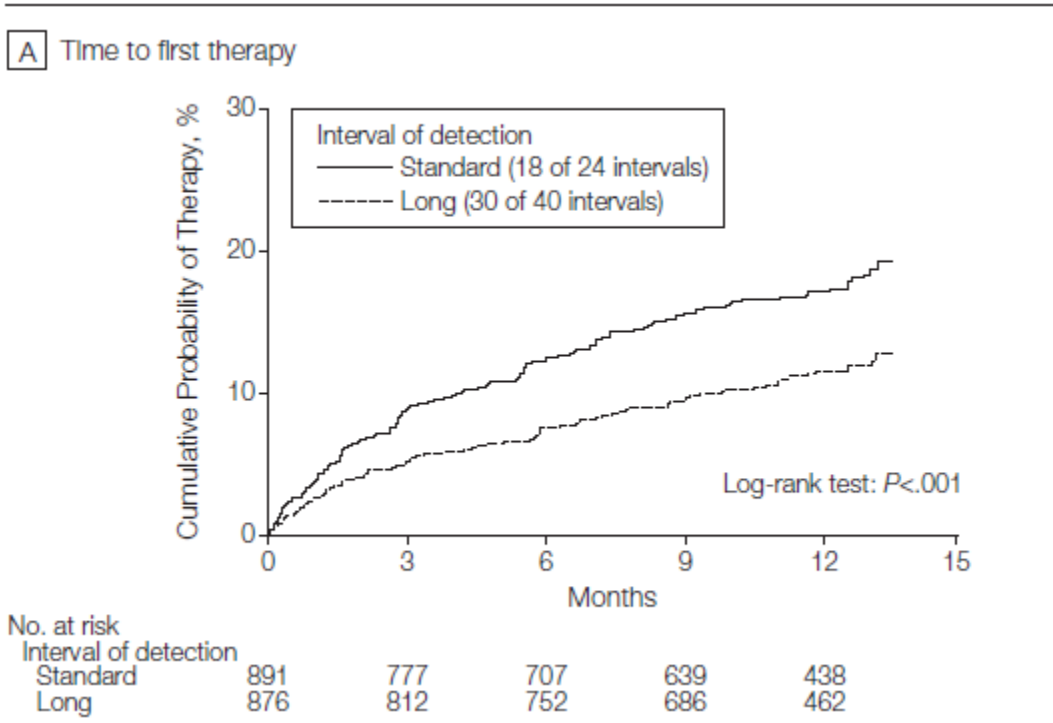
No. at Risk

Conventional therapy	514	490 (0.02)	392 (0.03)	219 (0.07)	89 (0.10)	14 (0.12)
High-rate therapy	500	478 (0.01)	372 (0.02)	221 (0.03)	90 (0.05)	21 (0.05)
Delayed therapy	486	471 (0.01)	375 (0.02)	205 (0.04)	99 (0.07)	14 (0.09)

Moss AJ et al. N Engl J Med 2012;367:2275-2283

NSVT veya stabil yavaş VT şokları? Detection süresi/sayısını arttıralım

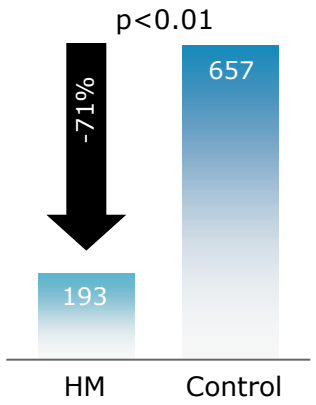
- ADVANCE III çalışması
  - 30/40 tanıma vs 18/24 tanıma
  - Şarj ederken ATP
  - Uygun şoklarda azalma
    - %54



ADVANCE III trial. JAMA. 2013;309:1903–11.

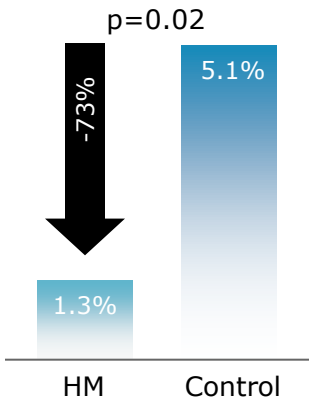
Home Monitoring yapsak?

ECOST çalışmasının sonuçları



Uygulanan tüm şoklar
-71%

Uygunsuz şok terapisi uygulanan hastalar
-52%



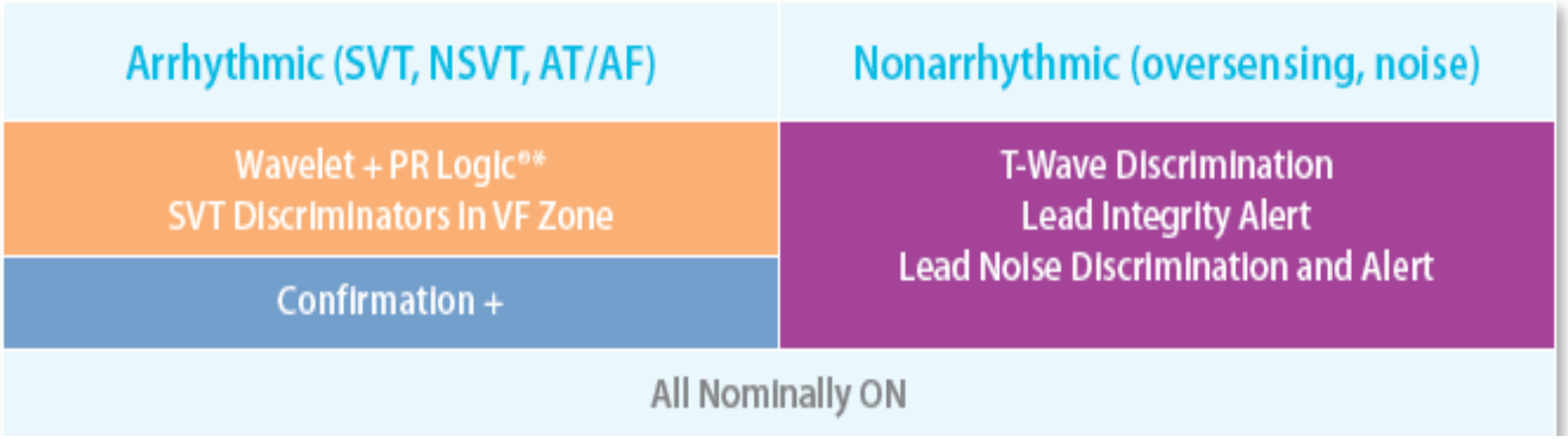
Uygunsuz şoklara bağlı hastaneye yatan hastalar
-73%

ECOST: randomized, multicenter, non-inferiority trail.
433 patients were randomly assigned (HM n=221/ control n=212)
mean follow-up time: 24 months

L. Guédon-Moreau et al., A randomized study of remote follow-up of implantable defibrillators. Safety and Efficacy report of the ECOST trial. *Eur Heart J,* 2012

+ Gürültü-SVT-VT ayrımı

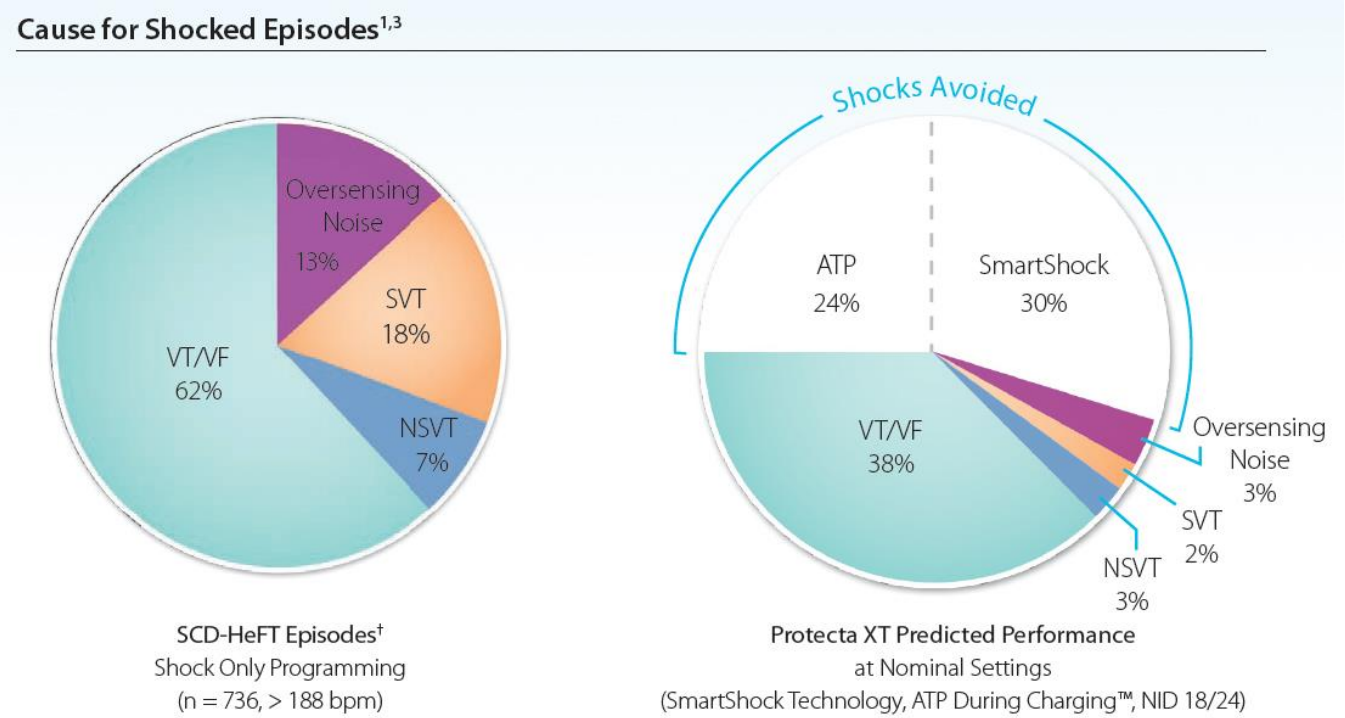
- PainFREE SST çalışması
- SmartShock™ Technology: 6 algoritma



- Uygunsuz ICD şoku
  - Primer korunmada %1.6
  - Sekonder korunmada %2.3

PainFREE SST trial. Europace. 2013;15:ii116-ii7

SmartShock™



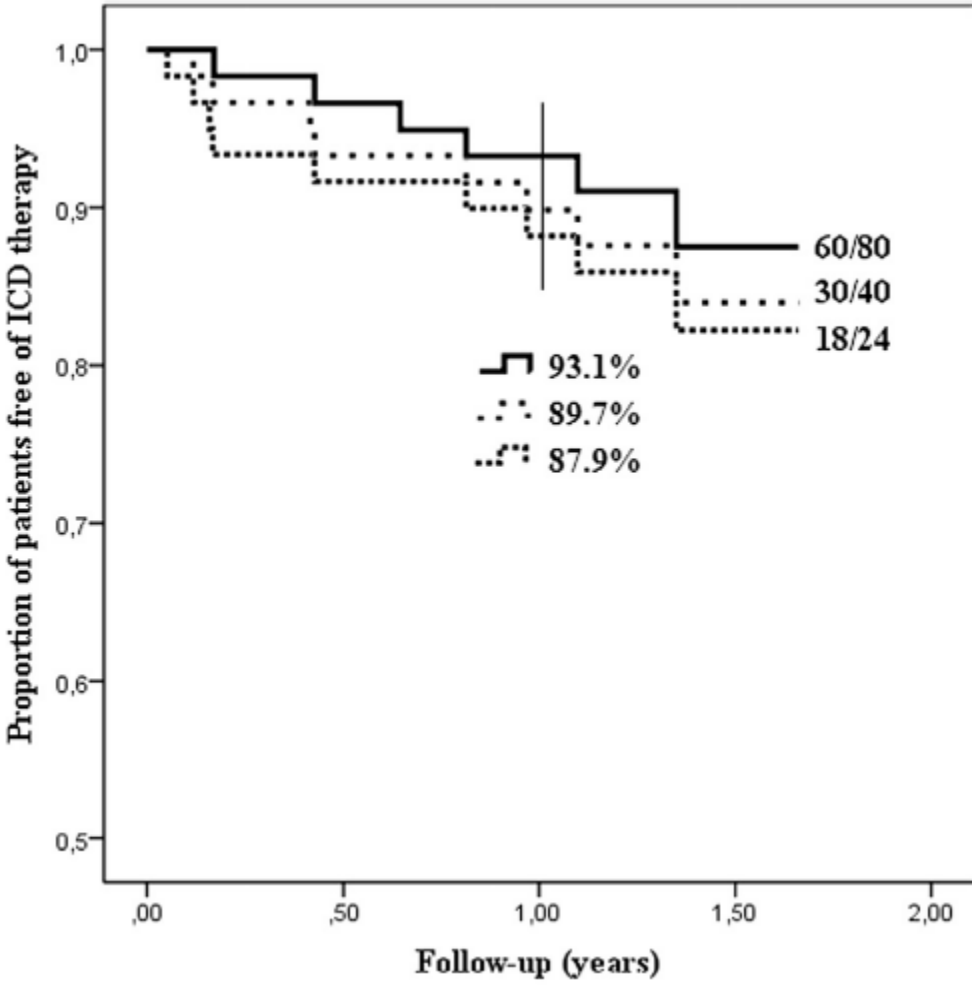
[1] *Virtual ICD: A Model to Evaluate Shock Reduction Strategies*. Presented at HRS 2010 (P03-125).

[2] Protecta Clinical Study, Medtronic data on file.

[3] Poole JE, Johnson GW, Hellkamp AS, et al. Prognostic importance of defibrillator shocks in patients with heart failure. *N Engl J Med*. September 4, 2008;359(10):1009-1017.t

Şansımızı biraz daha zorlasak mı?

- ENHANCED-ICD çalışması
  - İlk VF tanıma **60/80**, redection **30/40**
  - VT/fast VT/VF siklus uzunluğu 360/330/240 msn
  - Wavelet/T wave/lead noise/PR logic açık
  - Onset/stability kapalı



Programming Implantable Cardioverter-Defibrillator Therapy Zones to High Ranges to Prevent Delivery of Inappropriate Device Therapies in Patients With Primary Prevention: Results from the RISSY-ICD (Reduction of Inappropriate ShockS bY InCreaseD zones) trial

Serkan Cay, MD*, Ugur Canpolat, MD, Fatih Ucar, MD, Ozcan Ozeke, MD, Firat Ozcan, MD, Serkan Topaloglu, MD, and Dursun Aras, MD

Inappropriate shock is a frequently seen clinical problem despite advanced technologies used in modern implantable cardioverter-defibrillator (ICD) devices. Our aim was to investigate whether simply raising the ICD detection zones can decrease inappropriate therapies while still providing appropriate therapy. We randomized 223 patients with primary prevention to either the conventional programming group with 3 zones as VT_1 (167 to 182 beats/min) with discriminators, VT_2 (182 to 200 beats/min) with discriminators, and ventricular fibrillation (>200 beats/min) (n = 100) or the high-zone programming group with 3 zones as VT_1 (171 to 200 beats/min) with discriminators, VT_2 (200 to 230 beats/min) with discriminators, and ventricular fibrillation (>230 beats/min; n = 101). Twenty-two patients were lost to follow-up. The primary objectives were the first episode of appropriate and inappropriate therapies. The secondary objectives were all-cause mortality and hospitalization for heart failure. During 12-month follow-up, the first episode of appropriate therapy was higher (22% vs 10%, hazard ratio [HR] 2.18, 95% confidence interval [CI], 1.09 to 4.36, p = 0.028) and the first episode of inappropriate therapy was lower (5% vs 28%, HR 0.18 [95% CI 0.07 to 0.44], p <0.001) in the high-zone group compared with the conventional group. Although all-cause mortality did not differ (2% for the high-zone group vs 3% for the conventional group, HR 0.65 [95% CI 0.11 to 3.99], p >0.05), hospitalization for heart failure was significantly higher in the conventional group (13% vs 4%, HR 0.28 [95% CI 0.09 to 0.88], p = 0.021). In conclusion, in a real-world population, high-zone settings of the single-, dual-, and triple-chamber ICDs were associated with reduction in inappropriate therapy while still providing appropriate therapy. (Am J Cardiol 2015;115:1235–1243)

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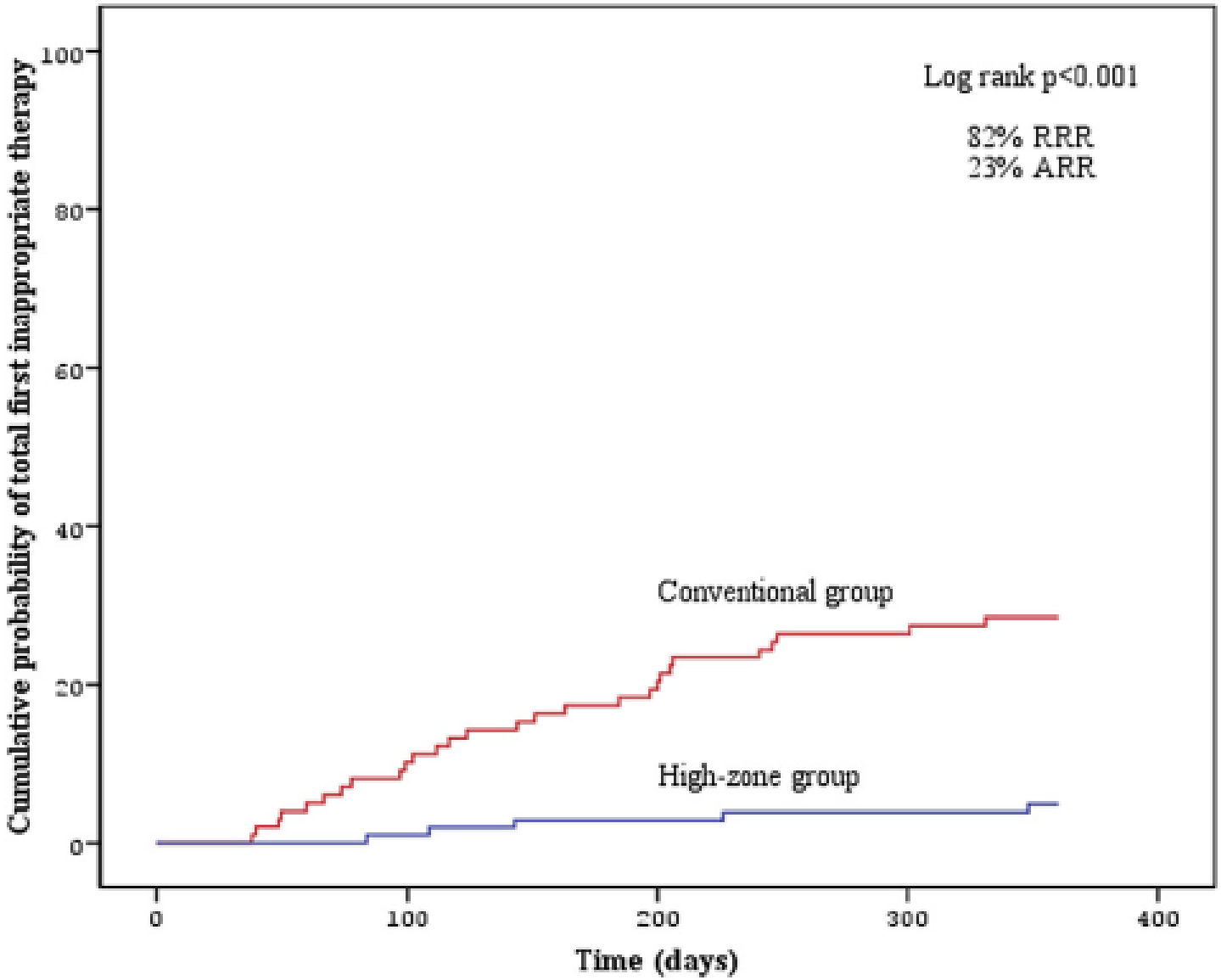


Number at risk					
Conventional	100	90 (0.10)	80 (0.20)	74 (0.26)	72 (0.28)
High-zone	101	100 (0.01)	98 (0.03)	97 (0.04)	96 (0.05)

Am J Cardiol 2015;115:1235e1243

ICD şok azaltıcı/engelleyici ayarlanabilen parametreler

- Siklus uzunluğu/Kalp hızı
- VT/VF zonu
- Detection Time (DT) or Number of Interval Detection (NID)
- SVT/VT ayrımında kullanılan özellikler
  - Stability
  - Sudden onset
  - Timer/Time out
  - Morfoloji kriteri
  - QRS aksı
  - Capture atımı
  - Tachy/Sinus ratio
  - Ahız – V hız ilişkisi
- SVT/VT ayrım algoritmaları: Tek odacıklı cihazlar için
- SVT/VT ayrım algoritmaları: Çift odacıklı cihazlar için
- Gürültü/parazit/T dalga tanıma algoritmaları
- Tedavi uygulamaları

Sonuç: Genel programlama yaklaşımı

- Hastaya/hastalığa özel ayarlama
- Yüksek taşikardi tanıma hızı ve tanıma süres/atımı (Klinik uygunsa)
- Önce ATP sonra gerekirse şok
- Uzun taşikardi tanıma süresi
- Uzaktan monitorizasyon
- Yeni özellikler (gürültü/T dalga algoritmaları)

ICD takılmış hastalarda şok azaltıcı yaklaşımlar

- Altta yatan – eşlik eden durumların tedavisi
- Antiaritmik tedavi
- ICD'nin uygun programlanması
- **Ablasyon**

Uygunsuz şoku engellemek için ablasyon

- SVT'lerin blasyonu
- AF ablasyonu
- AV nod ablasyonu (CRT + AF hastalarında)

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 DECEMBER 27, 2007 VOL. 357 NO. 26

Prophylactic Catheter Ablation for the Prevention of Defibrillator Therapy

Vivek Y. Reddy, M.D., Matthew R. Reynolds, M.D., Petr Neuzil, M.D., Ph.D., Allison W. Richardson, M.D., Milos Taborsky, M.D., Ph.D., Krit Jongnarangsin, M.D., Stepan Kralovec, Lucie Sediva, M.D., Jeremy N. Ruskin, M.D., and Mark E. Josephson, M.D.

ABSTRACT

BACKGROUND

For patients who have a ventricular tachyarrhythmic event, implantable cardioverter–defibrillators (ICDs) are a mainstay of therapy to prevent sudden death. However, ICD shocks are painful, can result in clinical depression, and do not offer complete protection against death from arrhythmia. We designed this randomized trial to examine whether prophylactic radiofrequency catheter ablation of arrhythmogenic ventricular tissue would reduce the incidence of ICD therapy.

METHODS

Eligible patients with a history of a myocardial infarction underwent defibrillator implantation for spontaneous ventricular tachycardia or fibrillation. The patients did not receive antiarrhythmic drugs. Patients were randomly assigned to defibrillator implantation alone or defibrillator implantation with adjunctive catheter ablation (64 patients in each group). Ablation was performed with the use of a substrate-based approach in which the myocardial scar is mapped and ablated while the heart remains predominantly in sinus rhythm. The primary end point was survival free from any appropriate ICD therapy.

RESULTS

The mortality rate 30 days after ablation was zero, and there were no significant

From the Cardiac Arrhythmia Service, Massachusetts General Hospital, Boston (V.Y.R., K.J., J.N.R.); the Harvard–Thorndike Electrophysiology Institute and Arrhythmia Service, Beth Israel Deaconess Medical Center, Boston (M.R.R., A.W.R., M.E.J.); and the Cardiac Arrhythmia Service, Homolka Hospital, Prague, Czech Republic (P.N., M.T., S.K., L.S.). Address reprint requests to Dr. Josephson at the Cardiovascular Division, Harvard–Thorndike Electrophysiology Institute and Arrhythmia Service, Beth Israel Deaconess Medical Center, 185 Pilgrim Rd., Boston, MA 02215, or at mjoseph2@bidmc.harvard.edu.

N Engl J Med 2007;357:2657-65.

SMASH-VT

126 hasta, klas 1-3 antiaritmik yok, MI öyküsü ve beraberinde VF, unstabil VT veya ICD ve 1 uygun şok varlığı

Randomized.

Ortalama EF %31.7

VF nedeniyle arrest: %18, unstabil VT %52, Senkop ve VT indüklenmesi %21, ICD+1 uygun şok %9

ICD takılması + substrat temelli RF ablasyon n=62

Sadece ICD n=64

- Primer son nokta: Uygun ICD tedavisi
- Ablasyon elektro-anatomik haritalama kılavuzluğunda yapılmış

Reddy V.Y, et al. N Engl J Med 2007;357:2657-65.

SMASH-VT

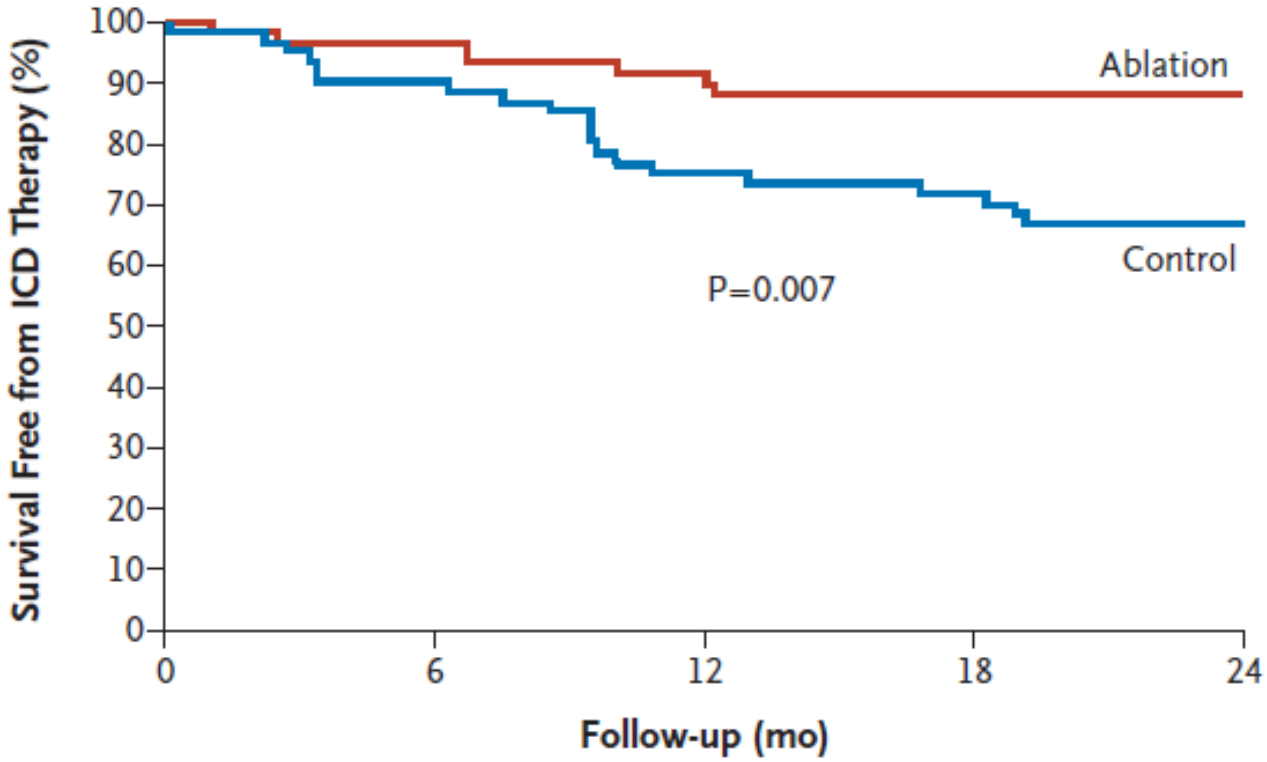
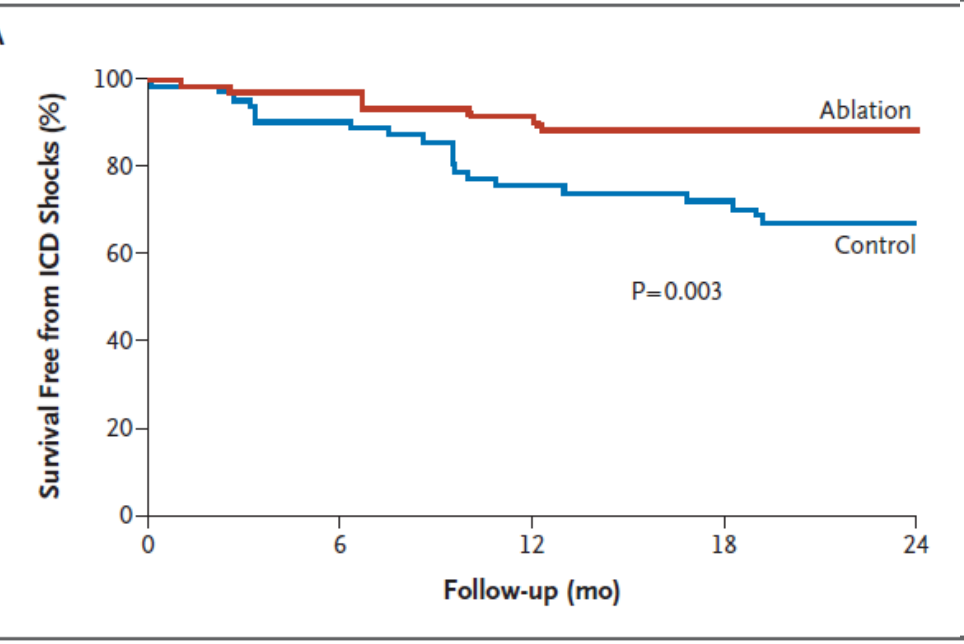


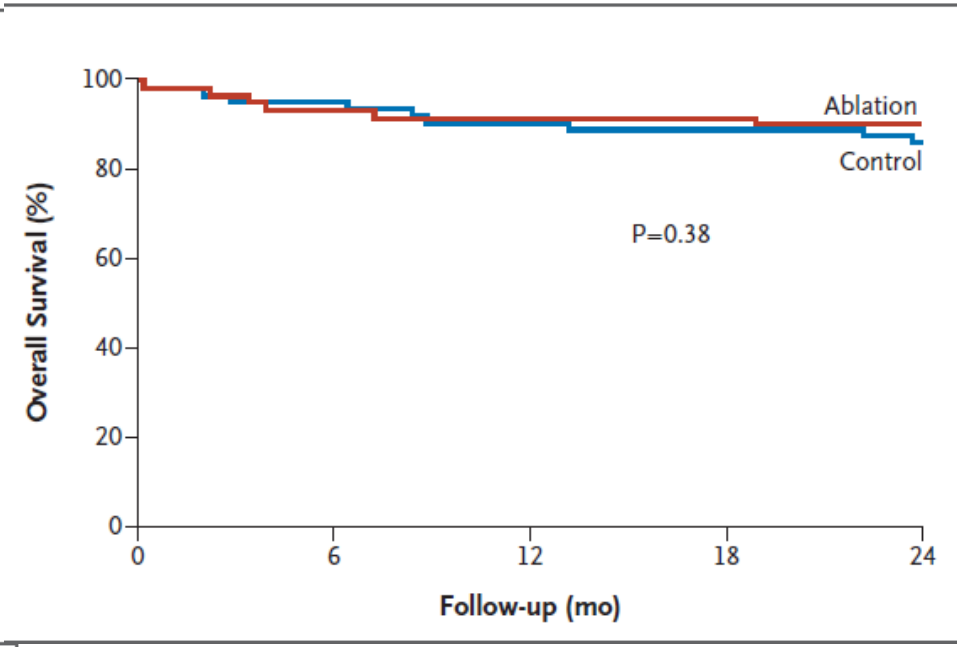
Figure 1. Kaplan–Meier Estimate of the Primary End Point of Survival Free from ICD Therapy.

ICD denotes implantable cardioverter–defibrillator.

Reddy V.Y, et al. N Engl J Med 2007;357:2657-65.

SMASH-VT





Reddy V.Y, et al. N Engl J Med 2007;357:2657-65.

Catheter ablation of stable ventricular tachycardia before defibrillator implantation in patients with coronary heart disease (VTACH): a multicentre randomised controlled trial

*Karl-Heinz Kuck, Anselm Schaumann, Lars Eckardt, Stephan Willems, Rodolfo Ventura, Etienne Delacrétaz, Heinz-Friedrich Pitschner, Josef Kautzner, Burghard Schumacher, Peter S Hansen, for the VTACH study group**

Summary

Background In patients with ventricular tachycardia (VT) and a history of myocardial infarction, intervention with an implantable cardioverter defibrillator (ICD) can prevent sudden cardiac death and thereby reduce total mortality. However, ICD shocks are painful and do not provide complete protection against sudden cardiac death. We assessed the potential benefit of catheter ablation before implantation of a cardioverter defibrillator.

Methods The Ventricular Tachycardia Ablation in Coronary Heart Disease (VTACH) study was a prospective, open, randomised controlled trial, undertaken in 16 centres in four European countries. Patients aged 18–80 years were eligible for enrolment if they had stable VT, previous myocardial infarction, and reduced left-ventricular ejection fraction (LVEF; ≤50%). 110 patients were randomly allocated in a 1:1 ratio to receive catheter ablation and an ICD (ablation group, n=54) or ICD alone (control group, n=56). Randomisation was done by computer-generated randomly permuted blocks and stratified by centre and LVEF (≤30% or >30%). Patients were followed up for at least 1 year. The primary endpoint was the time to first recurrence of VT or ventricular fibrillation (VF). Analysis was by intention to treat (ITT). This study is registered with ClinicalTrials.gov, number NCT00919373.

Findings 107 patients were included in the ITT population (ablation group, n=52; control group, n=55). Two patients (one in each group) withdrew consent immediately after randomisation without any follow-up data and one patient (ablation group) was excluded because of a protocol violaton. Mean follow-up was 22·5 months (SD 9·0). Time to recurrence of VT or VF was longer in the ablation group (median 18·6 months [lower quartile 2·4, upper quartile not determinable]) than in the control group (5·9 months [IQR 0·8–26·7]). At 2 years, estimates for survival free from VT or VF were 47% in the ablation group and 29% in the control group (hazard ratio 0·61; 95% CI 0·37–0·99; p=0·045). Complications related to the ablation procedure occurred in two patients; no deaths occurred within 30 days after ablation. 15 device-related complications requiring surgical intervention occurred in 13 patients (ablation group, four; control group, nine). Nine patients died during the study (ablation group, five; control group, four).

Lancet 2010; 375: 31–40

See Comment page 4

*Members listed at end of paper

Hanseatisches Herzzentrum, Asklepios Klinik St Georg, Hamburg, Germany (Prof K-H Kuck MD, A Schaumann MD); Medizinische Klinik C, Universitätsklinikum, Münster, Germany (Prof L Eckardt MD); Universitäres Herzzentrum, Hamburg, Germany (Prof S Willems MD, R Ventura MD); Universitätsklinik Inselspital, Bern, Switzerland (Prof E Delacrétaz MD); Kerckhoff-Klinik GmbH, Bad Nauheim, Germany (H-F Pitschner MD); Institute for Clinical and Experimental Medicine, Prague, Czech Republic (Prof J Kautzner MD); Herz-und Gefäß-Klinik, Bad Neustadt, Germany (Prof B Schumacher MD); and Aarhus University Hospital, Skejby, Sweden, Aarhus

VTACH

110 hasta, Stabil VT, MI öyküsü, EF < %50

Randomized.
Ortalama EF %31.7
VF nedeniyle arrest: %18, unstabil VT %52, Senkop ve VT indüklenmesi %21, ICD+1 uygun şok %9

ICD takılması + ablasyon
n=54

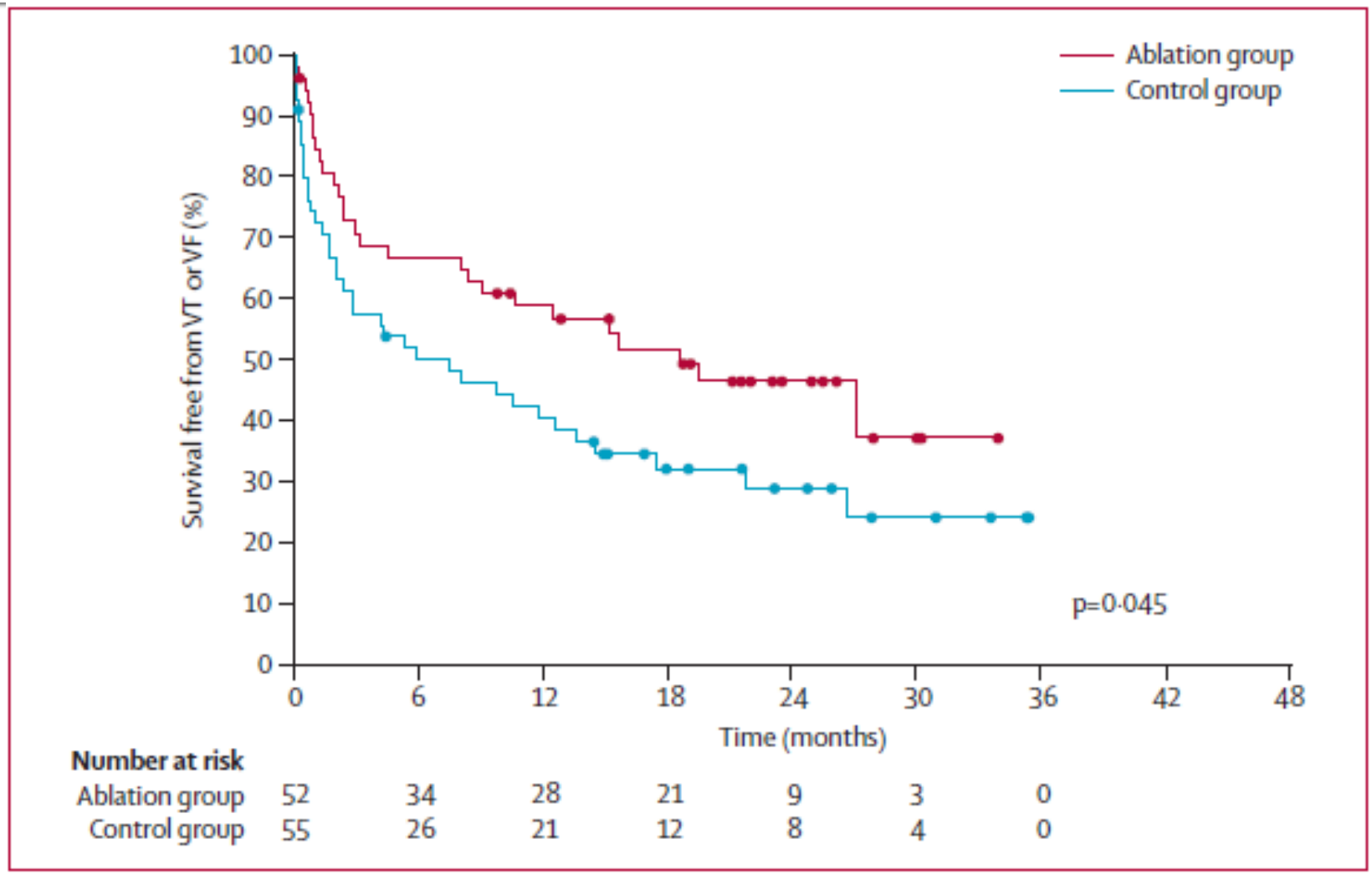
Sadece ICD

n=56

- Primer son nokta: İlk VT veya VF tekrarı
- Ablasyon elektro-anatomik haritalama kılavuzluğunda yapılmış

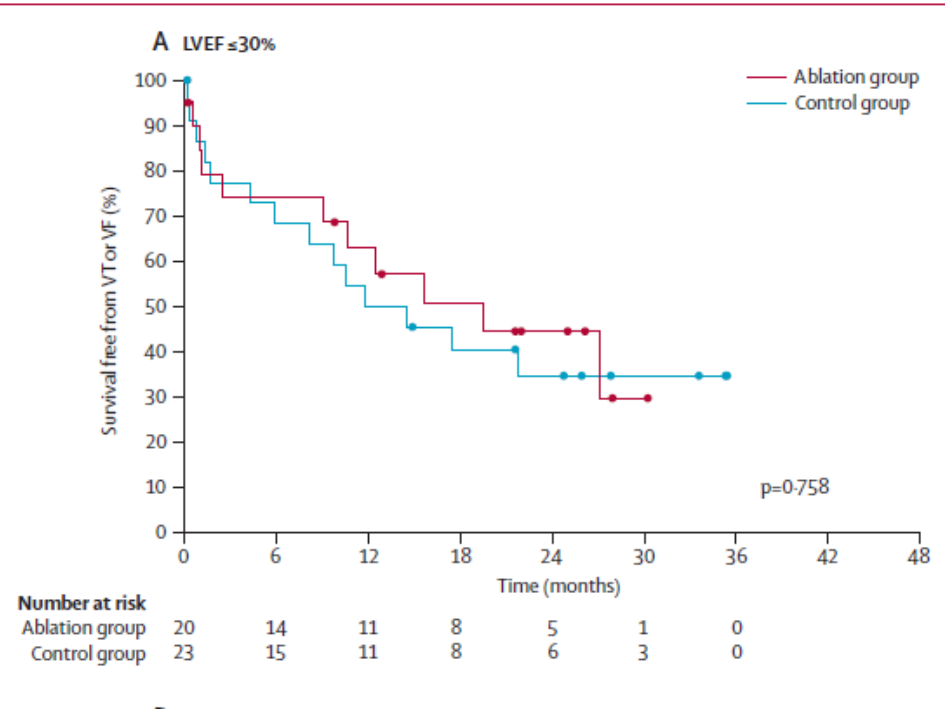
Kuck KH, et al. Lancet 2010; 375: 31–40

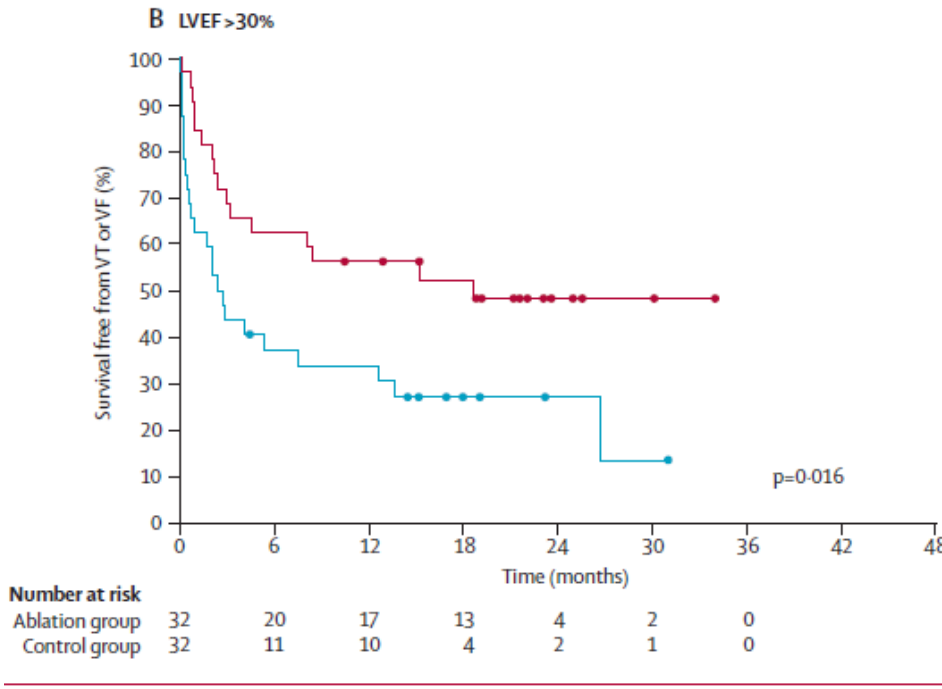
VTACH



Kuck KH, et al. Lancet 2010; 375: 31–40

VTACH





Kuck KH, et al. Lancet 2010; 375: 31–40

Meta-analysis of catheter ablation as an adjunct to medical therapy for treatment of ventricular tachycardia in patients with structural heart disease

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BACKGROUND Most studies of catheter ablation for the treatment of ventricular tachycardia (VT) are relatively small observational trials.

OBJECTIVE The purpose of this study was to define the relative risk of VT recurrence in patients undergoing catheter ablation as an adjunct to medical therapy versus medical therapy alone in a pooled analysis of controlled studies.

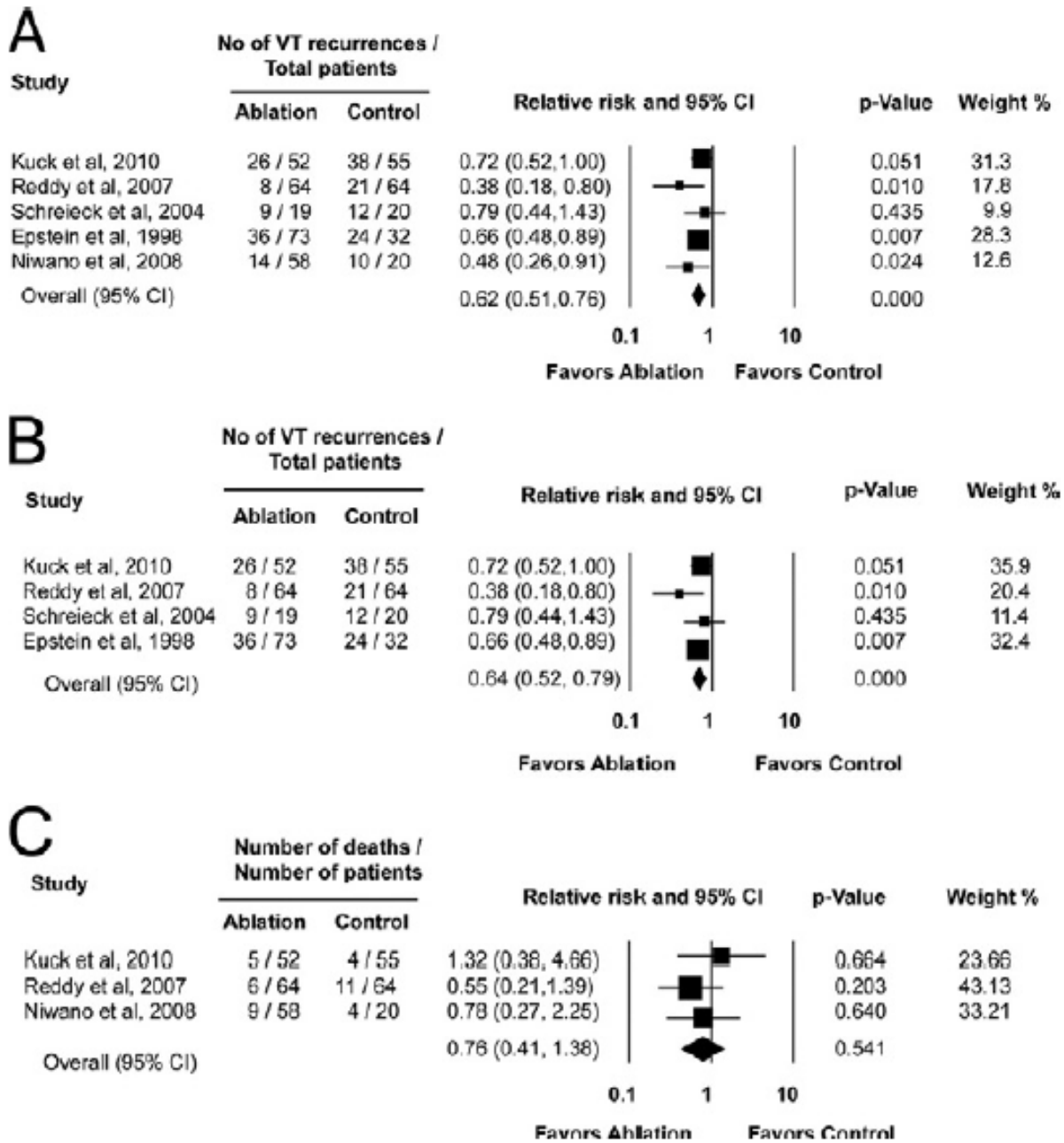
METHODS Randomized and nonrandomized controlled trials of patients who underwent adjunctive catheter ablation of VT versus medical therapy alone were sought. MEDLINE, EMBASE, the Cochrane central register of controlled trials (CENTRAL), and Web of Science were searched from 1965 to July 2010. Supplemental searches included Internet resources, reference lists, and reports of arrhythmia experts. Three authors independently reviewed and extracted the data regarding baseline characteristics, ablation methodology, medical therapy, complications, VT recurrences, mortality, and study quality. therapy alone for VT. Complications of catheter ablation included death (1%), stroke (1%), cardiac perforation (1%), and complete heart block (1.6%). Using a random-effects model, a statistically significant 35% reduction in the number of patients with VT recurrence was noted with adjunctive catheter ablation ($P<.001$). There was no statistically significant difference in mortality.

CONCLUSIONS Catheter ablation as an adjunct to medical therapy reduces VT recurrences in patients with structural heart disease and has no impact on mortality.

KEYWORDS Ventricular tachycardia; Catheter ablation; Medical therapy; Meta-analysis; arrhythmia

ABBREVIATIONS CENTRAL = Cochrane central register of controlled trials; **ICD** = implantable cardioverter-defibrillator; **PRISMA** = Preferred Reporting Items for Systematic Reviews

Mallidi J, et al .Heart Rhythm 2011;8:503–510



Mallidi J, et al .Heart Rhythm 2011;8:503–510

Patients treated with catheter ablation for ventricular tachycardia after an ICD shock have lower long-term rates of death and heart failure hospitalization than do patients treated with medical management only

T. Jared Bunch, MD,[*] J. Peter Weiss, MD,[*] Brian G. Crandall, MD,[*] John D. Day, MD, FHRS,[*] Heidi T. May, PhD, MSPH,[*] Tami L. Bair, RN,[*] Jeffrey S. Osborn, MD,[*] Charles Mallender, MD,[*] Avi Fischer, MD,[†] Kyle J. Brunner, MBA,[†] Srijoy Mahapatra, MD[†]

From the [*]Intermountain Heart Institute, Intermountain Medical Center, Murray, Utah, and [†]St Jude Medical Corporation, St. Paul, Minnesota.

BACKGROUND Ventricular arrhythmias in patients with implantable cardioverter-defibrillators (ICDs) adversely affect outcomes. Antiarrhythmic approaches to ventricular tachycardia (VT) have variable efficacy and may increase risk of ventricular arrhythmias, worsening cardiomyopathy, and death. Comparatively, VT ablation is an alternative approach that may favorably affect outcomes.

OBJECTIVE To further explore the effect on long-term outcomes after catheter ablation of VT, we compared patients with history of ICD shocks who did not undergo ablation, patients with a history of ICD shocks that underwent ablation, and patients with ICDs who had no history of ICD shocks.

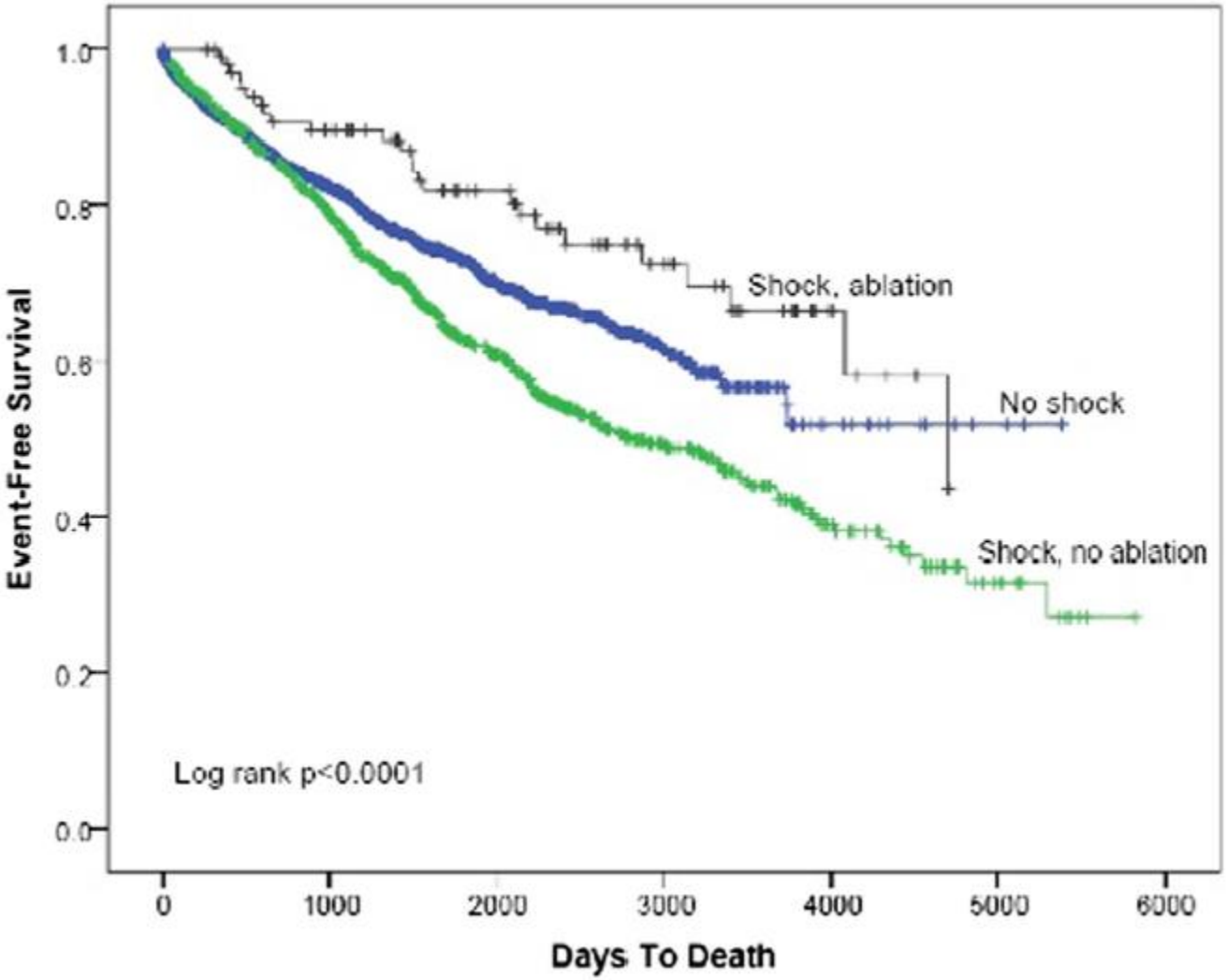
METHODS A total of 102 consecutive patients with structural heart disease who underwent VT ablation for recurrent ICD shocks were patients with history of ICD shocks who were treated medically than in patients with ICDs and no history of shock (hazard ratio [HR] 1.45; $P < .0001$ vs HR 2.00; $P < .0001$, respectively). The multivariate-adjusted risks were attenuated after VT ablation with death and heart failure hospitalization rates similar to those of patients with no shock (HR 0.89; $P = .58$ vs HR 1.38; $P = .09$, respectively). A similar nonsignificant trend was seen with stroke/transient ischemic attack.

CONCLUSIONS Patients treated with VT ablation after an ICD shock have a significantly lower risk of death and heart failure hospitalization than did patients managed medically only. The adverse event rates after VT ablation were similar to those of patients with ICDs but without VT.

Bunch TJ, et al. Heart Rhythm Heart Rhythm. 2014;11:533-40.

- Yapısal kalp hastalığı olan
- ICD +Tekrarlayıcı şok +VT ablasyonu: 102 hasta
- ICD + şok yok: 2088 hasta
- ICD + VT/VF nedeniyle uygun şok: 817 hasta

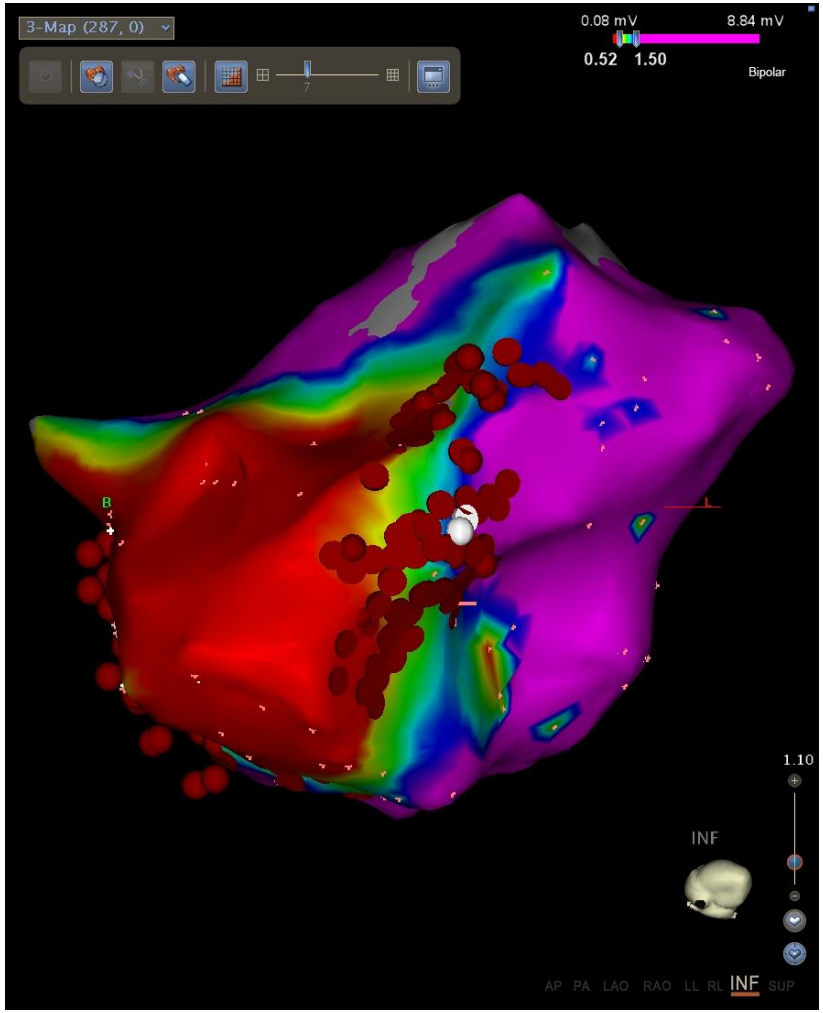
Bunch TJ, et al. Heart Rhythm Heart Rhythm. 2014;11:533-40.



Bunch TJ, et al. Heart Rhythm Heart Rhythm. 2014;11:533-40.

ICD'li hastada ne zaman ablasyon

- ICD takılması ile eş zamanlı?
- İlk şoktan sonra?
- **Sık şok olunca?**
- **Elektriksel fırtına sonrası?**



Kılavuz görüşü: Sustain monomorfik VT Kime ne zaman ablasyon yapılmalı

Sınıf 1

- Skarla ilişkili kalp hastalıklarında incessant VT veya VT fırtınası: acil ablasyon
- İskemik kalp hastalığı + sustain VT nedeniyle tekrarlayıcı şoklar olması

Sınıf 2a

- İskemik kalp hastalığı ve ICD'si olan hastalarda ilk sustained VT atağı sonrası

2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

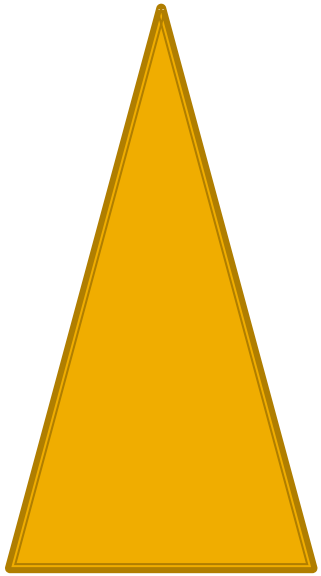
ICD takılı hastada ablasyon kararı

Sustained VT/VF

Tetikleyen olası faktörleri değerlendir/tedavi et
ICD pogramını gözden geçir – düzelt
Beta-bloker dozunu arttır

Ablasyon lehine

- Monomorfik VT
- Tecrübeli merkez
- Düşük işlem riski
- Sık veya incessant VT
- Artmış ilaç toksisite riski
- Hasta tercihi



Medikal tedavi lehine

- Polimorfik VT
- Tecrübesiz merkez
- Yüksek işlem riski
- Hasta tercihi

- .....

ICD şok azaltıcı/engelleyici ayarlanabilen parametreler

- Siklus uzunluğu/Kalp hızı
- VT/VF zonu
- Detection Time (DT) or Number of Interval Detection (NID)
- SVT/VT ayrımında kullanılan özellikler
  - Stability
  - Sudden onset
  - Timer/Time out
  - Morfoloji kriteri
  - QRS aksı
  - Capture atımı
  - Tachy/Sinus ratio
  - Ahız – V hız ilişkisi
- SVT/VT ayrım algoritmaları: Tek odacıklı cihazlar için
- SVT/VT ayrım algoritmaları: Çift odacıklı cihazlar için
- Gürültü/parazit/T dalga tanıma algoritmaları
- Tedavi uygulamaları

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Siklus uzunluğu/Kalp hızı VT/VF zonu

- ICD taşikardi tanıma kriteri olarak kalp hızı veya msn olarak ayarlama
- 1-3 taşikardi zonu
  - 1 VF
  - Hızlı VT zonu
  - Yavaş VT zonu
- Ayarlamada önemli parametreler
  - ICD takılma nedeni
    - Primer korunma vs. sekonder korunma
    - Altta yatan hastalık (KAH, KMP, Genetik aritmik sendrom, vs?)
  - Hasta yaşı
  - EF
  - Klinik taşikardi varsa
    - Taşikardi siklus uzunluğu/hızı
    - Taşikardi sayısı
    - Tolere edilme durumu
    - EPS yapılmışsa ATP uygulamasına yanıtı

ICD şok azaltıcı/engelleyici ayarlanabilen parametreler

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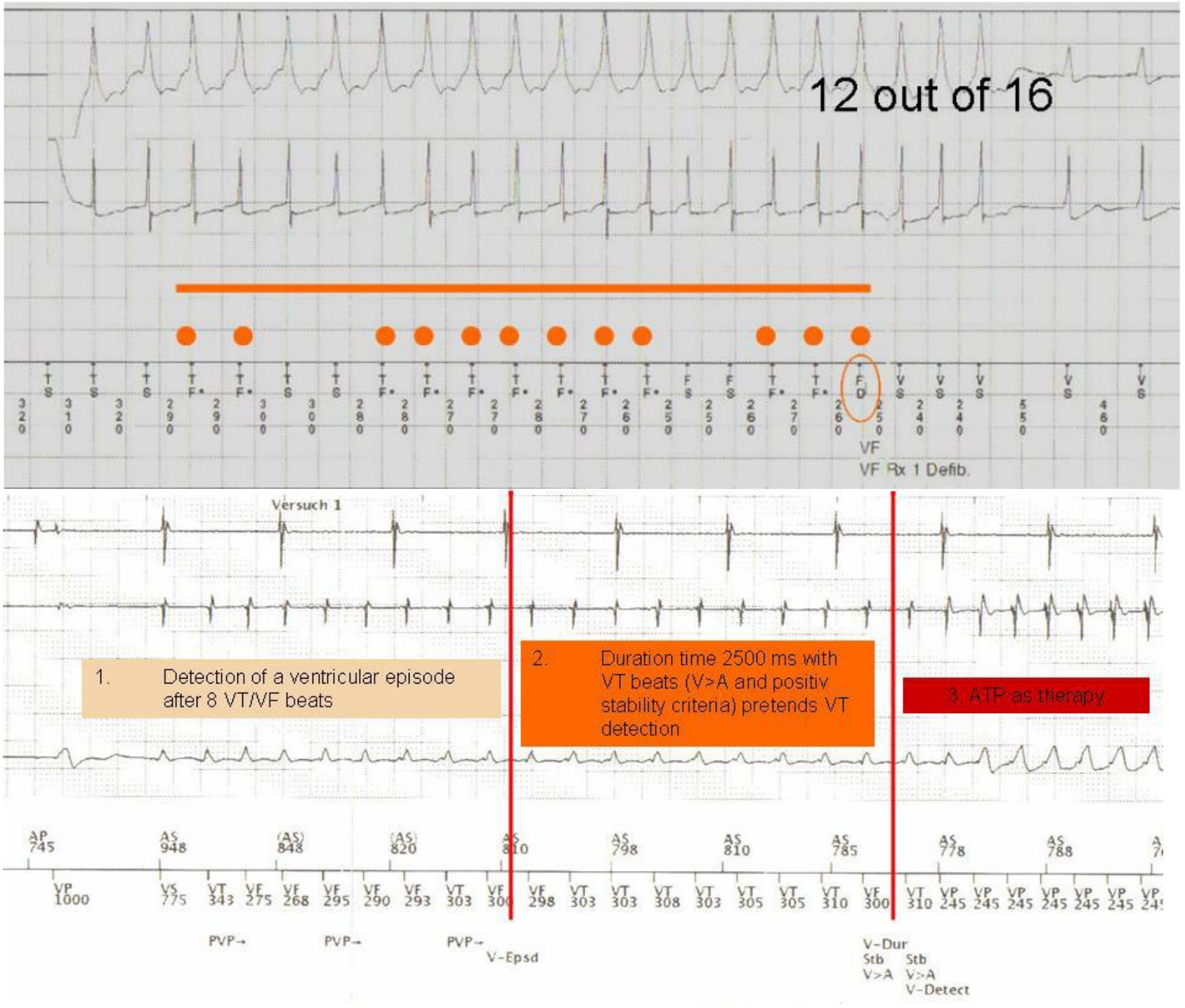
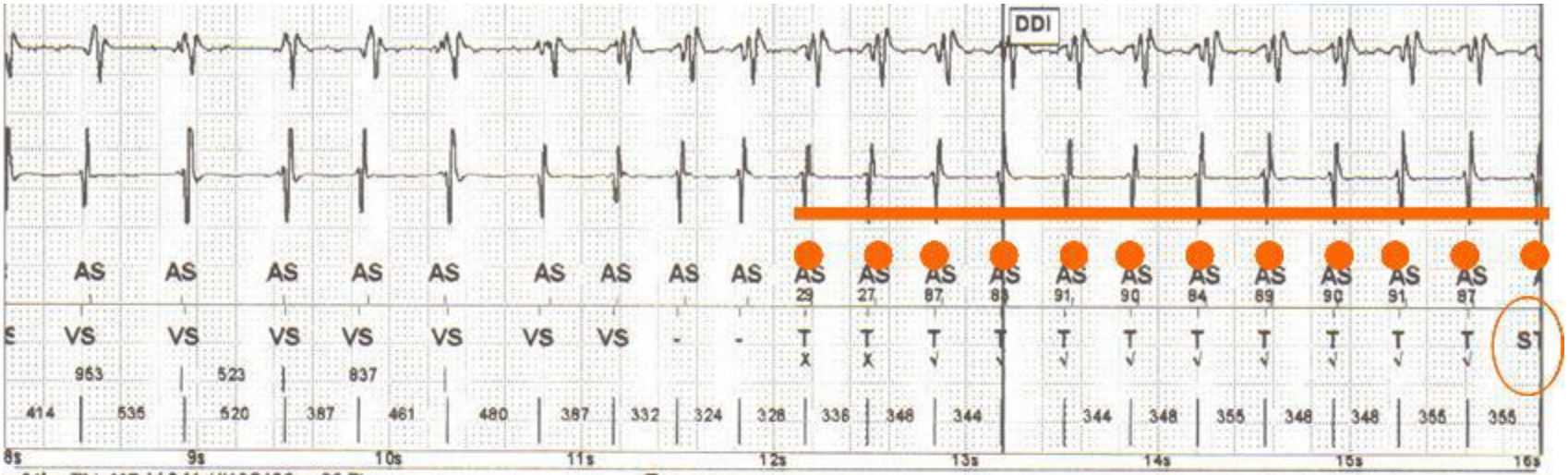
- Tedavi uygulamaları

Detection Time (DT) or Number of Interval Detection (NID)

- Cihazın taşikardi tanısı koyabilmesi için gerekli aritmi süresi
  - Saniye olarak (2.5 sn, gibi)
  - Atım sayısı (24 atım, 12/16 atım, gibi)
- Ayarlamada önemli parametreler
  - ICD takılma nedeni
    - Primer korunma vs. sekonder korunma
    - Altta yatan hastalık (KAH, KMP, Genetik aritmik sendrom, vs?)
  - Klinik taşikardi varsa
    - Taşikardi siklus uzunluğu/hızı
    - Taşikardi sayısı
    - Tolere edilme durumu
  - Hasta yaşı
  - EF


12 out of 16
VF
VF Rx 1 Defib.
Versuch 1
1. Detection of a ventricular episode after 8 VT/VF beats
2. Duration time 2500 ms with VT beats (V>A and positiv stability criteria) pretends VT detection
3. ATP as therapy
PVP→
PVP→
PVP→
V-Epsd
V-Dur
Stb V>A
Stb V>A V-Detect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Merlin™ PCS (#20638, 3330 v6.9.2)
ST. JUDE MEDICAL
Tachy Episode seite 1 von 2
14 Apr. 2009 14:20

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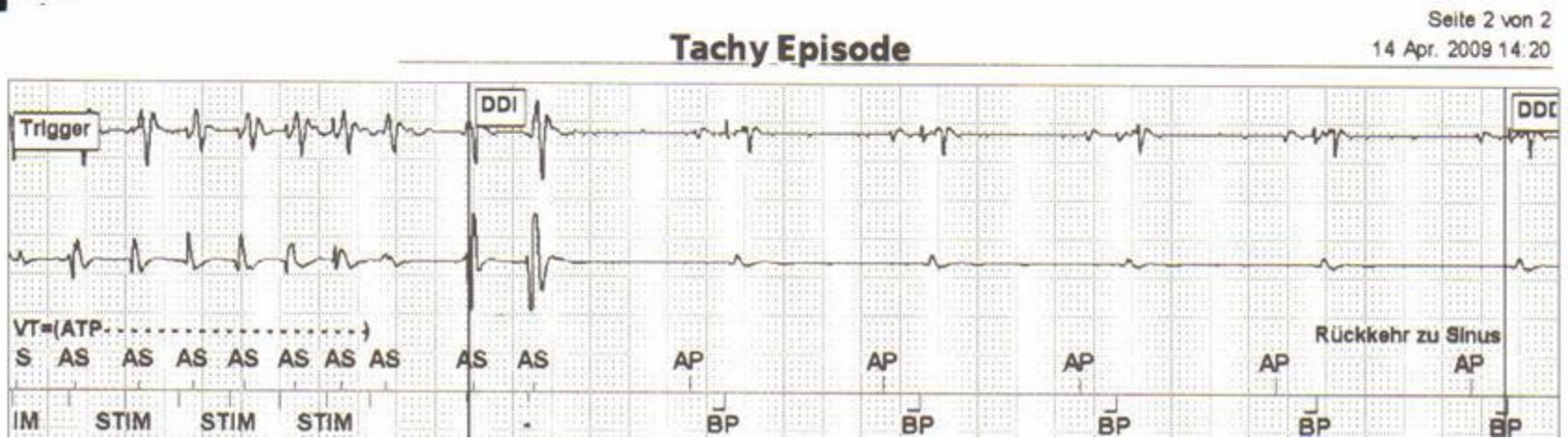
Tachy Episode
Seite 2 von 2
14 Apr. 2009 14:20
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ICD şok azaltıcı/engelleyici ayarlanabilen parametreler

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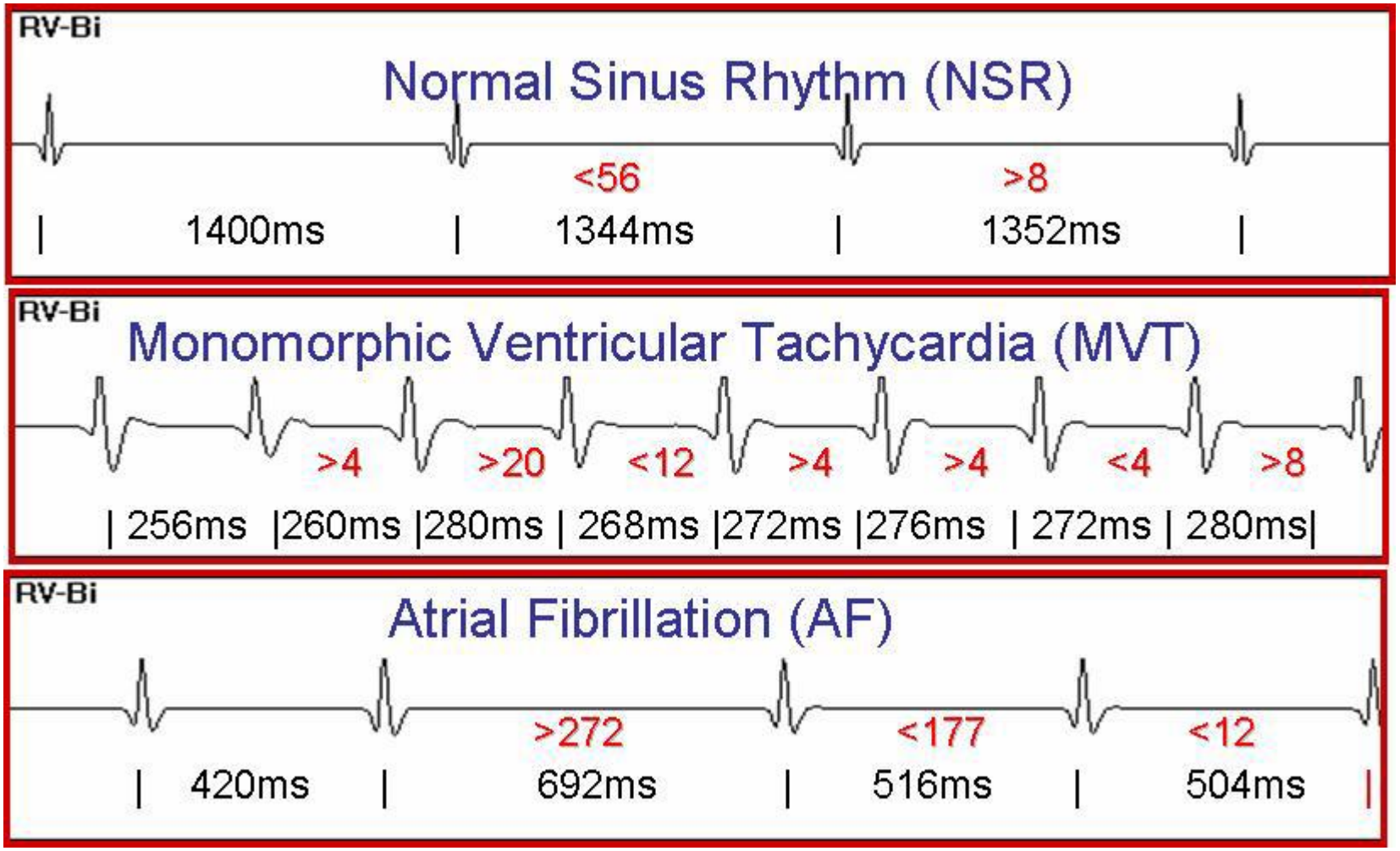
- Tedavi uygulamaları

SVT/VT ayrımında kullanılan özellikler: Stability

- AF stabil değil
- VT, SVT ve Sinüs ritmi stabil bir ritim
- Tek odacıklı cihazlarda ayarlanabilir
  - Yaklaşık 30 – 40 msn

SVT/VT ayrımında kullanılan özellikler: Stability



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- Tedavi uygulamaları

SVT/VT ayrımında kullanılan özellikler: Sudden Onset

- Taşikardinin başlama şeklini değerlendirmede kullanılır
  - Sinüs hızı derece derce artar
  - VT ani başlar
- Olası sorunlar
  - SVT ? AF?
  - Yavaş VT

ICD şok azaltıcı/engelleyici ayarlanabilen parametreler

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- Tedavi uygulamaları

SVT/VT ayrımında kullanılan özellikler: Timer/Time out

- Taşikardi tanıma kriterleri için veya ATP uygulamaları için zaman sınırlanması konması
- Kullanılmamalı!!

ICD şok azaltıcı/engelleyici ayarlanabilen parametreler

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- Tedavi uygulamaları

SVT/VT ayrımında kullanılan özellikler: Morfoloji kriteri

- Cihazın normal QRS morfolojisini kaydedip bunu taşikardideki QRS morfolojisi ile karşılaştırması
- Mutlaka ayarlanmalı
- Kısıtlılık
  - AV tam blok sürekli pace ritmi !!!
  - Dal bloğu varlığı (intermittant veya hıza bağlı)
  - Erken dönemde lead yer değişimine bağlı veya MI nedeni ile morfoloji değişimi
    - Otomatik update

ICD şok azaltıcı/engelleyici ayarlanabilen parametreler

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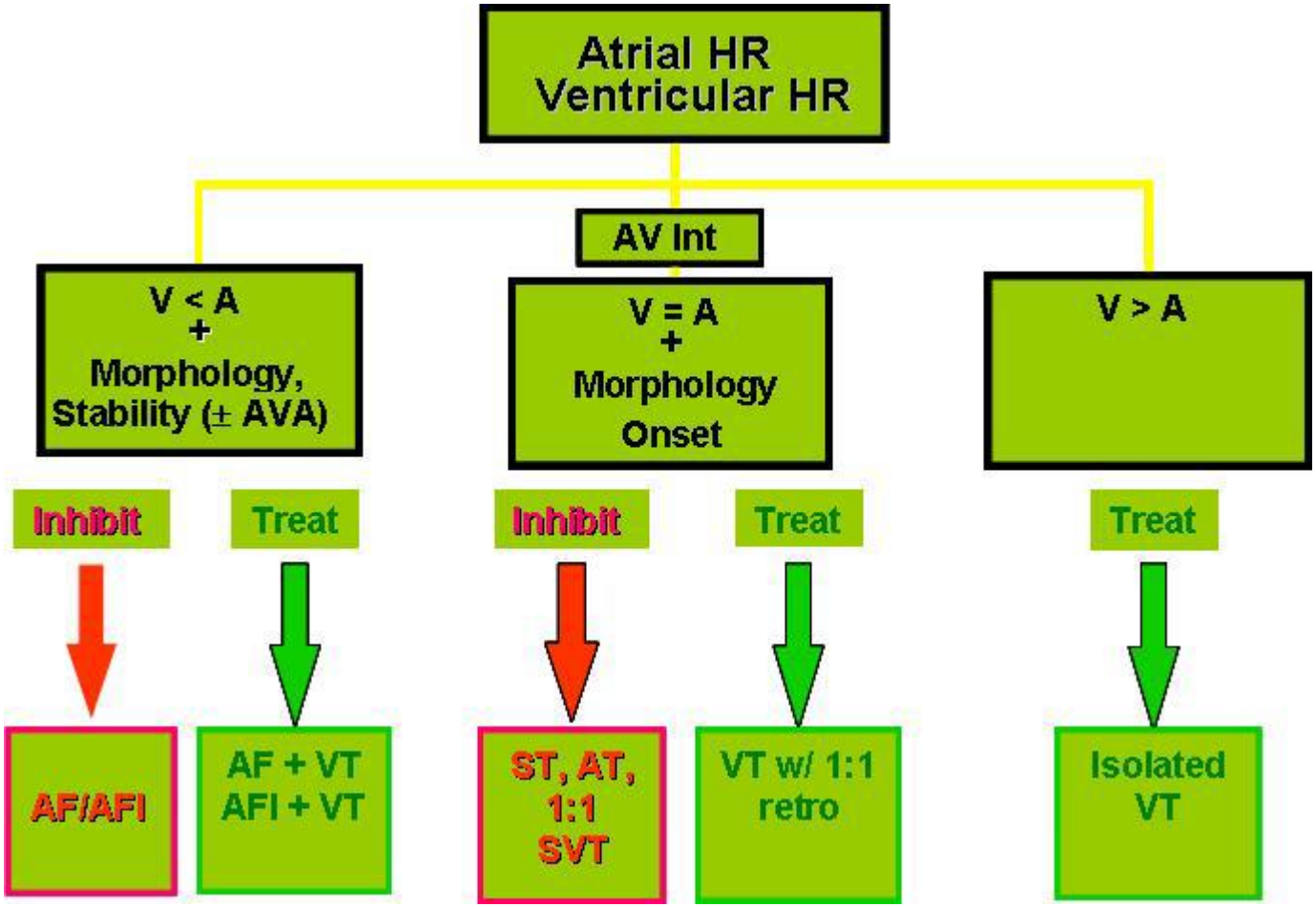
SVT/VT ayrım algoritmaları: Çift odacıklı cihazlar için



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- **Tedavi uygulamaları**

SVT/VT ayrımında kullanılan özellikler: Tedavi uygulamaları

- VF zonuna giren taşikardilerin ne kadarı VF?
- ATP uygulamaları
  - VT tedavileri: Önce ATP sonra şok
  - VF tedavileri: Şok için şarj olurken ATP

Programming	Inappropriate shock	No inappropriate shock	P value
Single chamber			
Number of patients	83	83	
Lowest VT zone (beats/min)	169.3 ± 19.9	171.9 ± 14.5	0.540
Lowest VT zone detection time (s)	2.45 ± 1.99	2.42 ± 2.07	0.830
Stability on % (n)	17 (14)	36 (30)	0.030
Sudden onset on % (n)	16 (13	23 (19)	0.160
Dual chamber			
Number of patients	32	36	
V>a on% (n)	31 (10)	50 (18)	0.054
Atrial fibrillation discriminator on % (n)	34 (11)	44 (16)	0.210

Table 5. Influences of discrimination algorithms to inappropriate ICD-shock according to single and dual chamber detection in MADIT II trial [4].

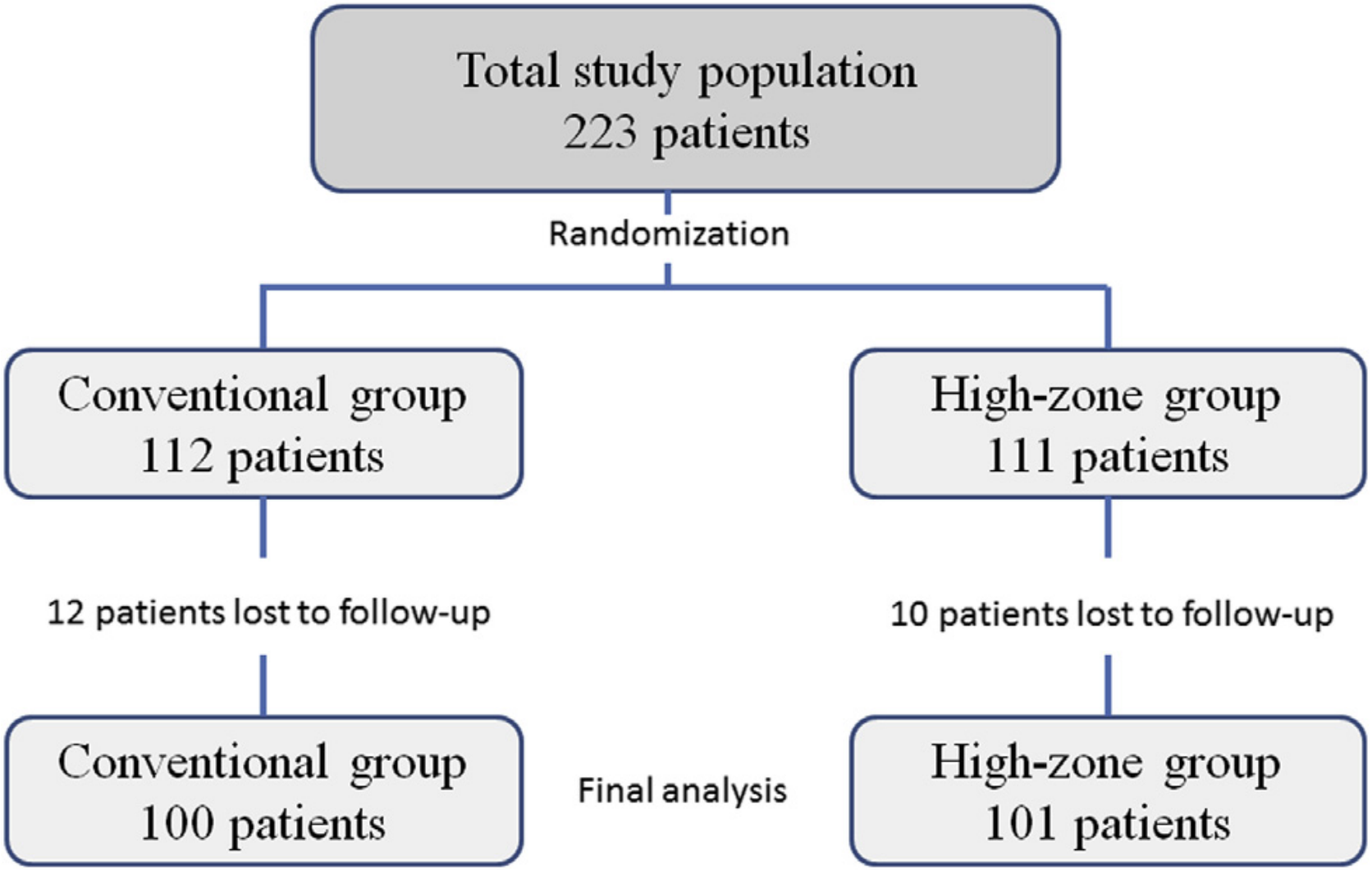
Daubert JP, et al: Inappropriate implantable cardioverter-defibrillator shocks in MADIT II: J Am Coll Cardiol. 2008;51:1357-1365.

Programming Implantable Cardioverter-Defibrillator Therapy Zones to High Ranges to Prevent Delivery of Inappropriate Device Therapies in Patients With Primary Prevention: Results from the RISSY-ICD (Reduction of Inappropriate ShockS bY InCreaseD zones) trial

Serkan Cay, MD*, Ugur Canpolat, MD, Fatih Ucar, MD, Ozcan Ozeke, MD, Firat Ozcan, MD, Serkan Topaloglu, MD, and Dursun Aras, MD

Inappropriate shock is a frequently seen clinical problem despite advanced technologies used in modern implantable cardioverter-defibrillator (ICD) devices. Our aim was to investigate whether simply raising the ICD detection zones can decrease inappropriate therapies while still providing appropriate therapy. We randomized 223 patients with primary prevention to either the conventional programming group with 3 zones as VT_1 (167 to 182 beats/min) with discriminators, VT_2 (182 to 200 beats/min) with discriminators, and ventricular fibrillation (>200 beats/min) (n = 100) or the high-zone programming group with 3 zones as VT_1 (171 to 200 beats/min) with discriminators, VT_2 (200 to 230 beats/min) with discriminators, and ventricular fibrillation (>230 beats/min; n = 101). Twenty-two patients were lost to follow-up. The primary objectives were the first episode of appropriate and inappropriate therapies. The secondary objectives were all-cause mortality and hospitalization for heart failure. During 12-month follow-up, the first episode of appropriate therapy was higher (22% vs 10%, hazard ratio [HR] 2.18, 95% confidence interval [CI], 1.09 to 4.36, p = 0.028) and the first episode of inappropriate therapy was lower (5% vs 28%, HR 0.18 [95% CI 0.07 to 0.44], p <0.001) in the high-zone group compared with the conventional group. Although all-cause mortality did not differ (2% for the high-zone group vs 3% for the conventional group, HR 0.65 [95% CI 0.11 to 3.99], p >0.05), hospitalization for heart failure was significantly higher in the conventional group (13% vs 4%, HR 0.28 [95% CI 0.09 to 0.88], p = 0.021). In conclusion, in a real-world population, high-zone settings of the single-, dual-, and triple-chamber ICDs were associated with reduction in inappropriate therapy while still providing appropriate therapy. **(Am J Cardiol 2015;115:1235–1243)**

Am J Cardiol 2015;115:1235e1243

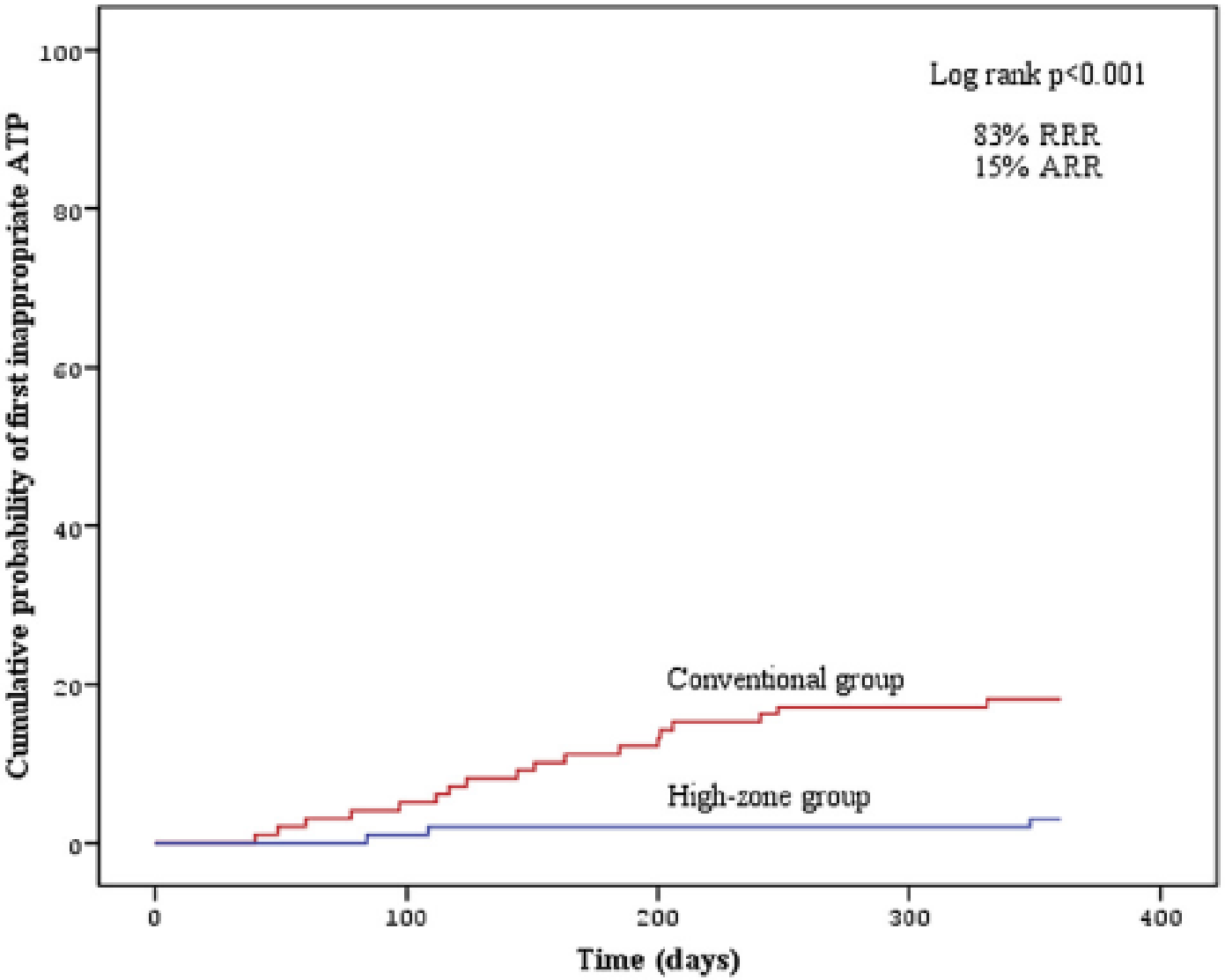


Am J Cardiol 2015;115:1235e1243

Programmed parameters	Conventional group	High-zone group
Detection		
VT_1 zone (bpm)	167-182	171-200
NID, initial	32	32
NID, redetection	12	12
VT_2 zone (bpm)	182-200	200-230
NID, initial	30/40	30/40
NID, redetection	12/16	12/16
VF zone (bpm)	>200	>230
NID, initial	30/40	30/40
NID, redetection	12/16	12/16
Monitor zone (bpm)	133-167	133-171
NID, initial	40	40
Supraventricular tachycardia discriminators		
Single-chamber ICDs		
Wavelet	ON	ON
Onset	ON	ON
Stability	ON	ON
Dual-/Triple-chamber ICDs		
PR logic	ON	ON
Onset	ON	ON
Stability	ON	ON
Therapy		
VT_1 zone	ATP x 6, then shock	ATP x 6, then shock
VT_2 zone	ATP x 4, then shock	ATP x 4, then shock
VF zone	ATP during charging and shock	ATP during charging and shock
Monitor zone	None	None

Am J Cardiol 2015;115:1235e1243

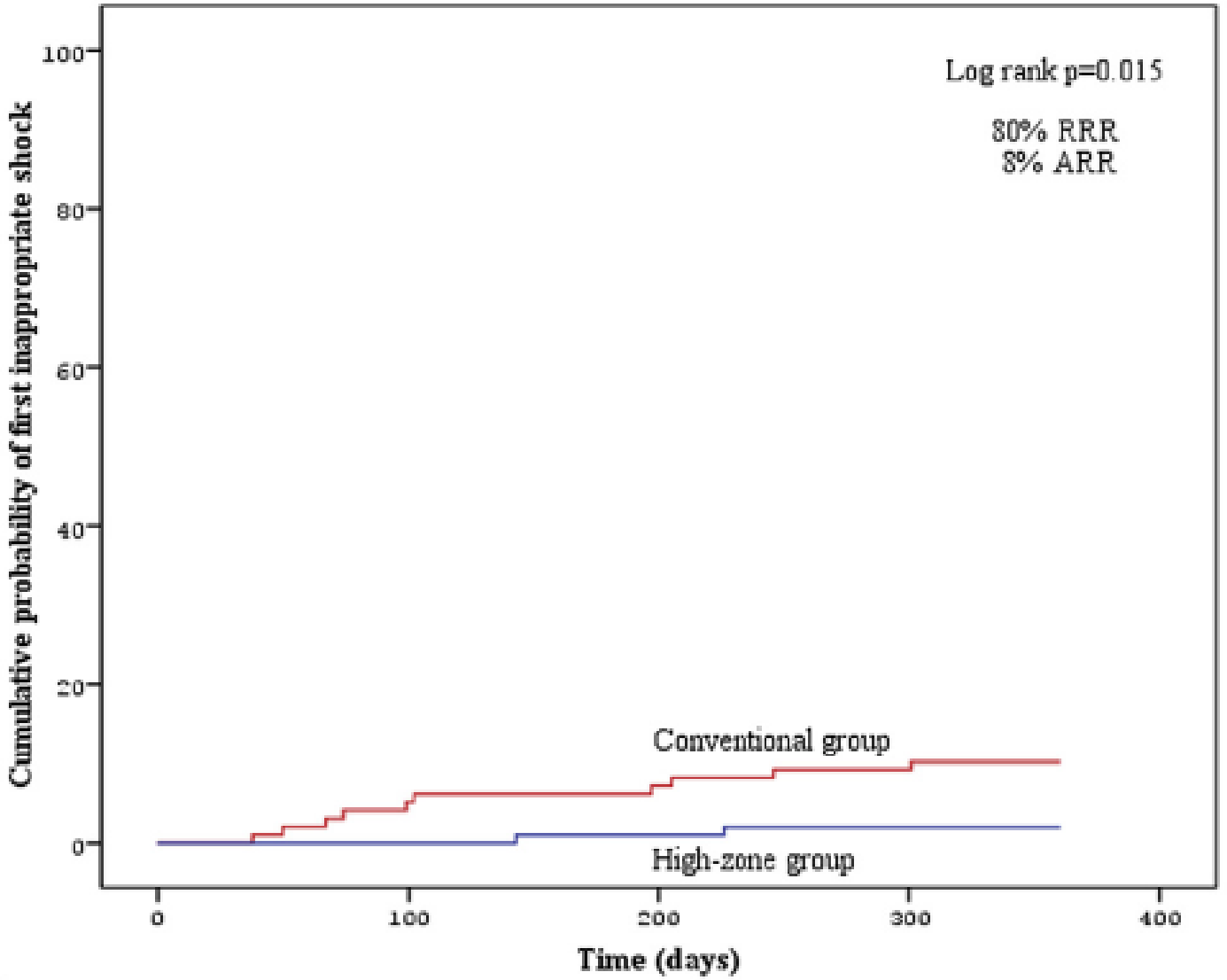
B



Number at risk					
Conventional	100	95 (0.05)	88 (0.12)	83 (0.17)	82 (0.18)
High-zone	101	100 (0.01)	99 (0.02)	99 (0.02)	98 (0.03)

Am J Cardiol 2015;115:1235e1243

C



Number at risk					
Conventional	100	95 (0.05)	93 (0.07)	91 (0.09)	90 (0.10)
High-zone	101	101 (0.00)	100 (0.01)	99 (0.02)	98 (0.03)

Am J Cardiol 2015;115:1235e1243