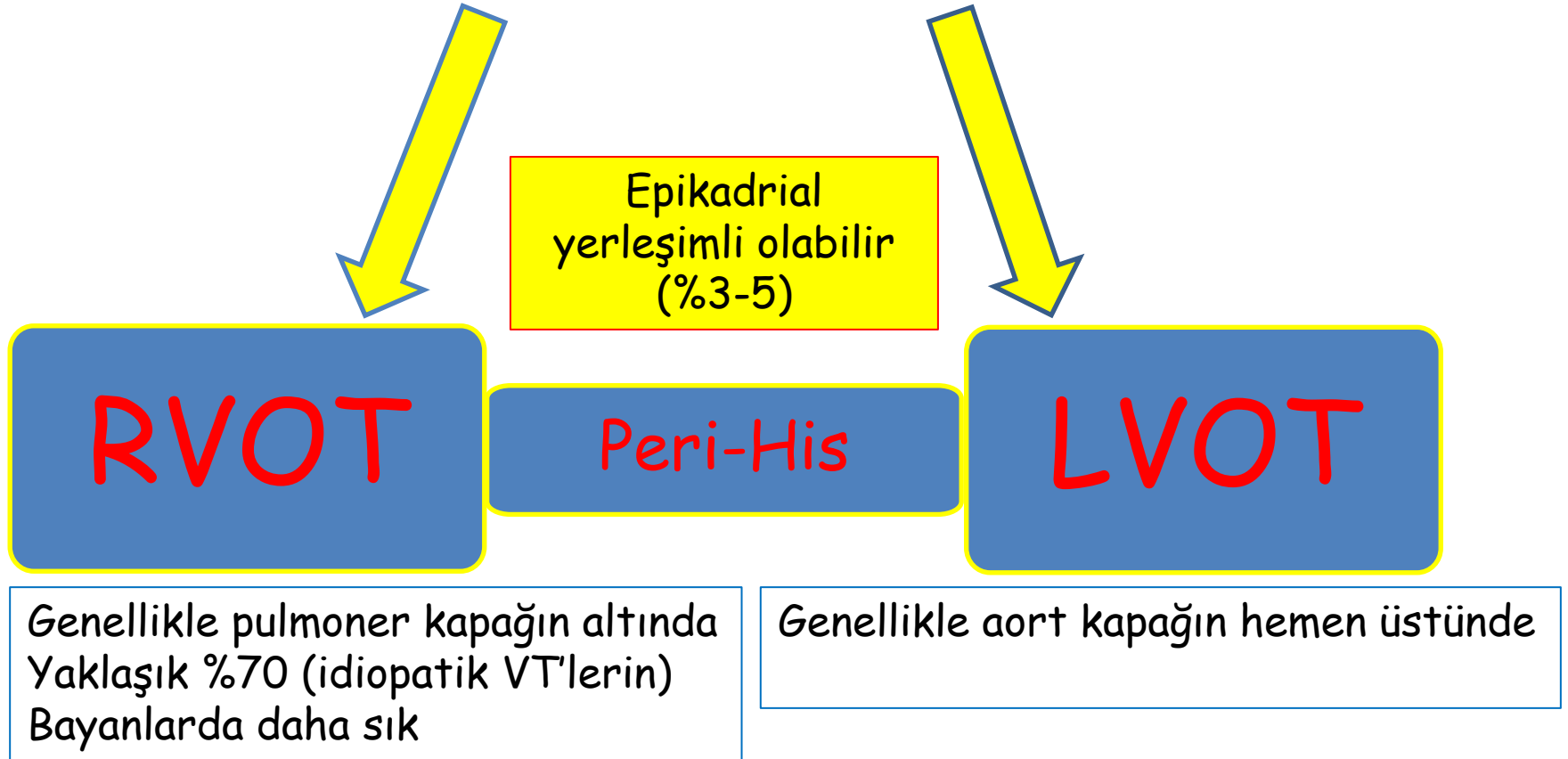


Çıkış Yolu

VT Ablasyonu

Prof. Dr. Basri Amasyalı
Dumlupınar Üniversitesi
Kütahya

Çıkış Yolu Taşikardileri



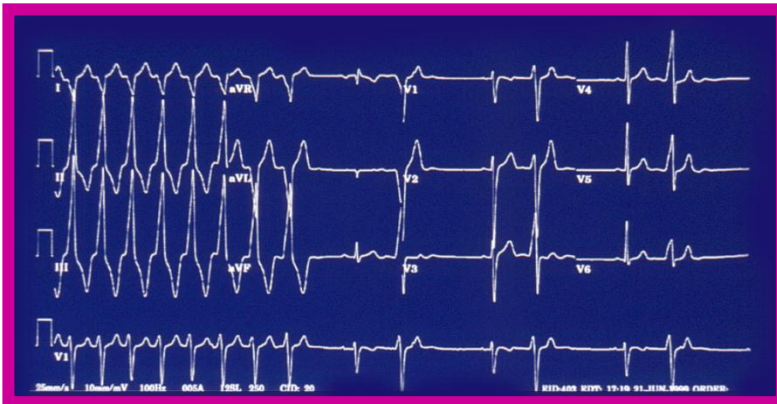
Çıkış Yolu Ventriküler Taşikardileri

- Adenozine duyarlıdır
- c-AMP yoluyla intraselüler Ca artışı sonucu gelişen geç ard-depolarizasyon ve triggerred aktivite
- EPS'de; Katekolaminler ve diğer sempatik ajanlar VT indüksiyonunu kolaylaştırır
- Programlı stimülasyondan çok burst pacing ile indüklenirler

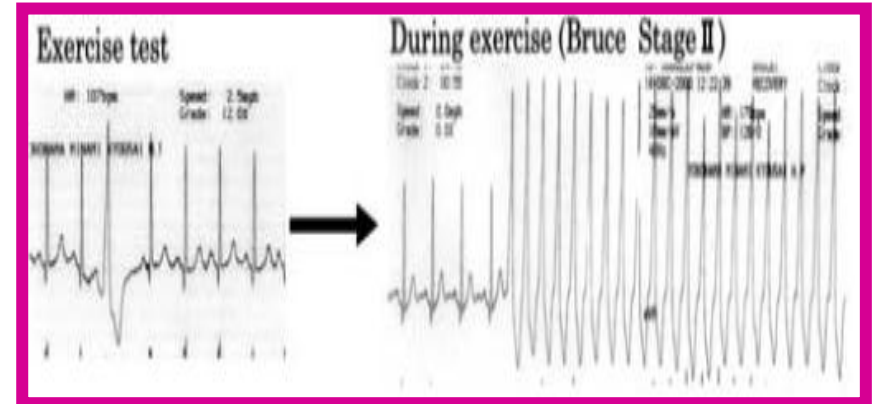
RVOT-VT

- Aritmi kliniğine başvuran tüm VT vakalarının %10'udur
- En sık idiyopatik VT'dir (>%70)
- 20-40 yaşlarda ve kadınlarda daha sıktır
- Klinik olarak iki VT formu vardır

**Non-sustained, repetitif,
monomorfik VT**



**Paroksismal, exersiz-induced,
sustained VT**



LVOT - VT

- Genel olarak RVOT VT ile aynı klinik ve elektrofizyolojik özelliklere sahip
- Daha çok supravavülerdir
(aortic cusp; İdiopatik VT'lerin yaklaşık %20'si)
- Epikardial ablasyon
 - Koroner sinüs yoluyla
 - Transperikardial
- LCC-RCC ve NCC: sıklık sırasına göre
- Aorta mitral bileşke, His etrafı

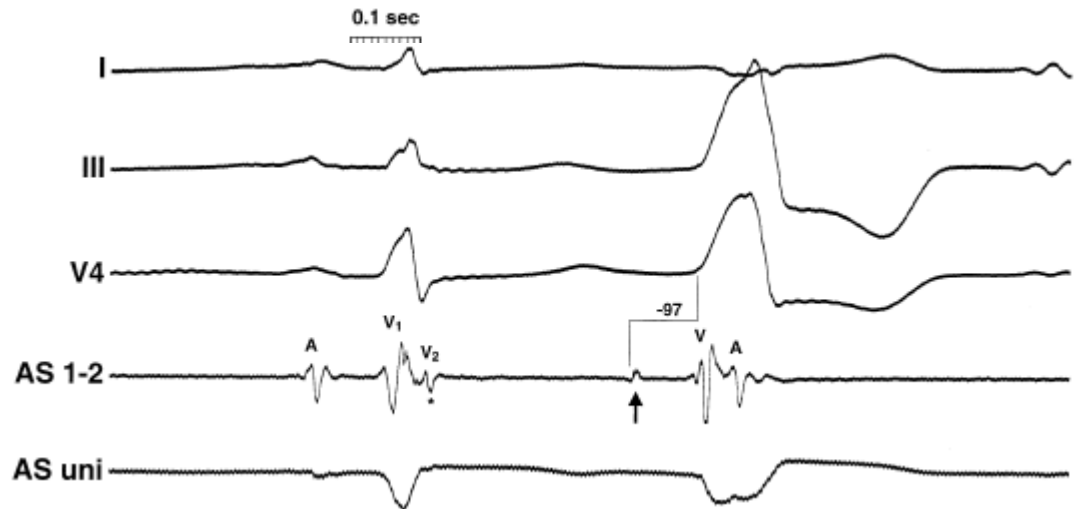
Ablasyon yerinin tespiti

- EKG kabaca yol gösterebilir
- EPS'de
 - Aktivasyon Mapping
 - Konvansiyonel ya da 3-D mapping sistemi
 - Discrete potansiyel (aortic cusp ya da pulmoner arterde)
 - Başarılı ablasyon yerinde lokal aktivasyon 10-60 msn öndedir
 - Pace-Mapping

«Discrete» potansiyelin önemi



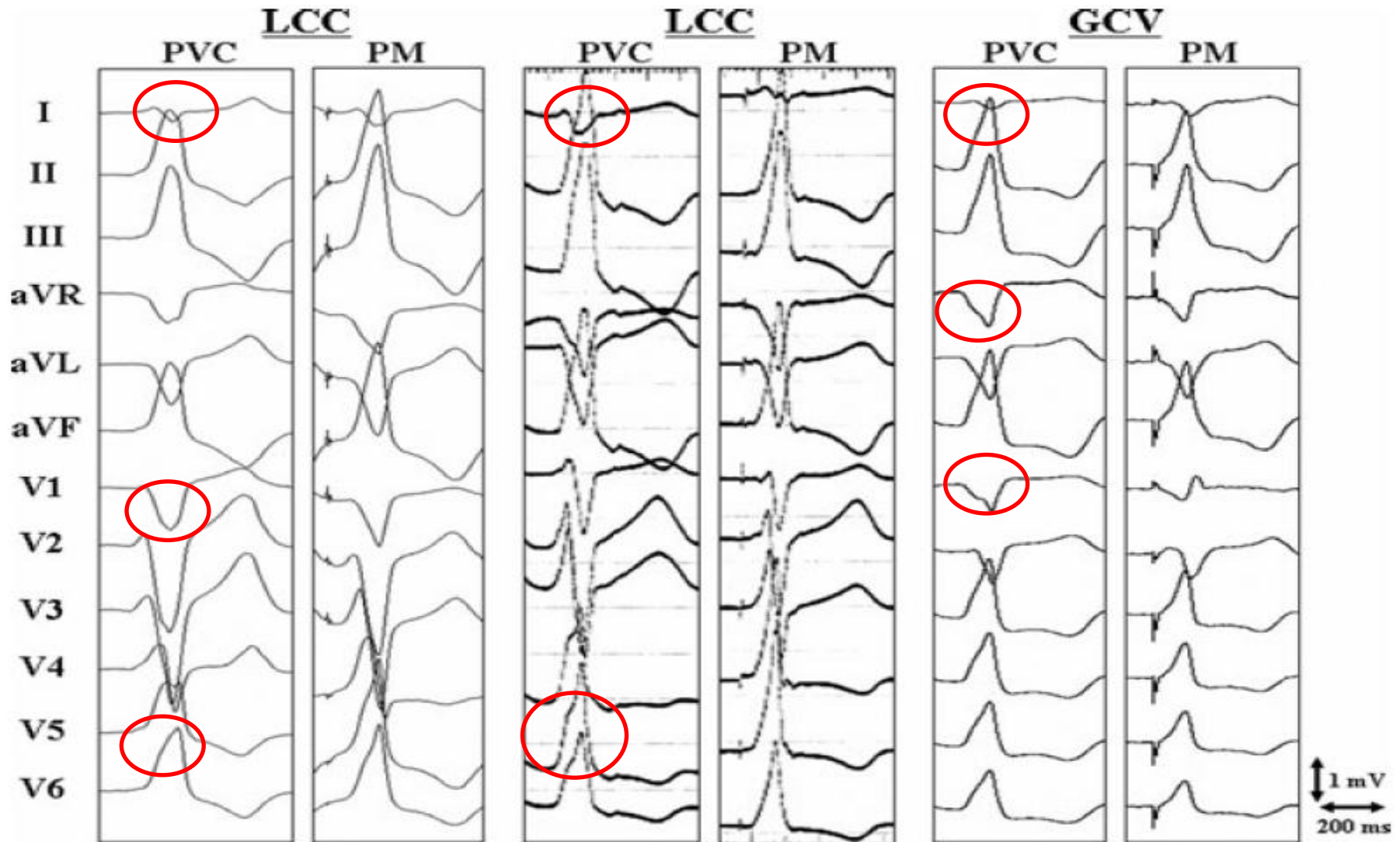
LCC kaynaklı RMVT



Pace Mapping ?

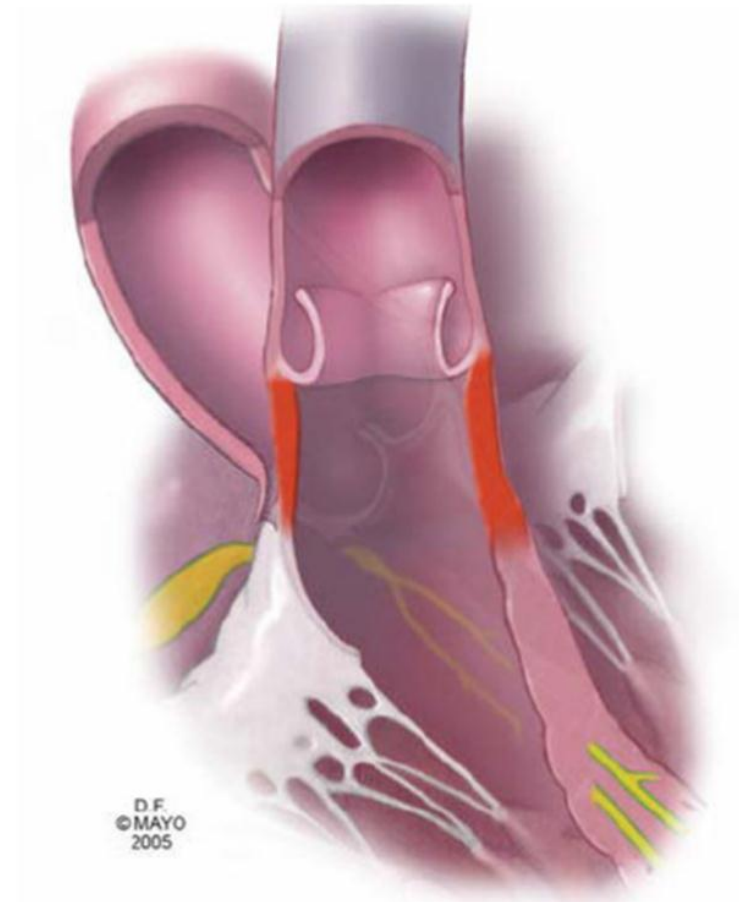
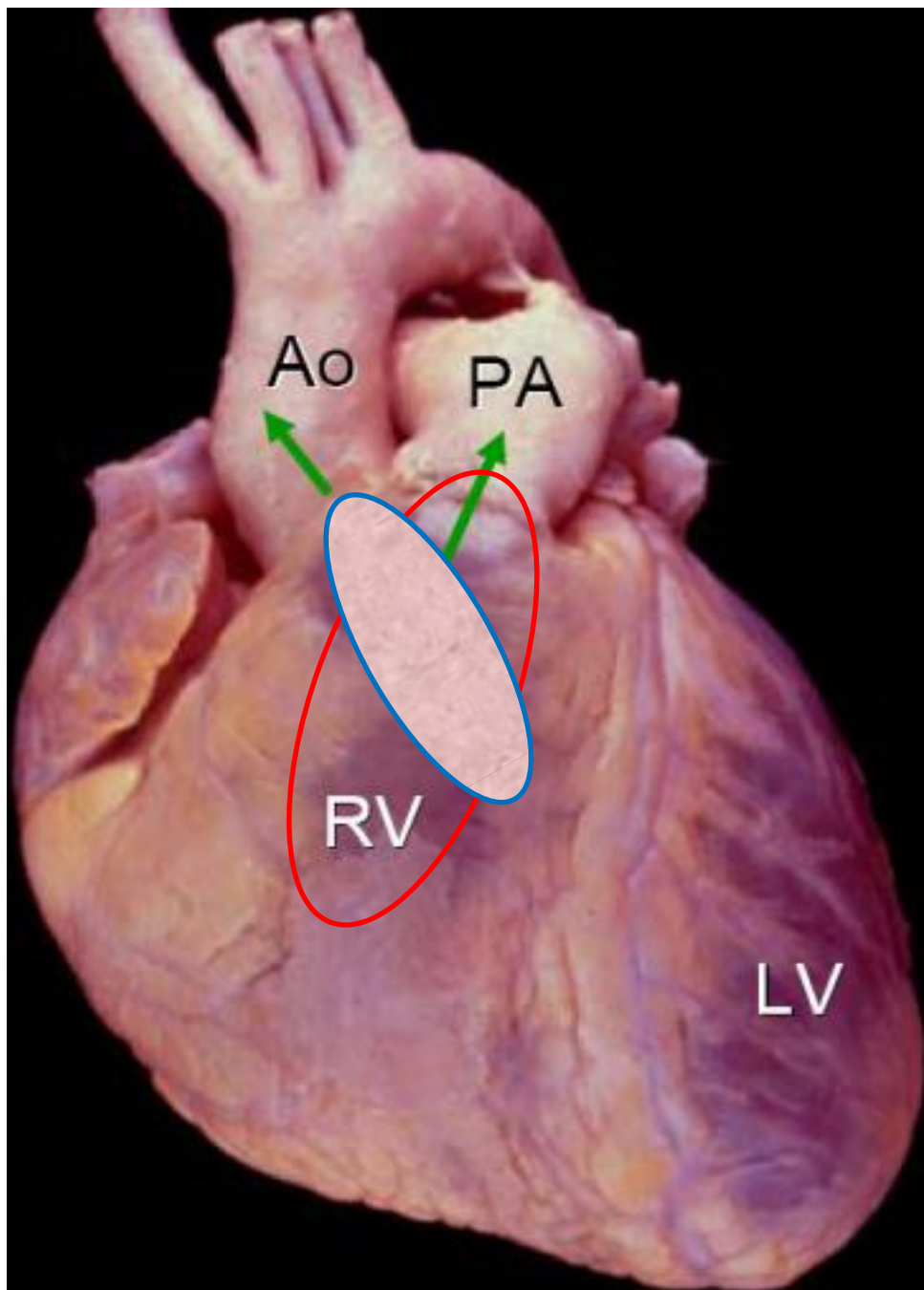
- 12:12 uyumda dahi yaklaşık olarak 2 cm²'lik geniş bir alan temsil edilmektedir.
 - 10-15 mm' lik mesafelerde QRS morfolojisi benzer olabilmektedir.
Kadish et al. JACC 1991, J Electrocardiol 1998
Clyne CA, et al. PACE 2007
 - Hedefte 1-2 mm'lik sapma dahi ablasyonu başarısız kılabilir.
- Yüksek outputlarda miyokardial uzantıların yanı sıra (intra-arterial alanda) komşu miyokard da uyarılabilir.....aynı nokta iki farklı QRS morfolojisi
- Odak ile taşikardinin çıkış noktası farklı olabilir
 - RVOT ve LVOT arasında değişebilir

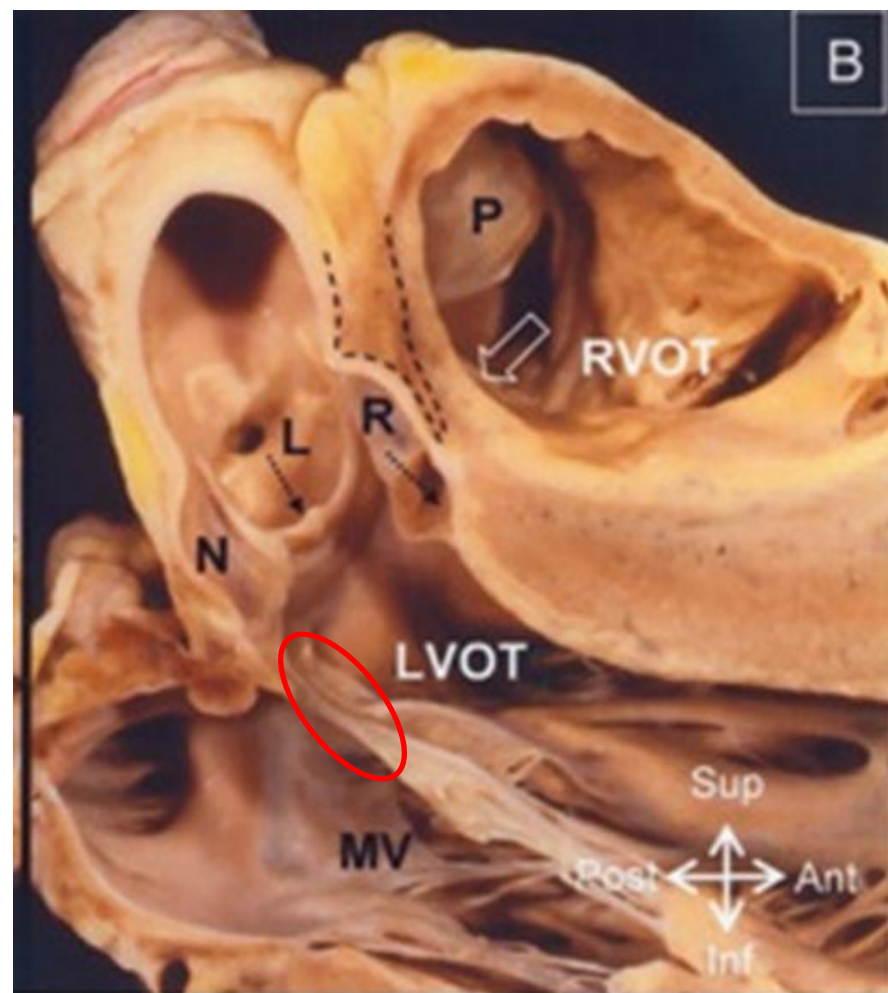
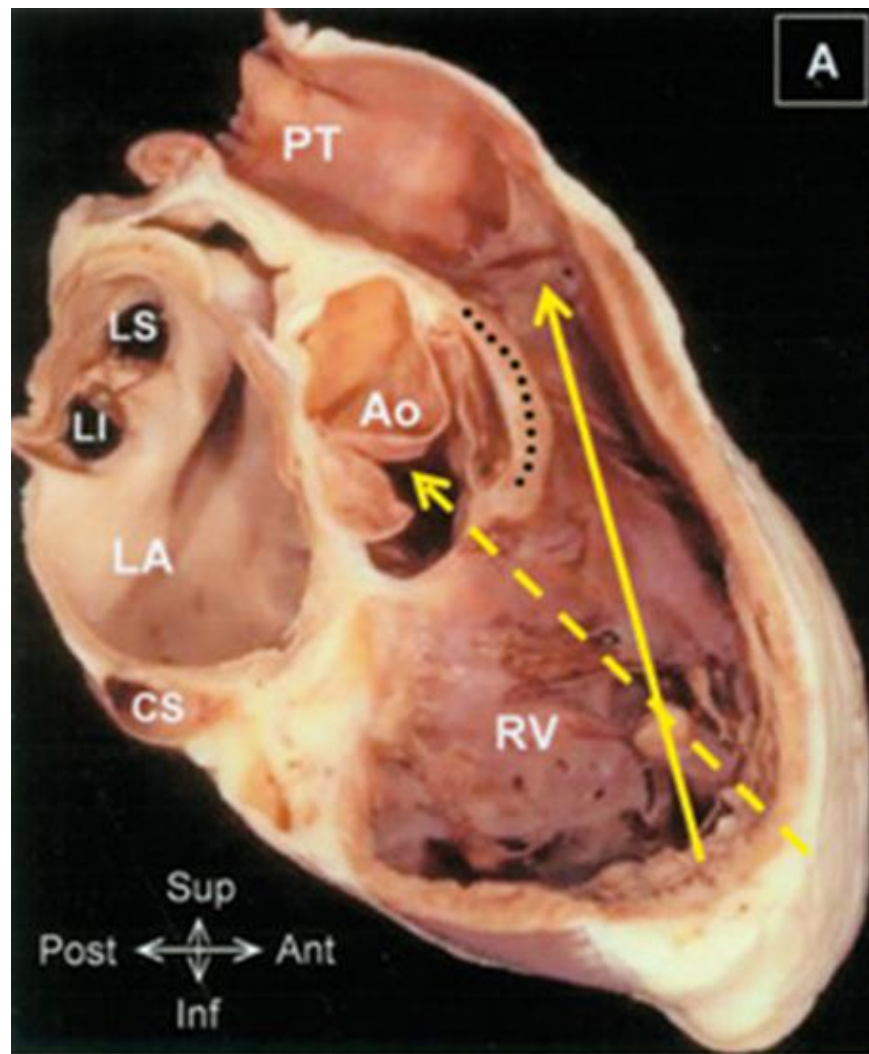
Başarılı ablasyon noktalarında pace-map

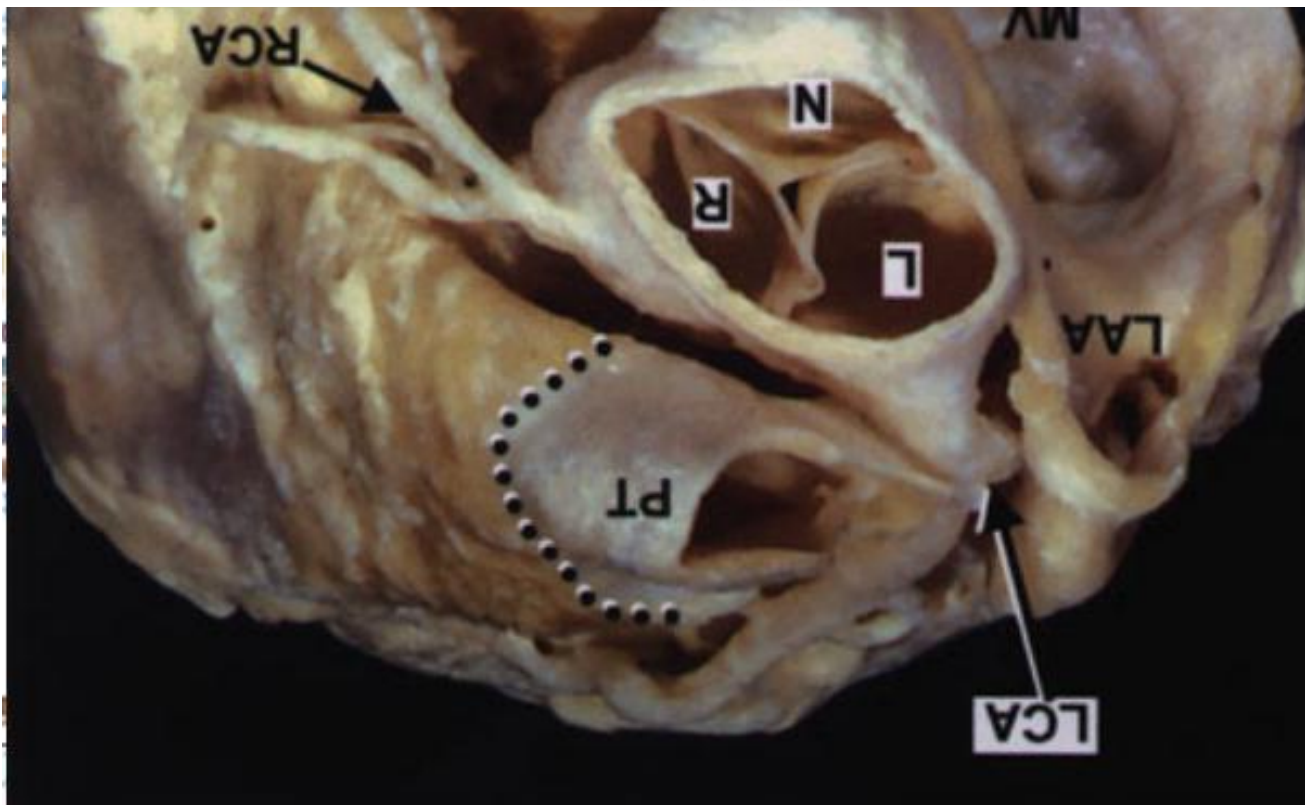
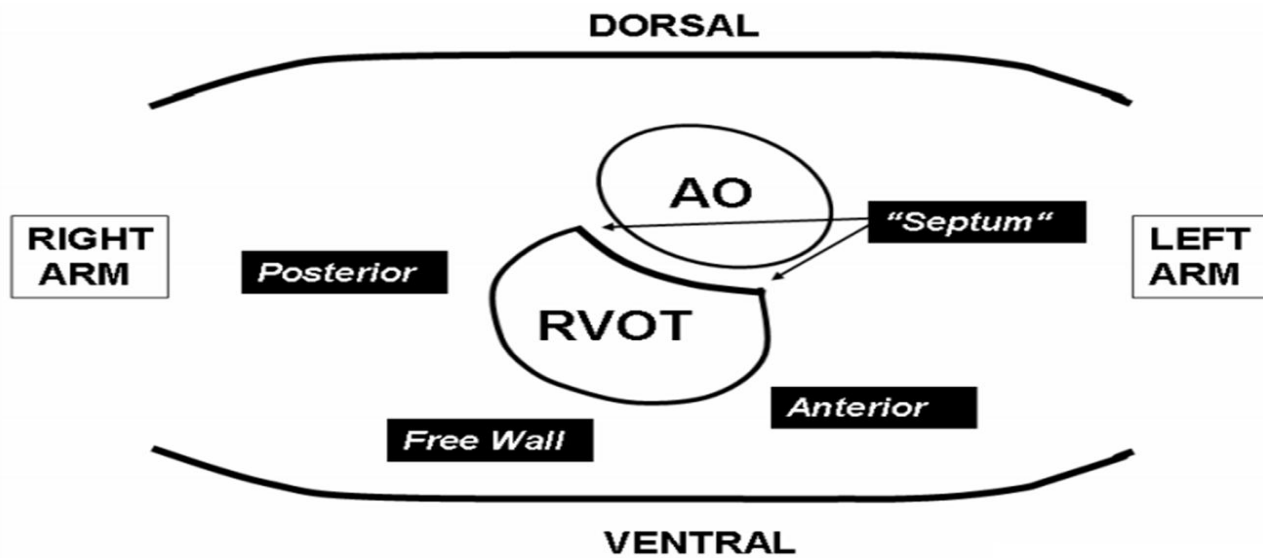


Idiopathic Left Ventricular Arrhythmias Originating Adjacent
to the Left Aortic Sinus of Valsalva: Electrophysiological
Rationale for the Surface Electrocardiogram

(*J Cardiovasc Electrophysiol*, Vol. 21, pp. 170-176, February 2010)

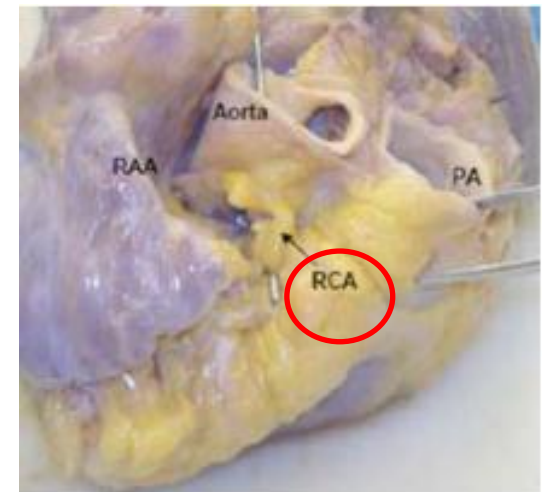
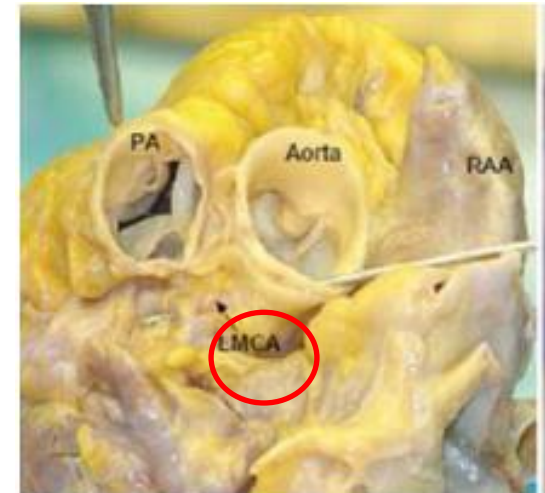
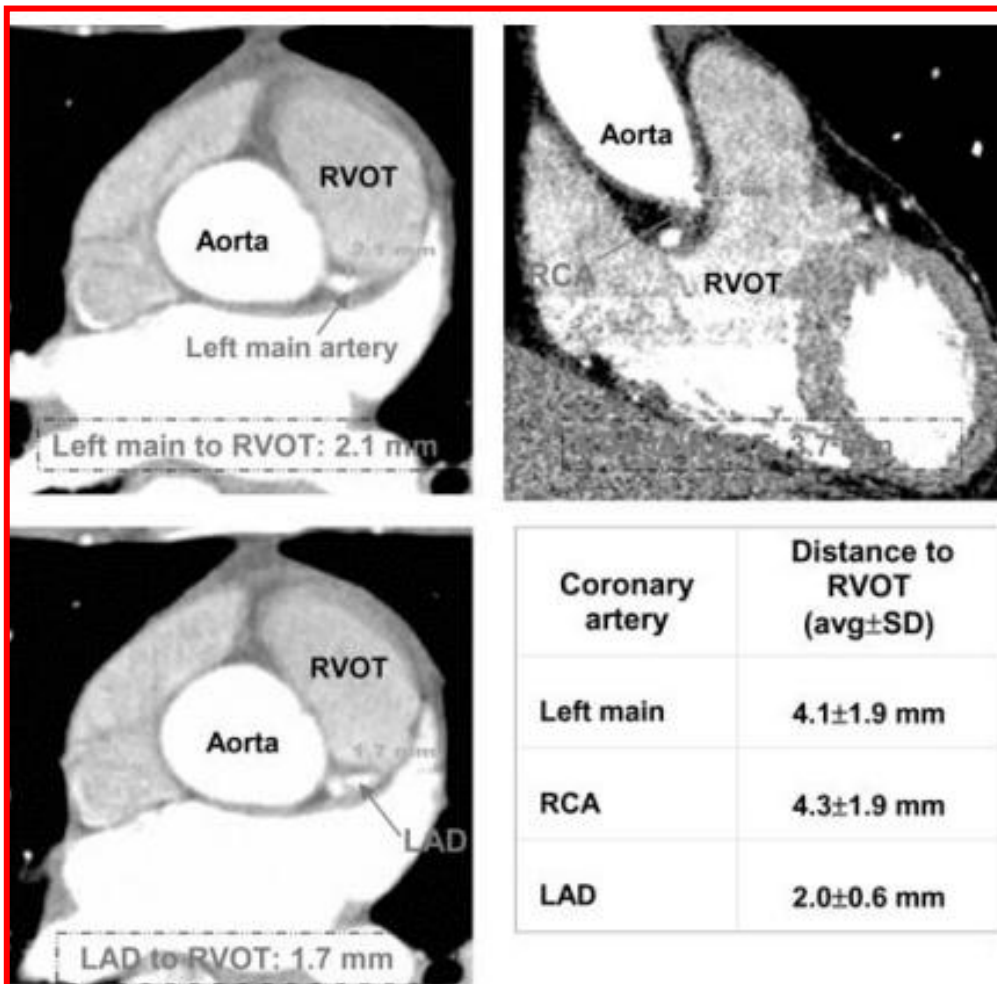






Catheter Ablation of Right Ventricular Outflow Tract Tachycardia: Value of Defining Coronary Anatomy

MARMAR VASEGHI, M.D., DAVID A. CESARIO, M.D., Ph.D., AMAN MAHAJAN, M.D., Ph.D.,
ISAAC WIENER, M.D., NOEL G. BOYLE, M.D., Ph.D., MICHAEL C. FISHBEIN, M.D.,*
BARBARA NATTERSON HOROWITZ, M.D., and KALYANAM SHIVKUMAR, M.D., Ph.D.



Monomorphic VT in structurally normal heart

VT morphology

LBBB pattern,
inferior axis

S wave in L1, R-wave transition in V1 or V2

Transition zone $\geq V4$

S wave in
V5 or V6
absent

S wave in
V5 or V6
present

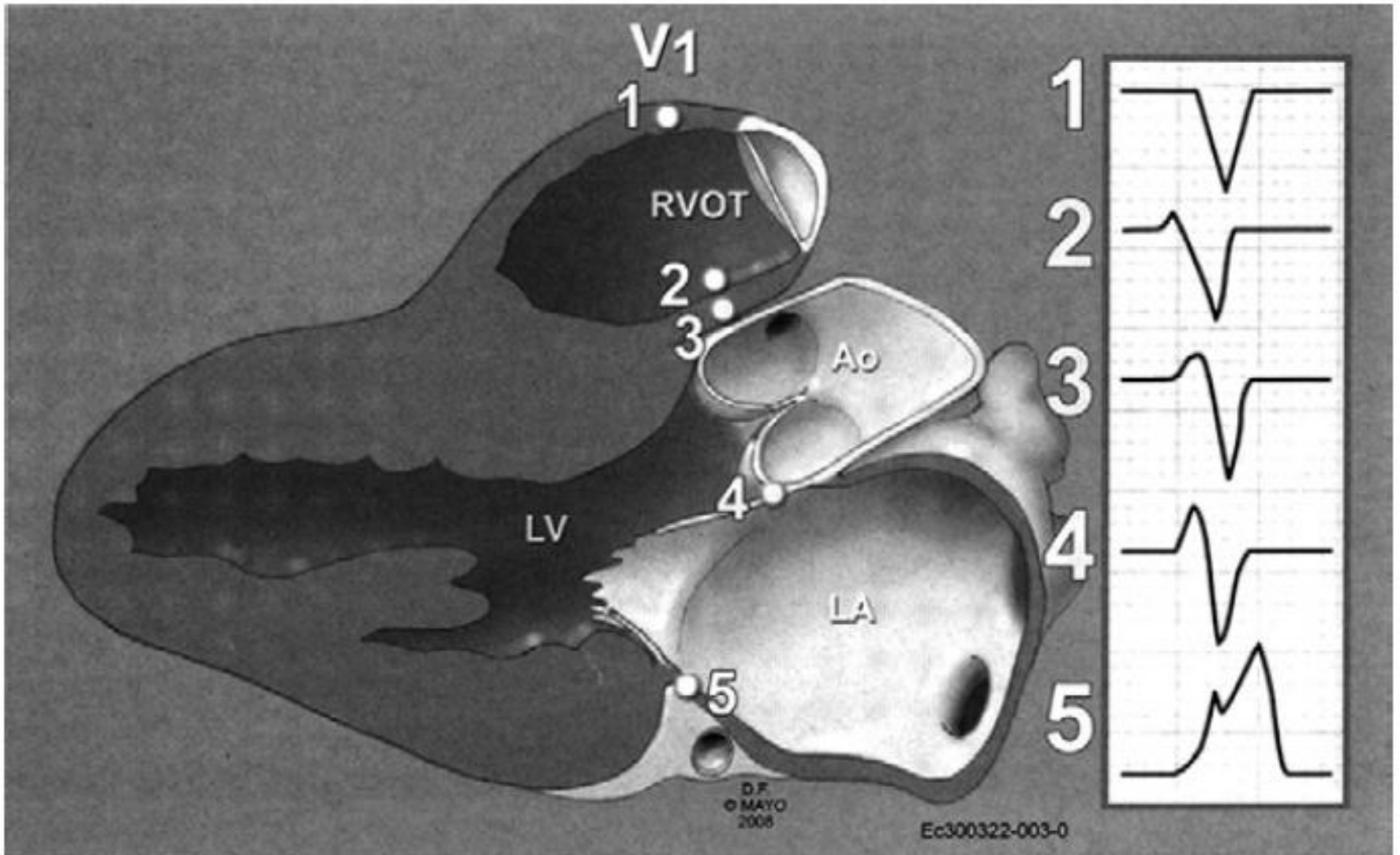
RVOT
VT

Supravalvular
LVOT VT

Infravalvular
LVOT VT

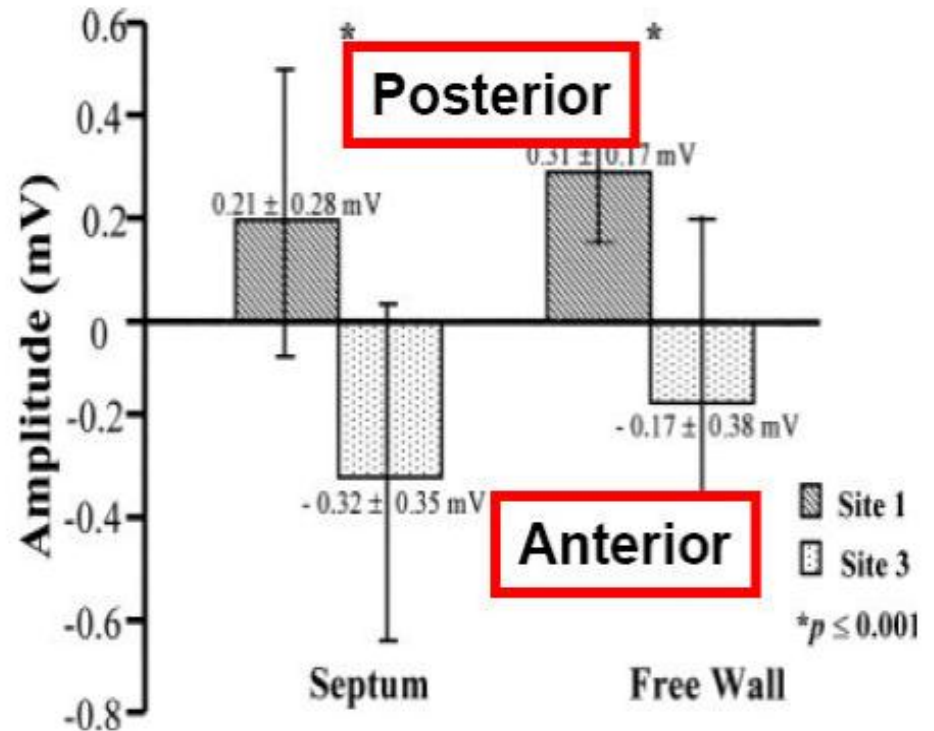
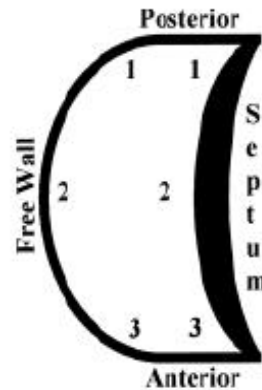
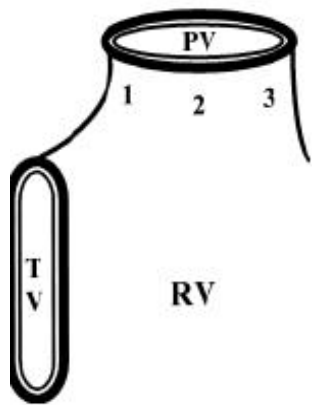
Idiopathic propranolol-sensitive (automatic) monomorphic VT (IPVT)

V 1 derivasyonu



J Cardiovasc Electrophysiol 2009;20:955- 68.

RVOT lokalizasyonunda D1 derivasyonu

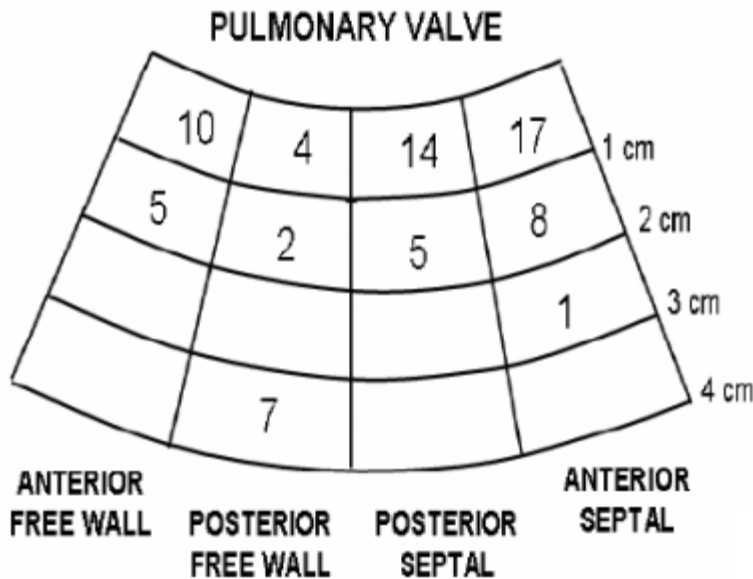


Dixit et al, JCE 2003;14:1

Joshi et al, JCE 2005;16suppl:S52

RVOT lokalizasyonunda serbest duvar-septal ayırımı

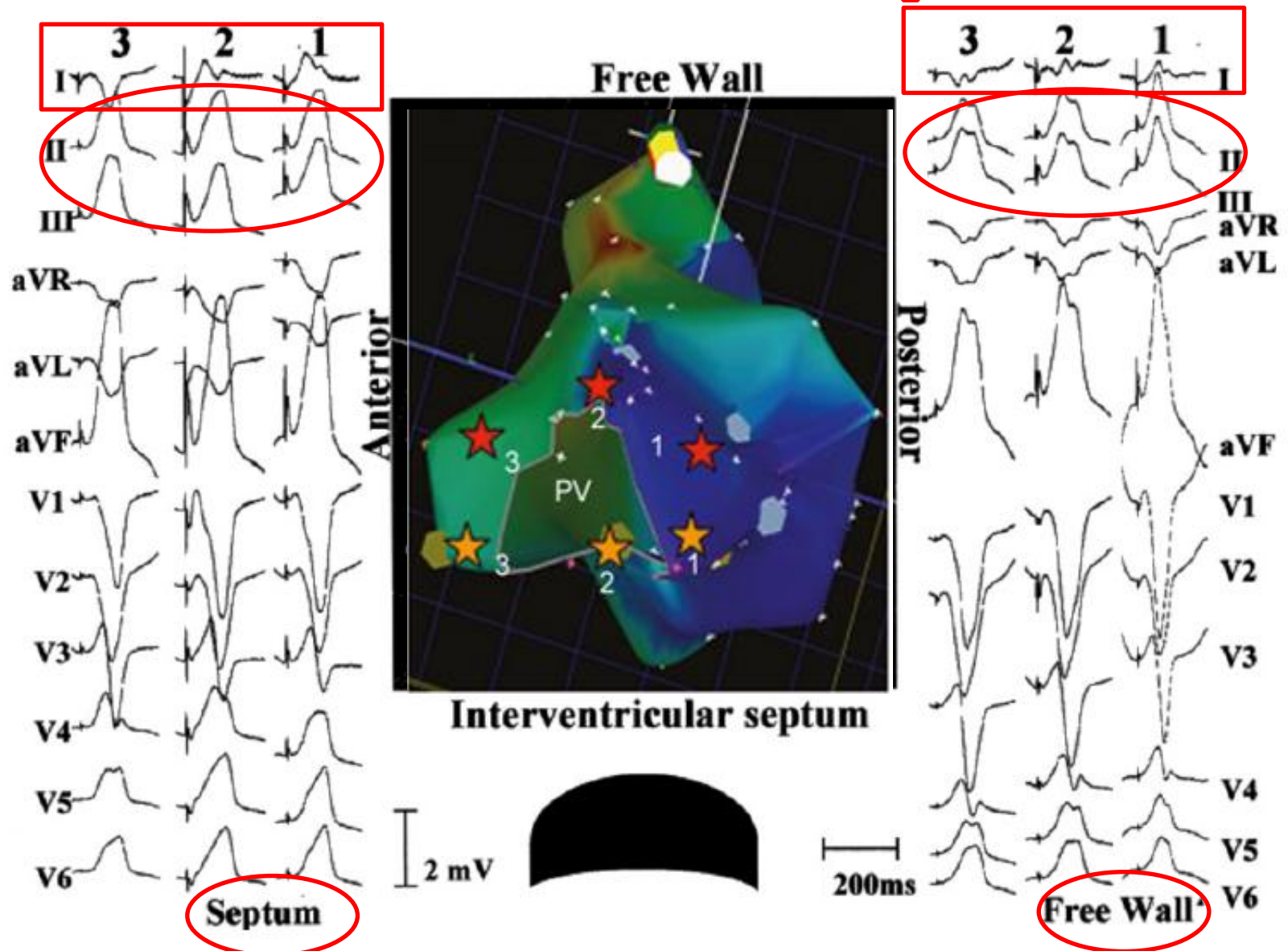
- QRS süresi ≥ 140 ms
- İnferior derivasyonlarda QRS'de çentiklenme
- V3'de $R/S \leq 1$



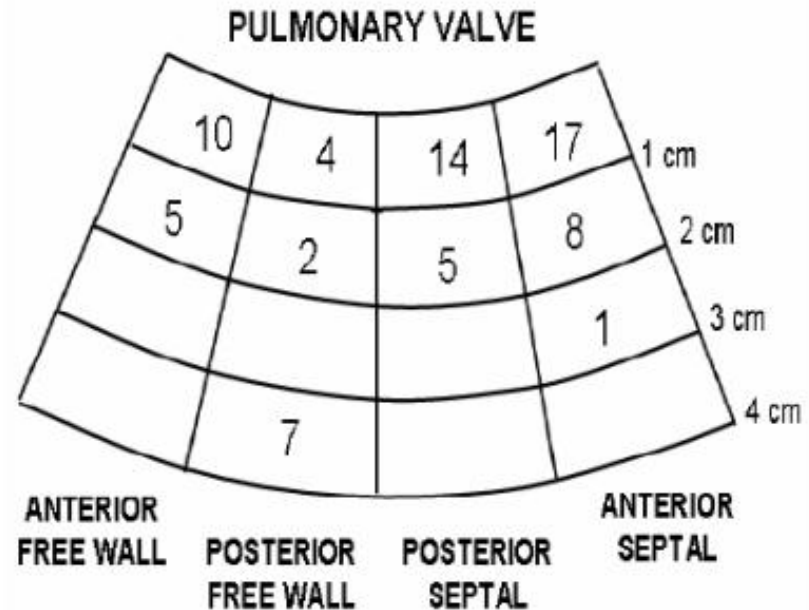
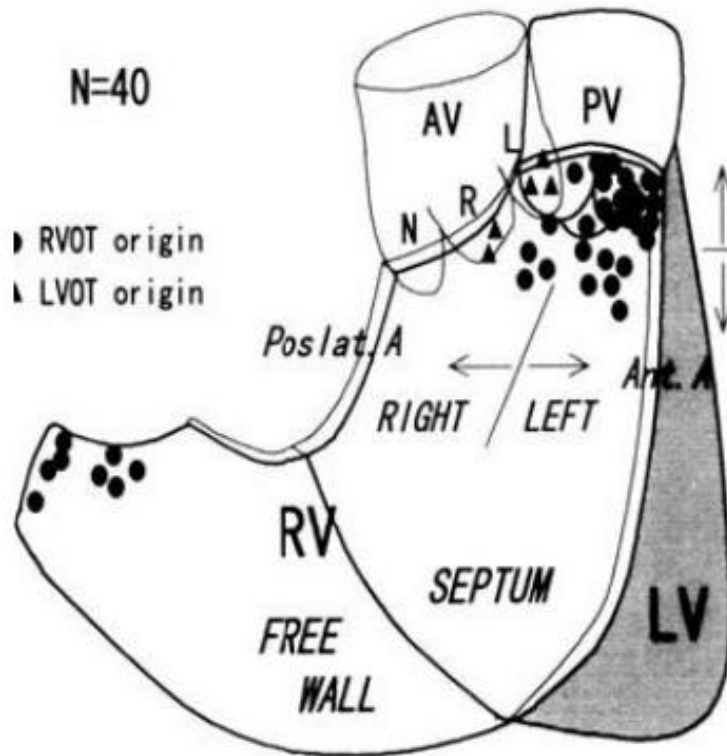
Dixit et al, JCE 2003;14:1

Joshi et al, JCE 2005;16suppl:S52

RVOT EKG morfolojileri



RVOT taşikardilerin dağılımı



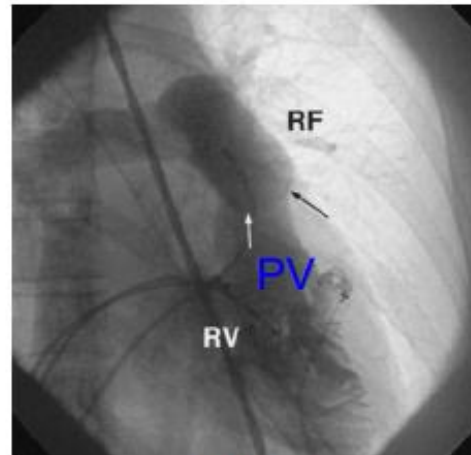
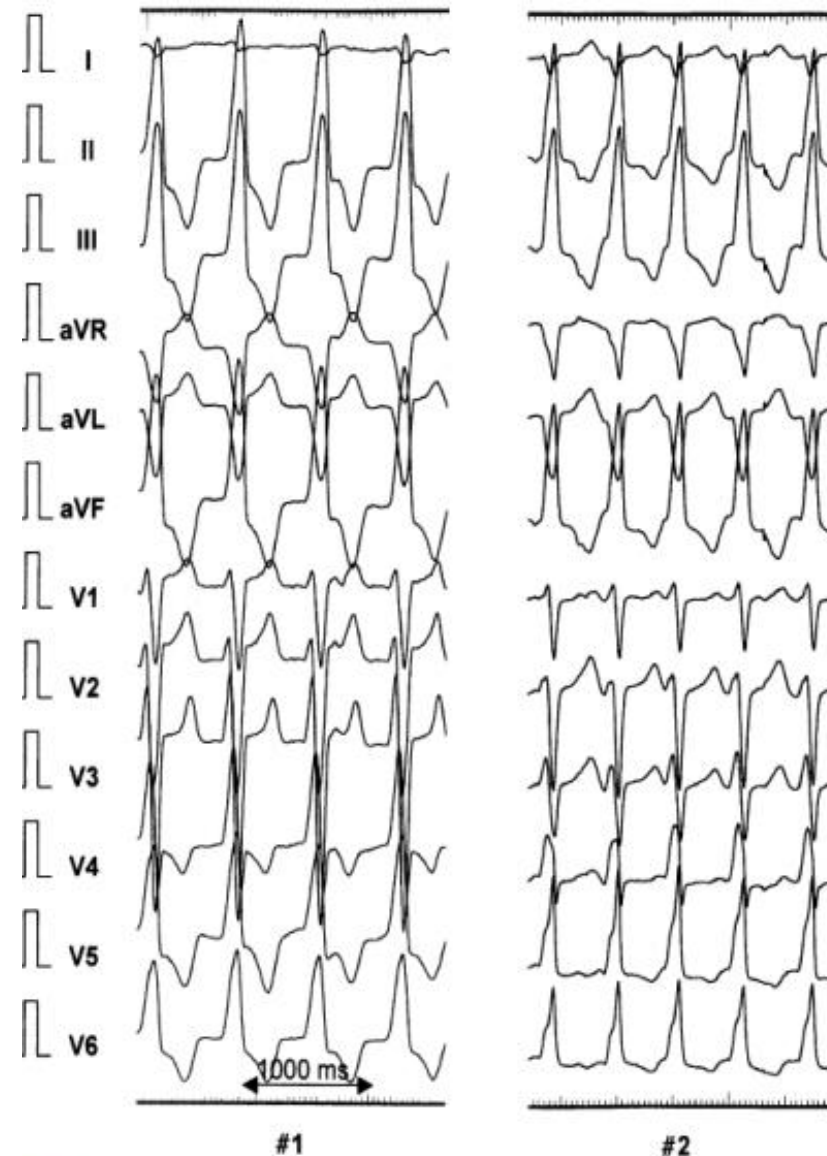
- Majority arise 1-2 cm below the PV
- 20-30 % are free wall

Joshi et al, JCE 2005;16suppl:S52

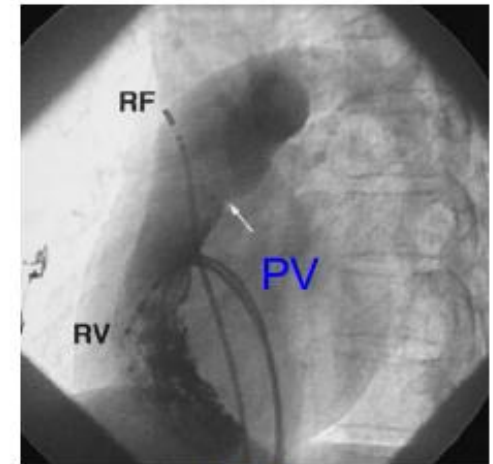
Pulmoner arter kaynaklı VT'ler

- Pulmoner artere doğru olan miyokardial uzantılar sola ve yukarıya doğrudur
- Dolayısıyla EKG'de;
 - İnferioru gören derivasyonlarda belirgin R dalgası
 - Diğer derivasyonlarda (D_I, aVL ve aVR) ise belirgin Q dalgası görülür
 - Odak daha çok solda olduğu için de Q dalgası aVL'de aVR'den daha derindir.
 - Tranzisyon zonu biraz daha V2"ye kayıyor

Pulmoner arter kaynaklı VT'ler



RAO

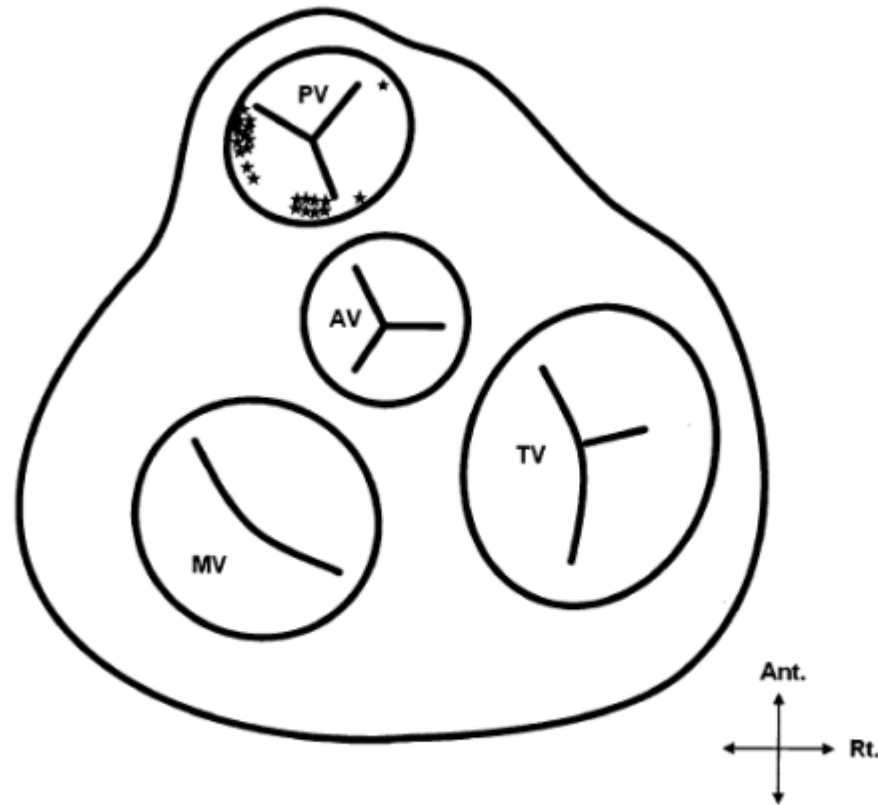


LAO

- **Taller R in II, III, aVF**
1.89~1.92 mV vs 1.49~1.57 mV
(PA VT vs RVOT VT)
- **Larger R/S ratio in V2**
0.32 vs 0.17 (PA VT vs RVOT VT)
- **aVL/aVR ratio of Q-wave amplitude >1 in the PA** (1.11 vs 0.88 :RVOT VT)

Timmermans C, et al. Circulation. 2003;108:1960
Sekiguchi, et al. J Am Coll Cardiol 2005;45:887

Pulmoner arterde odakların dağılımı



- The successful ablation sites were located 1.18 ± 0.43 cm above the pulmonary valve and mostly along the septum.

Sekiguchi Y, et al. J Am Coll Cardiol 2005;45:887

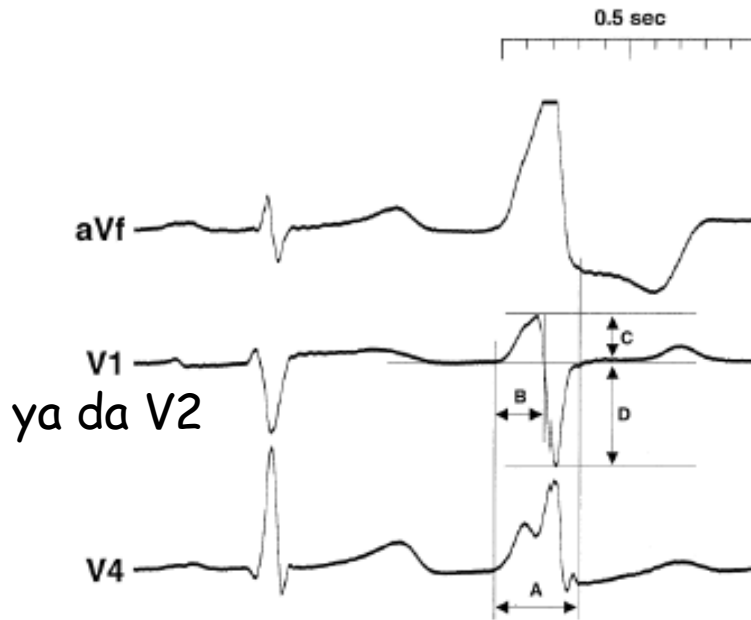
LVOT-VT EKG

- V1'de küçük R-dalgası
- Erken prekordial tranzisyon ($R/S \geq 1$; V2 -V3'de)
- İnfravalvüler olanlarda
 - RBBB (bir kısmında) ve inferior aks
 - V5-V6'da S dalgası

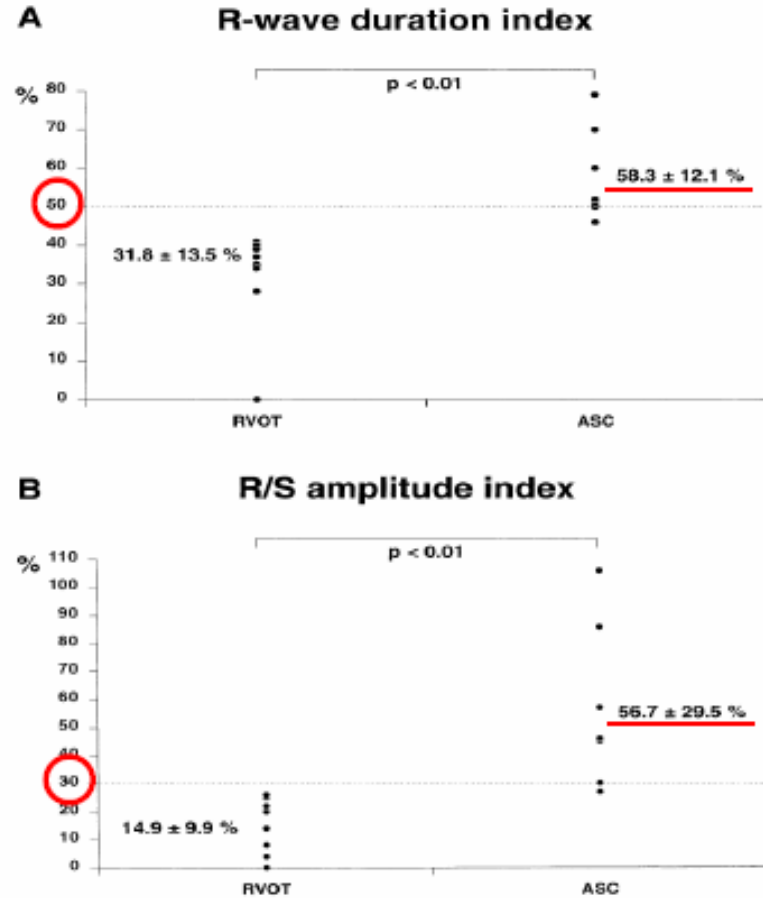
Tranzisyon zonu

- V1-2'de: odak LVOT'da (%100 spesifite)
- V4 ve ötesi: odak RVOT'da (%100 spesifite)
- V3'de;
 - yaklaşık %60'ı RVOT (infravalvüler)
 - yaklaşık %40:
 - LVOT
 - Aortic cusp
 - Koroner Sinüs
 - Epikardial (transperikardial yaklaşım)
 - Pulmoner arter

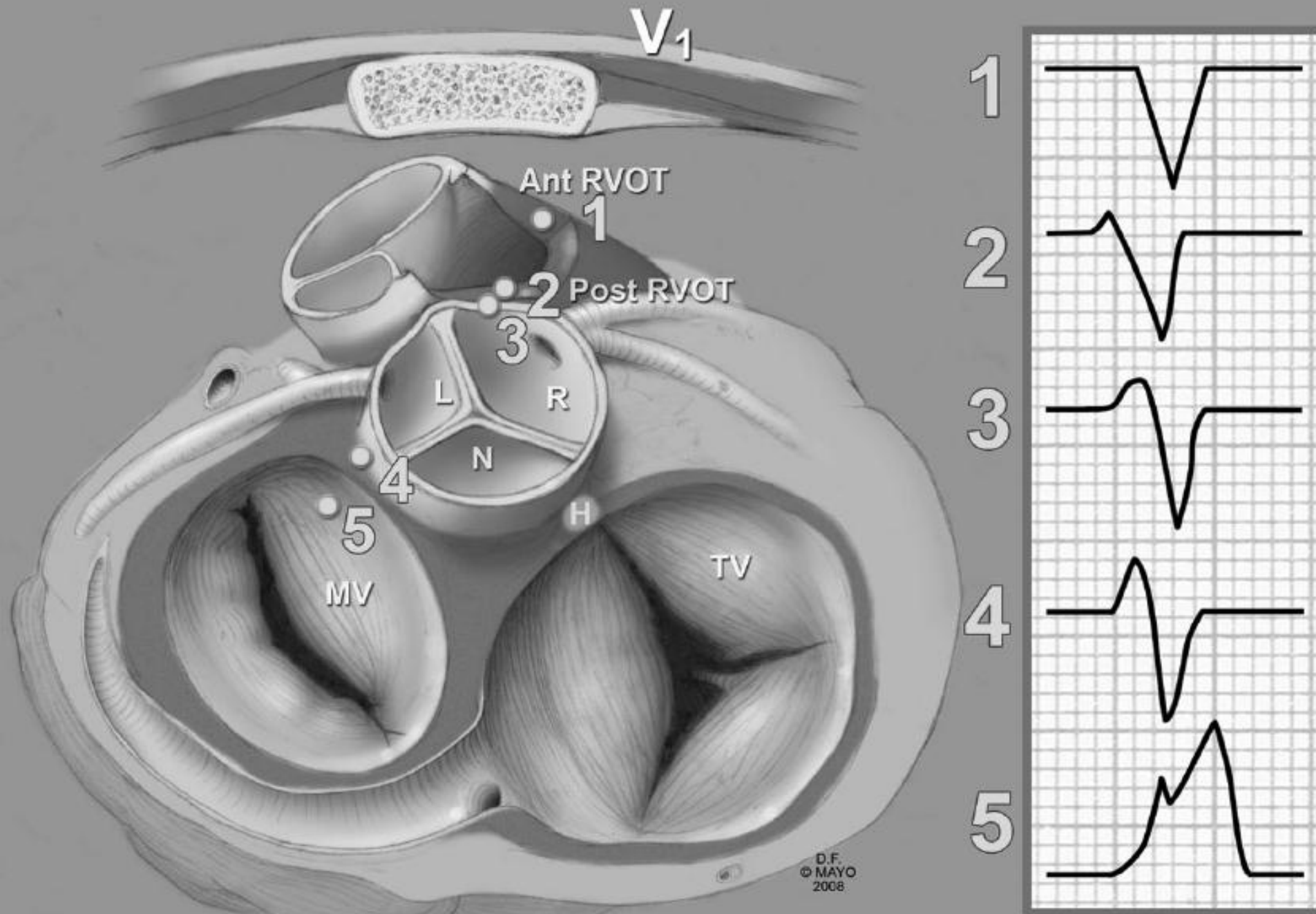
RVOT-LVOT ayırımı



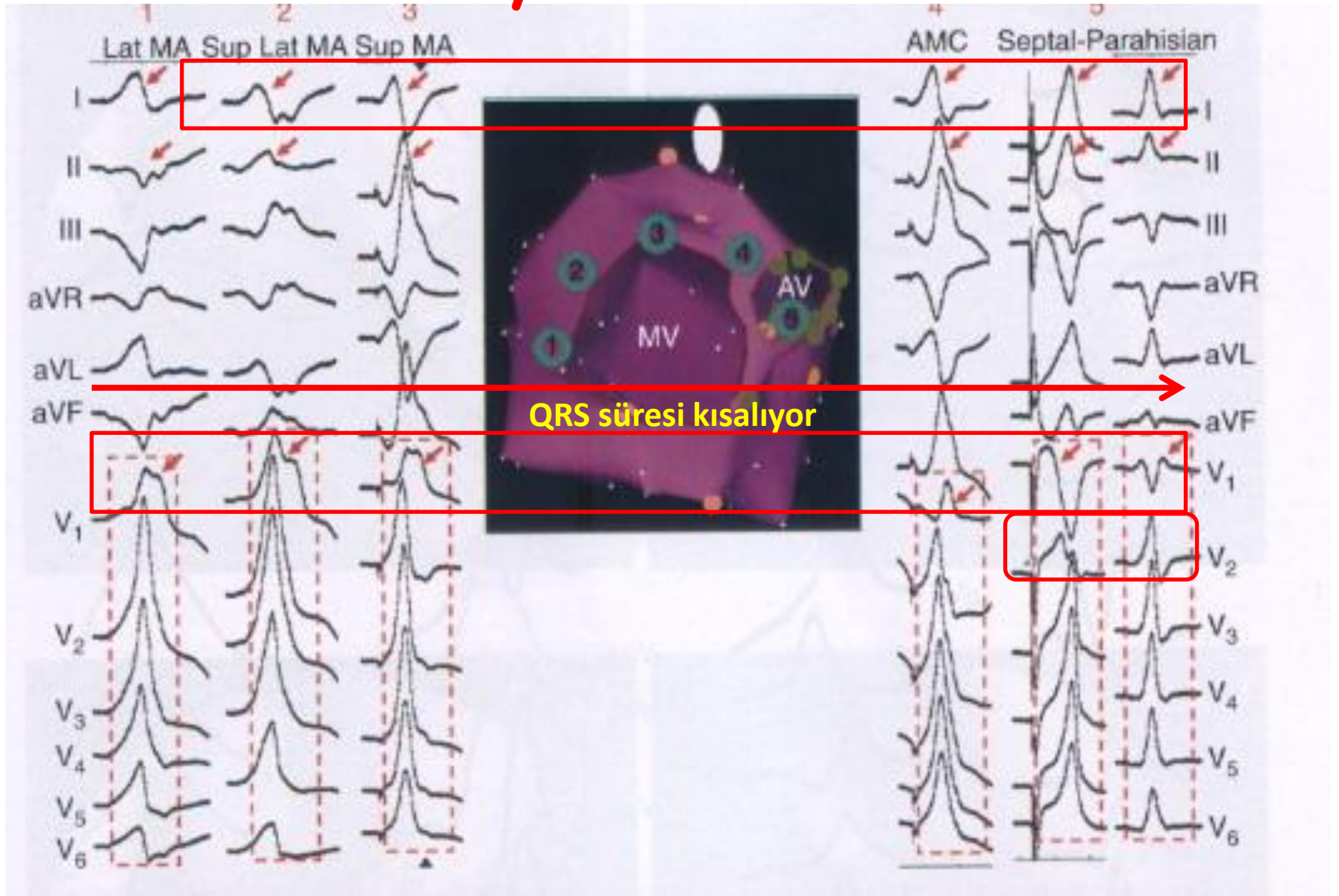
- A Total QRS duration(ms)
- B R-wave duration (ms)
- C R-wave amplitude (mV)
- D S-wave amplitude (mV)



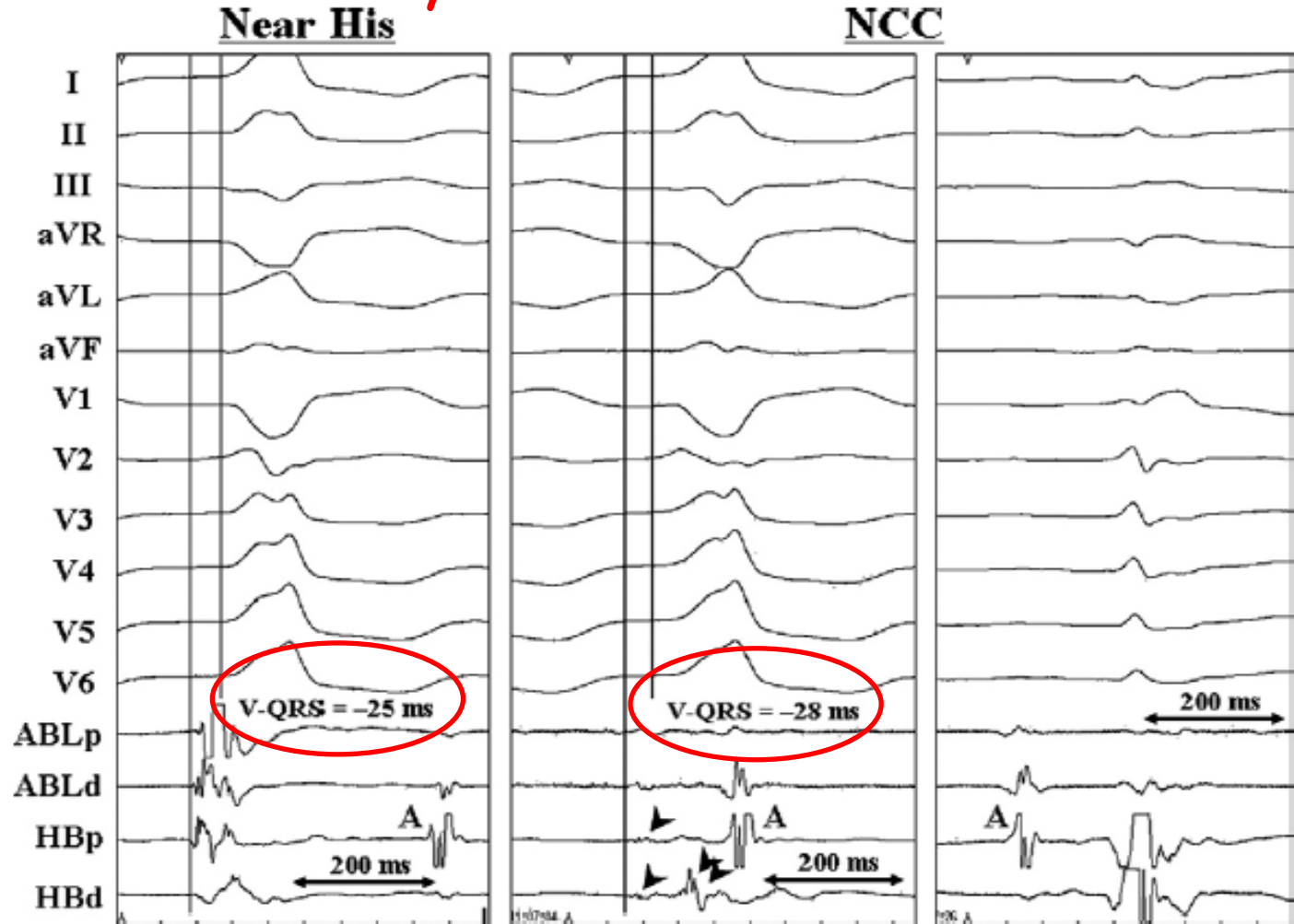
Ouyang F, et al. J Am Coll Cardiol 2002;39:500



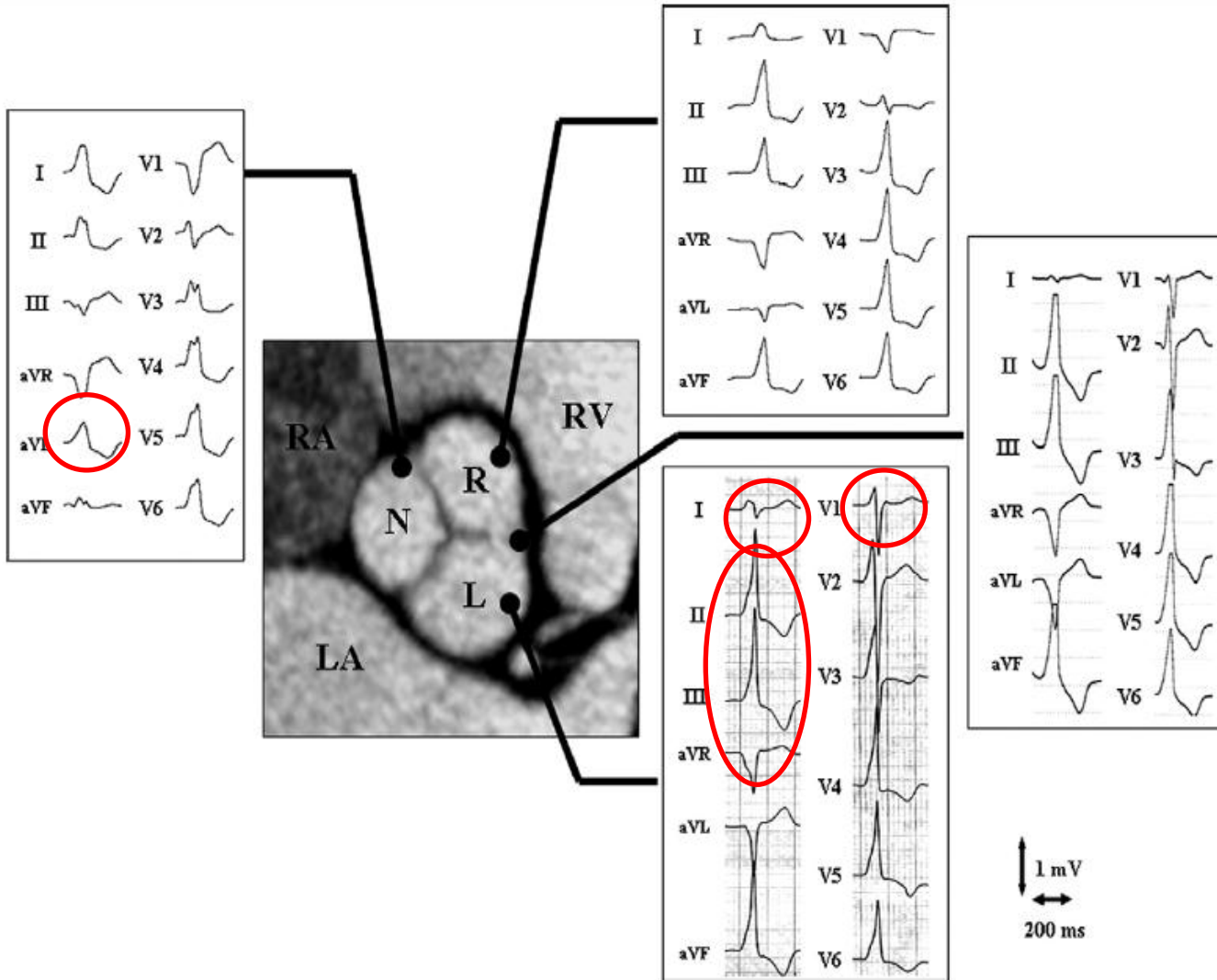
LV kaynaklı VT'de EKG



His bölgesinde aktivasyon önde ise mutlaka
NCC ya da RCC bakılmalı



RCC-LCC-NCC arasındaki farklar



DIII/DII 'de R dalga :
>0.9 ise LCC (%100 sensitivite)

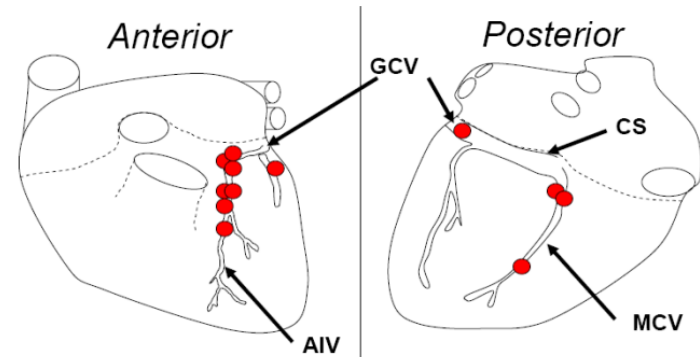
LBBB ve inferior aks morfolojisi gösteren VT'ler

	RV OT	PA	LVOT	ASV	LV epi	CS	Total
Ito S,	55(69%)		7(9%)	11(14%)	7(9%)		80
Tanner	20(61%)	1(3%)	5(15%)	2(6%)	2(6%)	3(9%)	33
Sekiguchi Y	92(72%)	24(19%)		11(9%)			148
Iwai S,	100(82%)		22(18%)				122
	267(70%)	25(7%)	58(15%)		12(3%)		383 (100%)

Ito S, et al. J Cardiovasc Electrophysiol. 2003;14:1280
Tanner H, et al. J Am Coll Cardiol 2005;45:418
Sekiguchi Y, et al. J Am Coll Cardiol 2005;45:887
Iwai S, et al. J Cardiovasc Electrophysiol, Vol. 2006;17:1

İdiopatik Epikardial LV kaynaklı VT

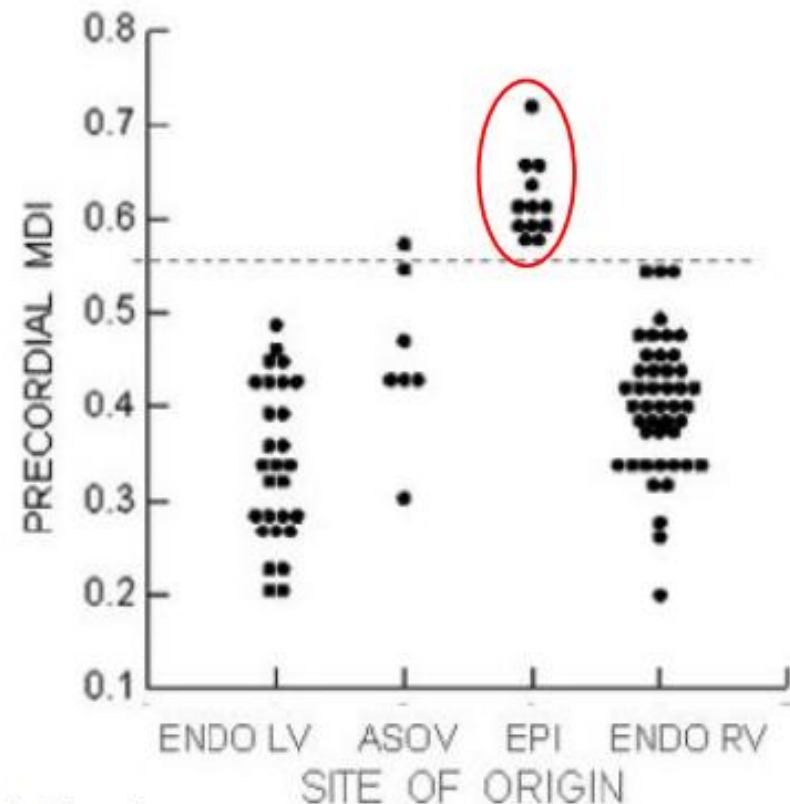
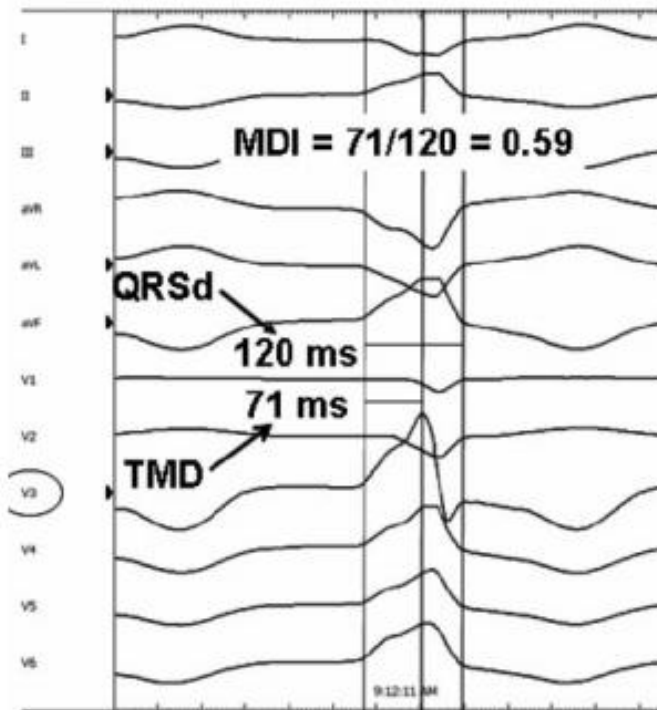
- Perivasküler orijinlidir
- Katekolamin ile artar ve adenozone duyarlıdır
- İdiopatik VT'lerin %5-10'unu
- EKG'de;
 - D1'de belirgin negatif QRS
 - QRS çentikli ve geniş
 - V2-3'de tranzisyon zone



Daniels DV, et al. *Circulation*. 2006;113:1659

İdiopatik Epikardial LV kaynaklı VT

- Precordial MDI >0.55 reliably identified EPI VT.



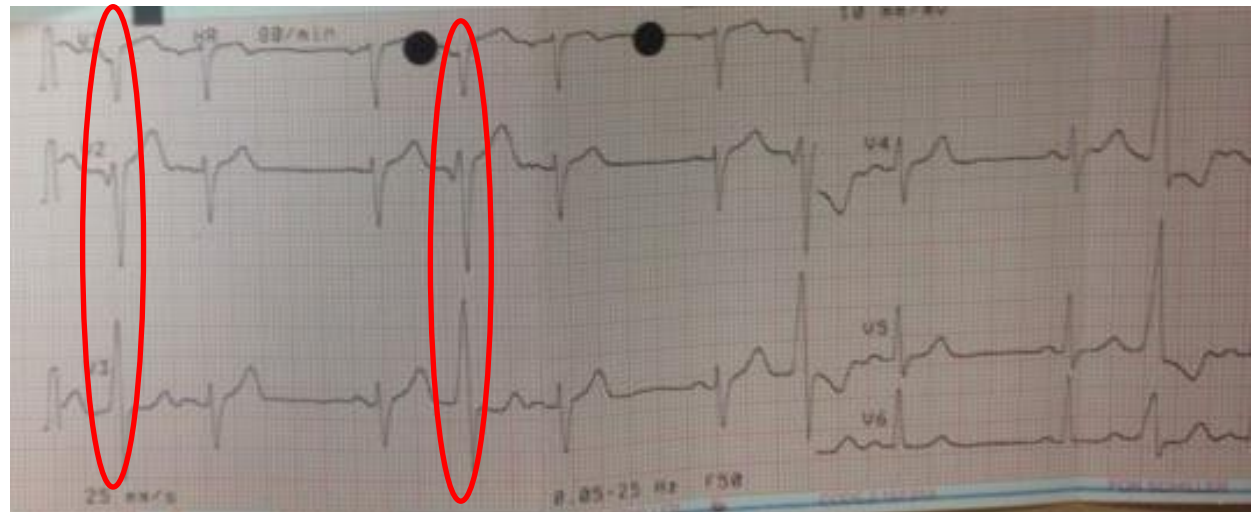
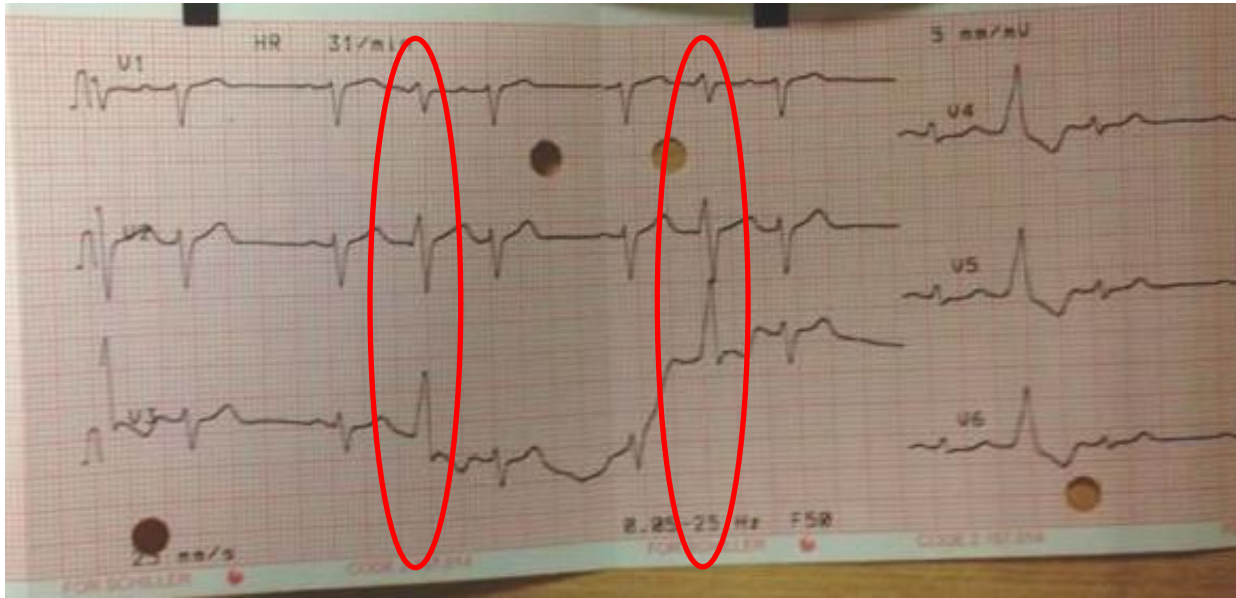
MDI : the maximum deflection index

TMD: time to maximum deflection in precordial lead

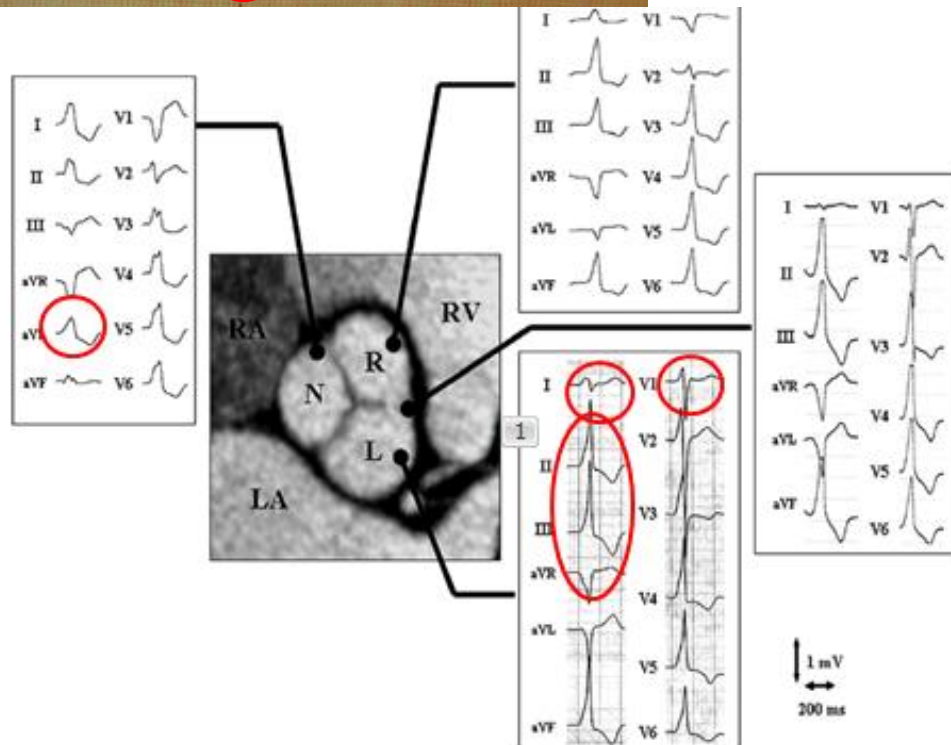
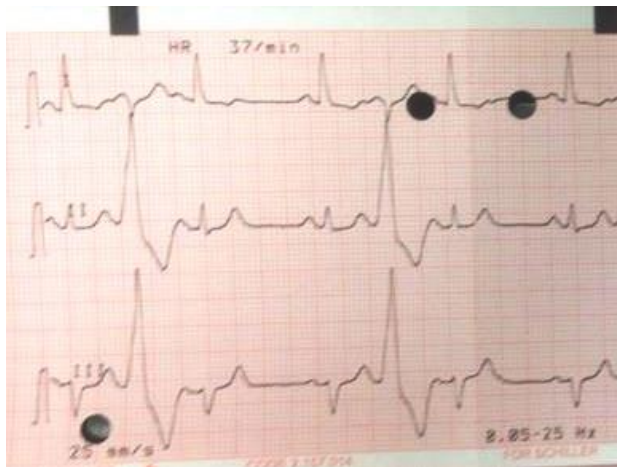
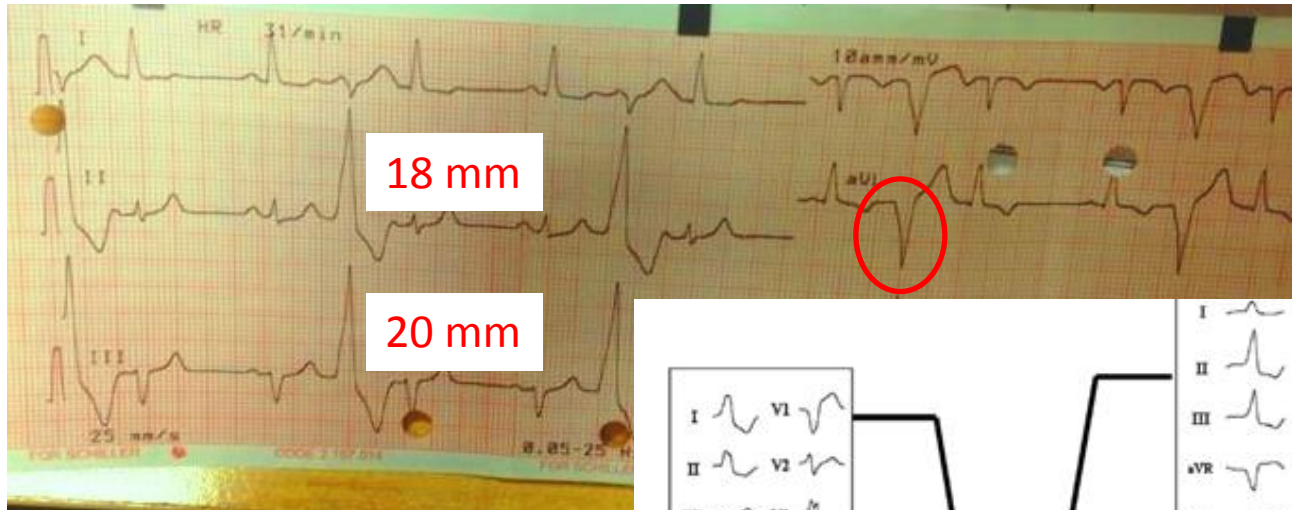
Olgu-1

- 55 yaşında erkek hasta
- 3 yıldır çarpıntı şikayeti var
- HT nedeniyle ARB alıyor
- Aritmi nedeniyle beta bloker, KKB, amiodarone kullanmış. Etkisiz
- EKO: LVEF %50. LV çapları hafif artmıştır (64/44 mm). Kapak fonksiyonları normal.
- KAG: 1 ay önce yapılmış. Normal.
- VES nedeniyle başarısız ablasyon öyküsü mevcut

EKG-prekordial

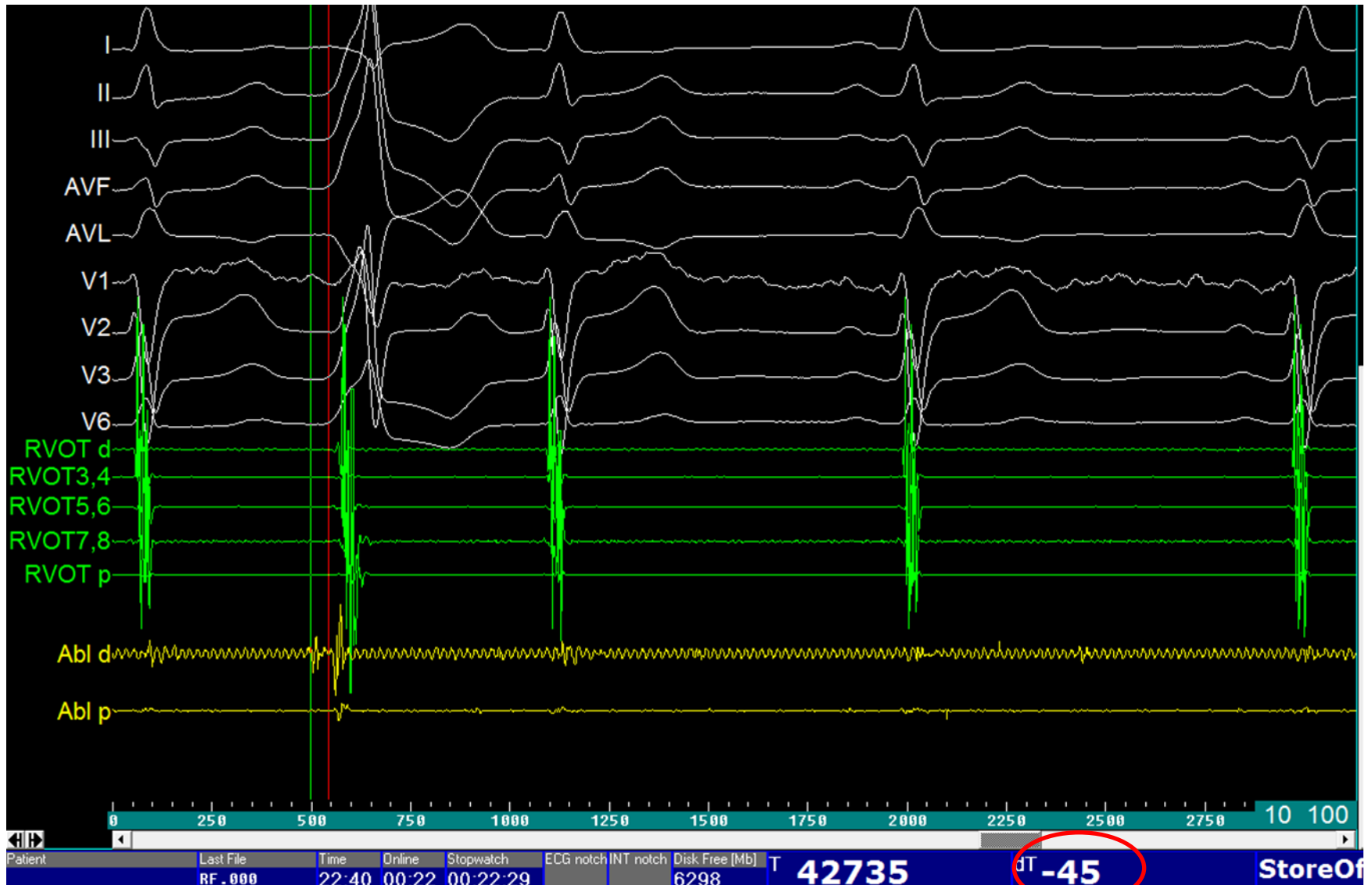


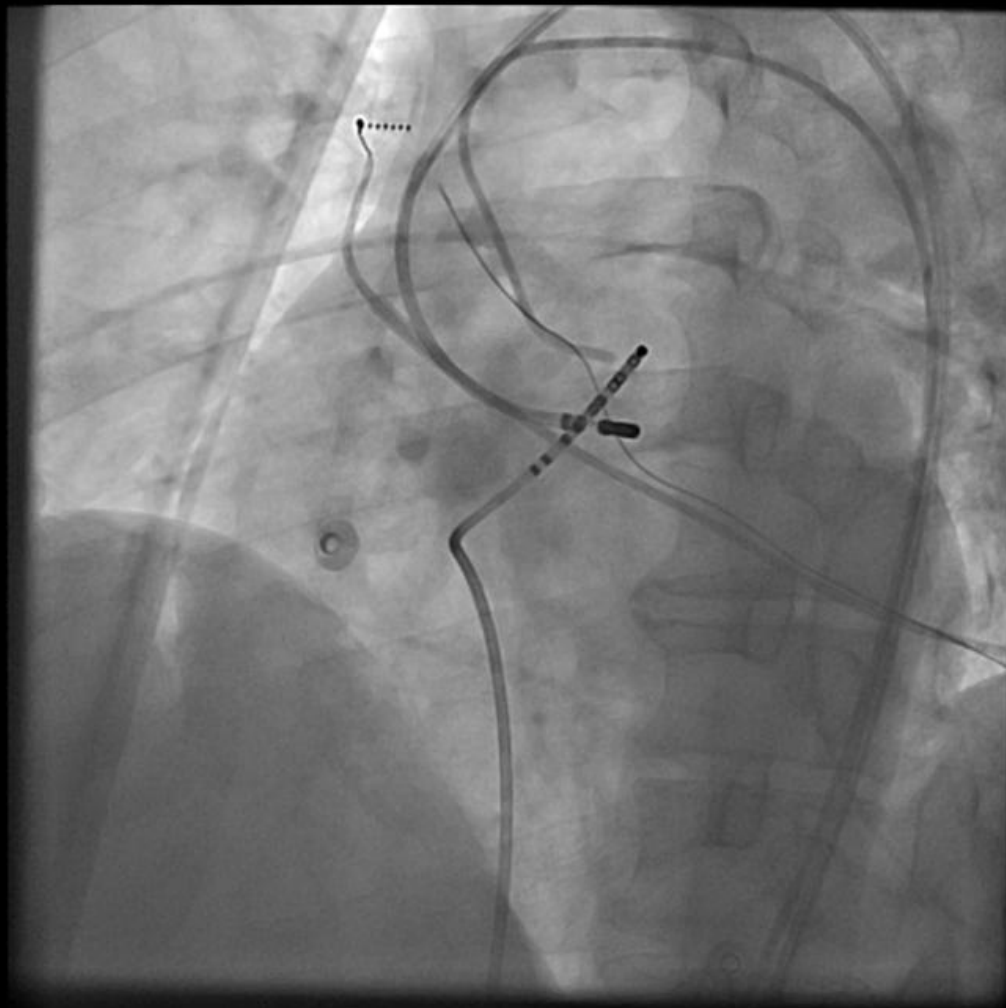
EKG-extremite

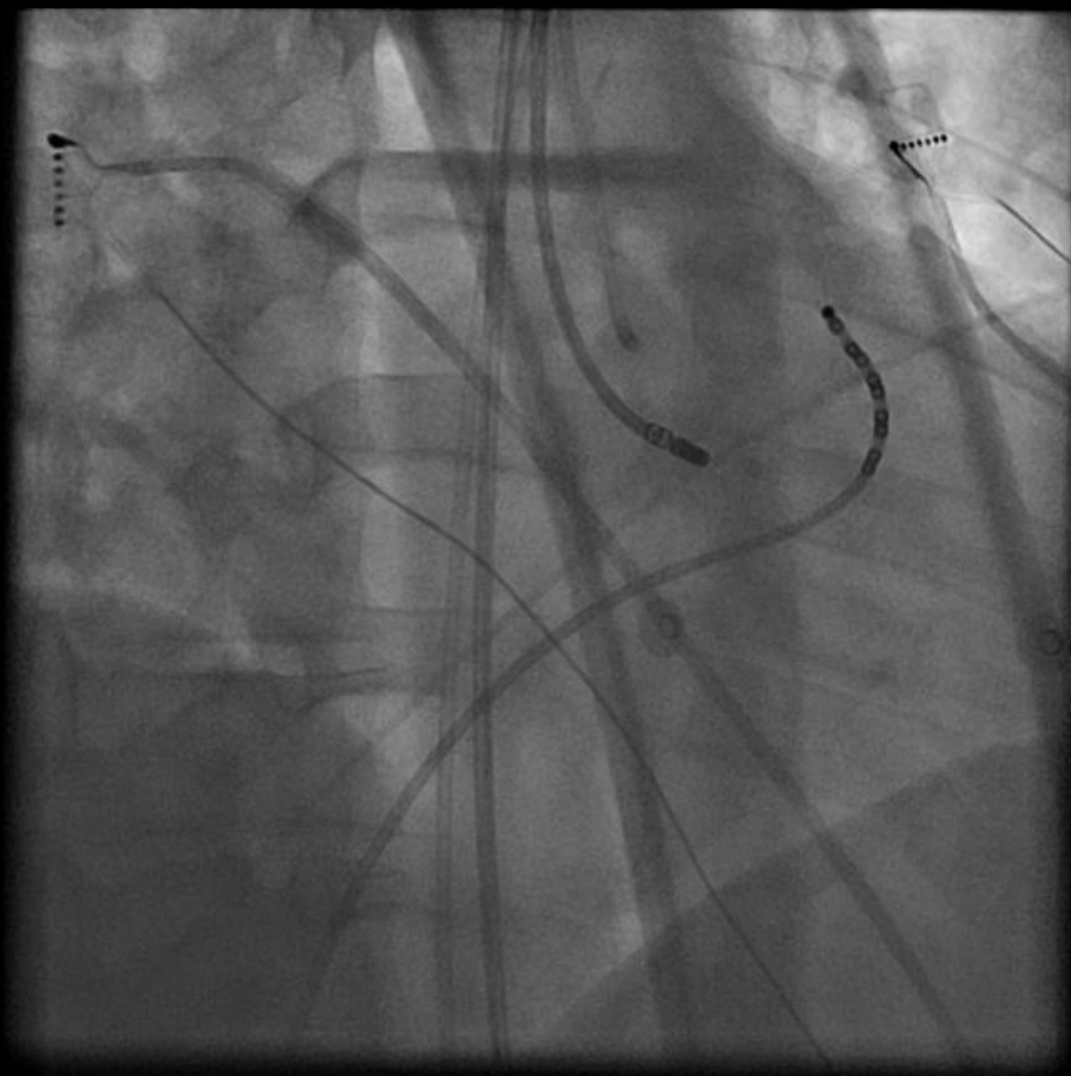


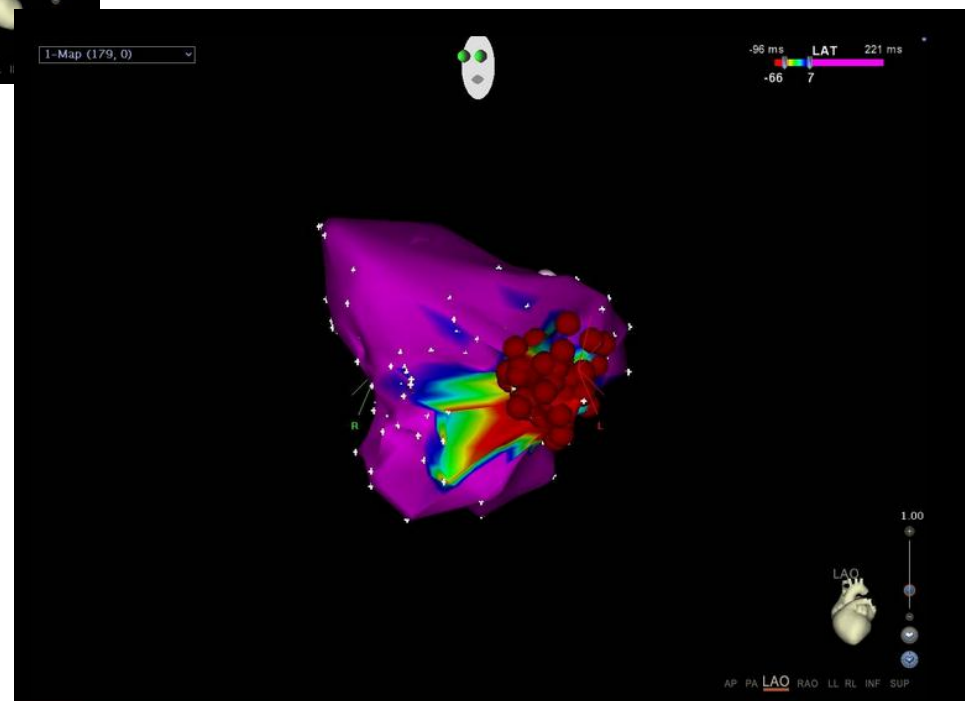
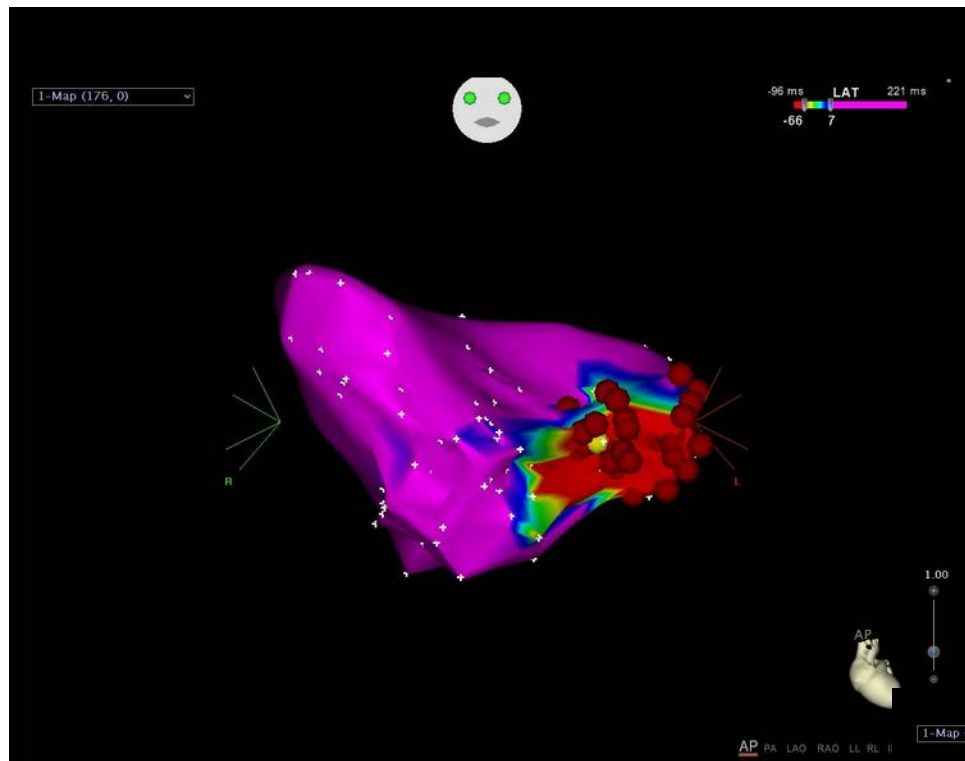
1 DIII/DII 'de R dalga :
>0.9 ise LCC (%100 sensitivite)

LCC-VES ablasyonu





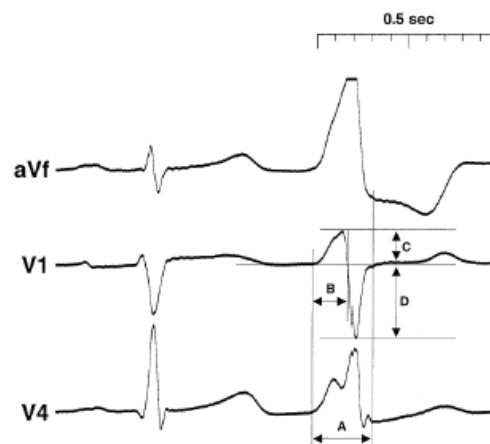
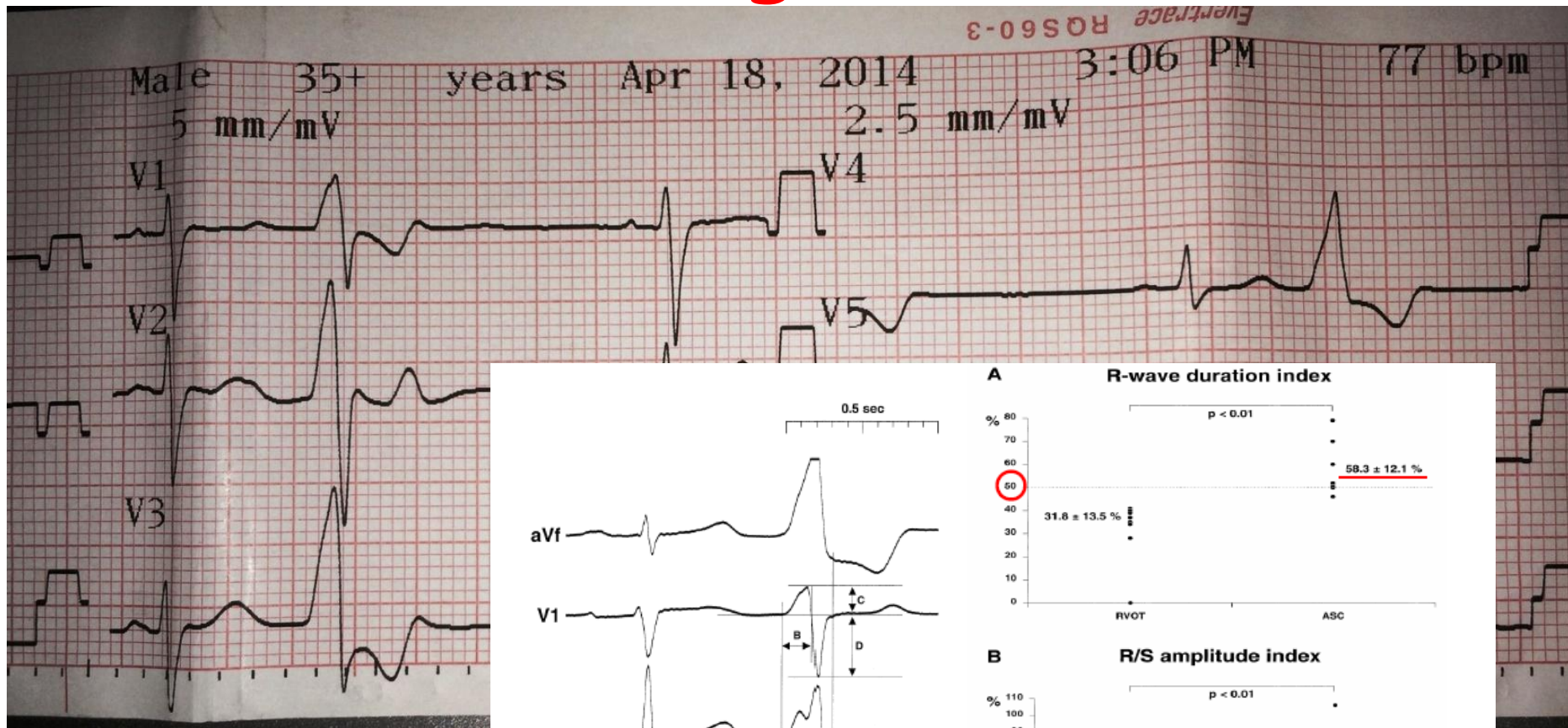




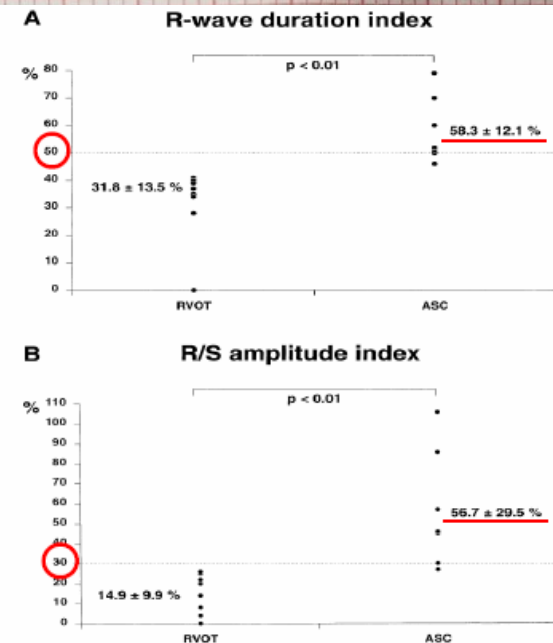
Olgu-2

- 18 yaşında erkek hasta
- EKO normal
- 1 yıldır çarpıntı şikayeti var
- İlaç tedavisi etkisiz (BB, KKB)
- 1 kez başarısız ablasyon öyküsü var
 - Anteralateral ve lateral mitral anülüs lokalizasyonunda ablasyon denenmiş

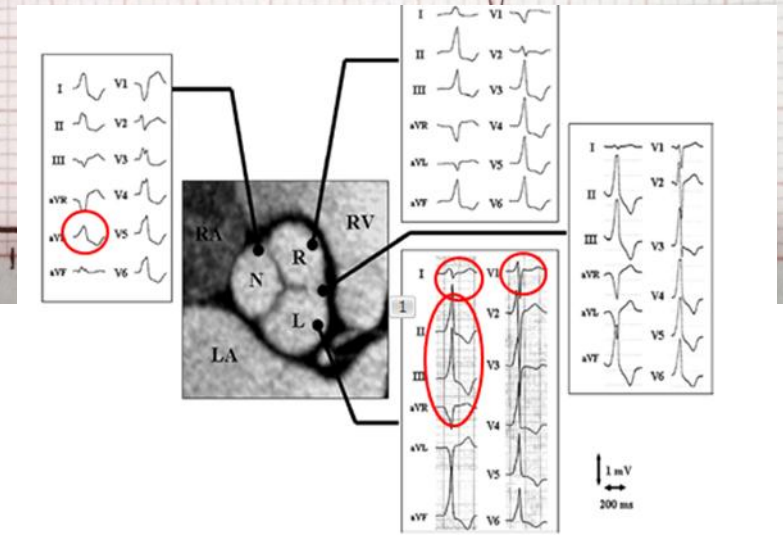
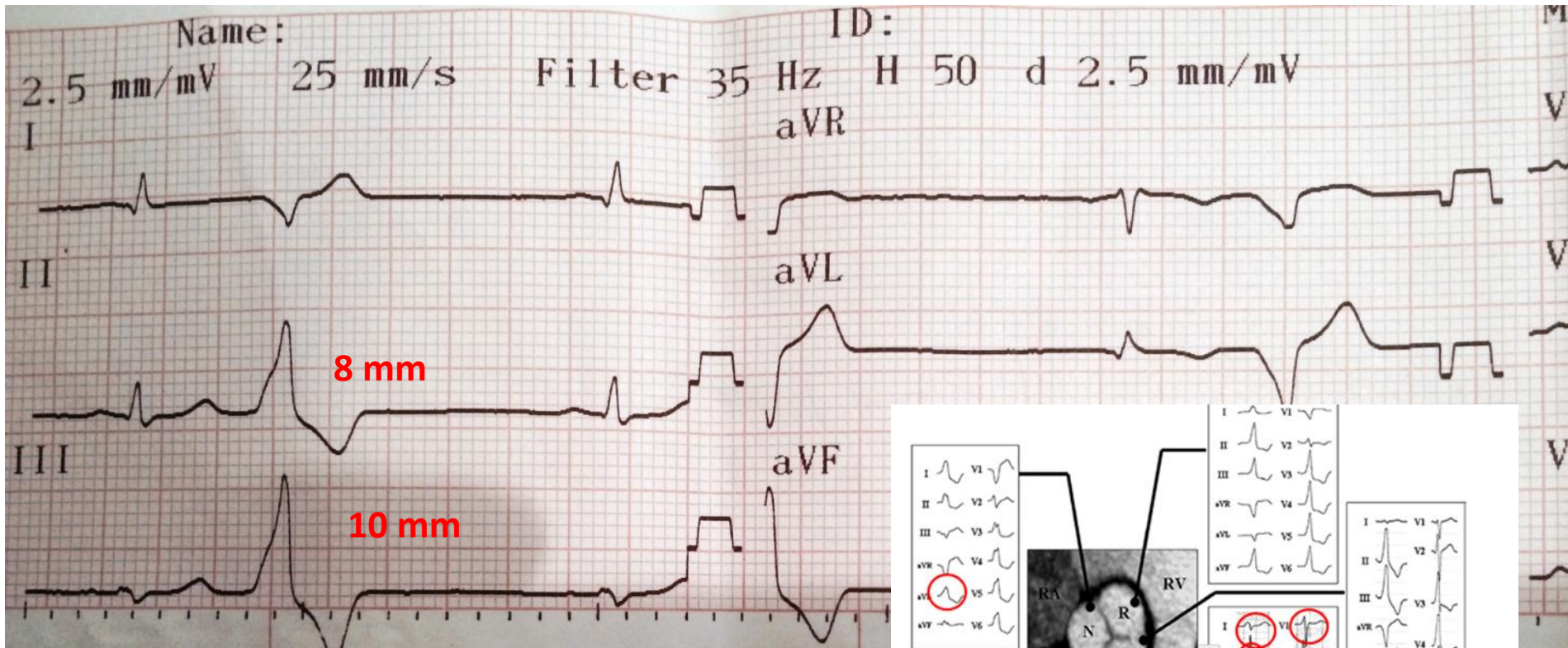
Olgu-2



- A Total QRS duration(ms)
- B R-wave duration (ms)
- C R-wave amplitude (mV)
- D S-wave amplitude (mV)

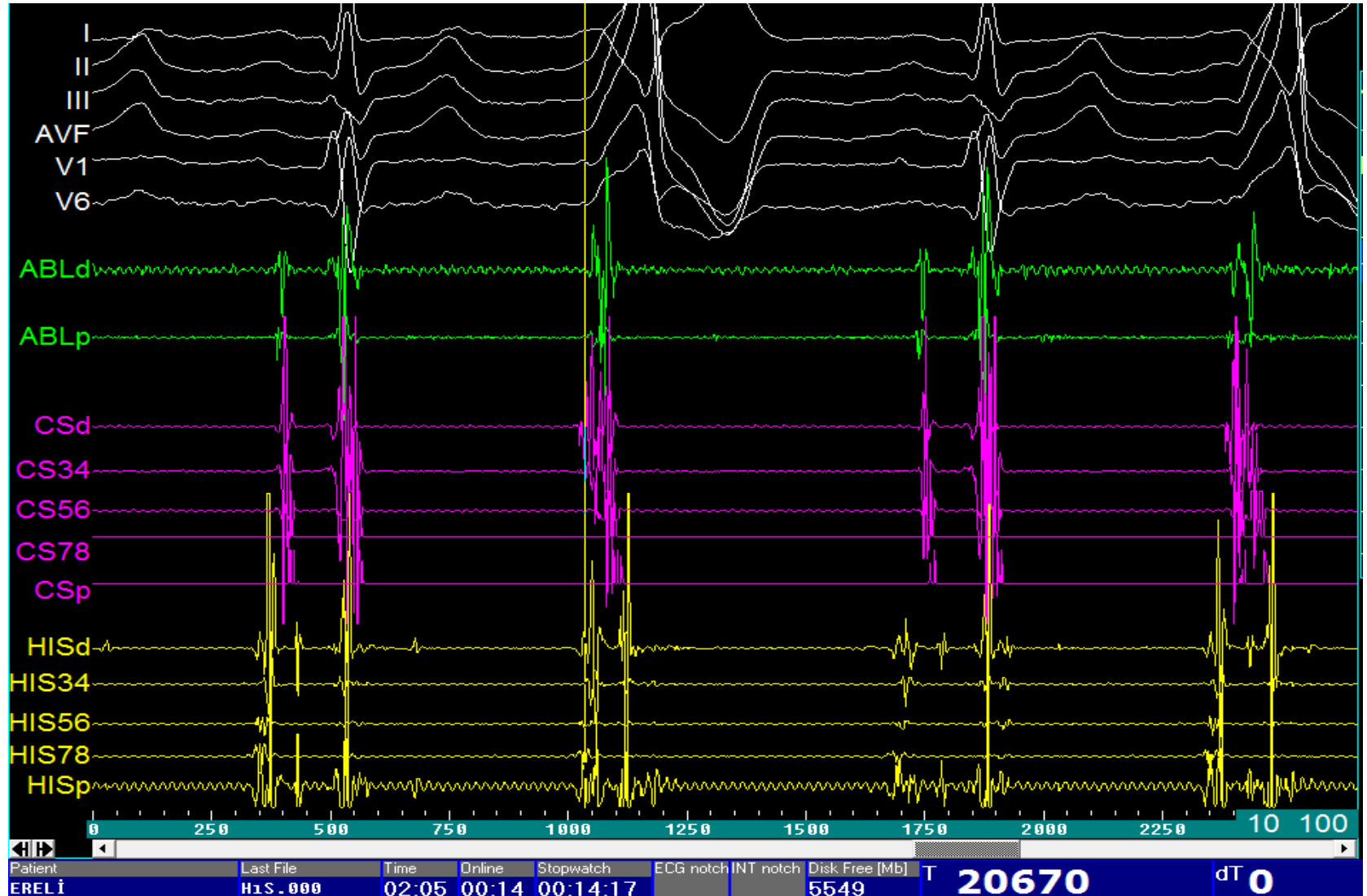


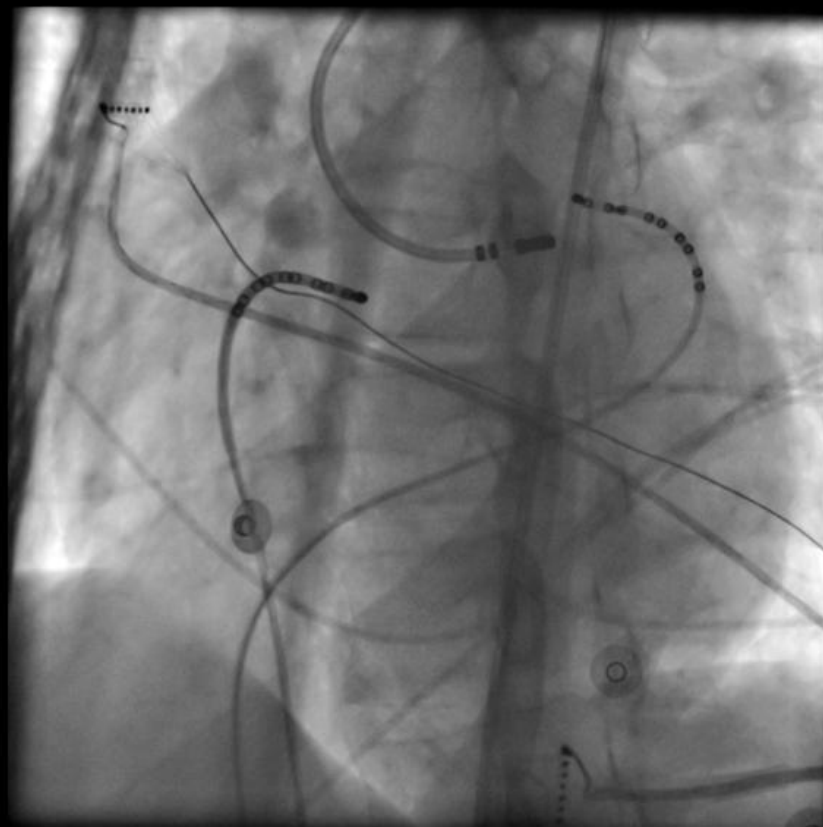
Olgu-2



1 DIII/DII 'de R dalga :
>0.9 ise LCC (%100 sensitivite)

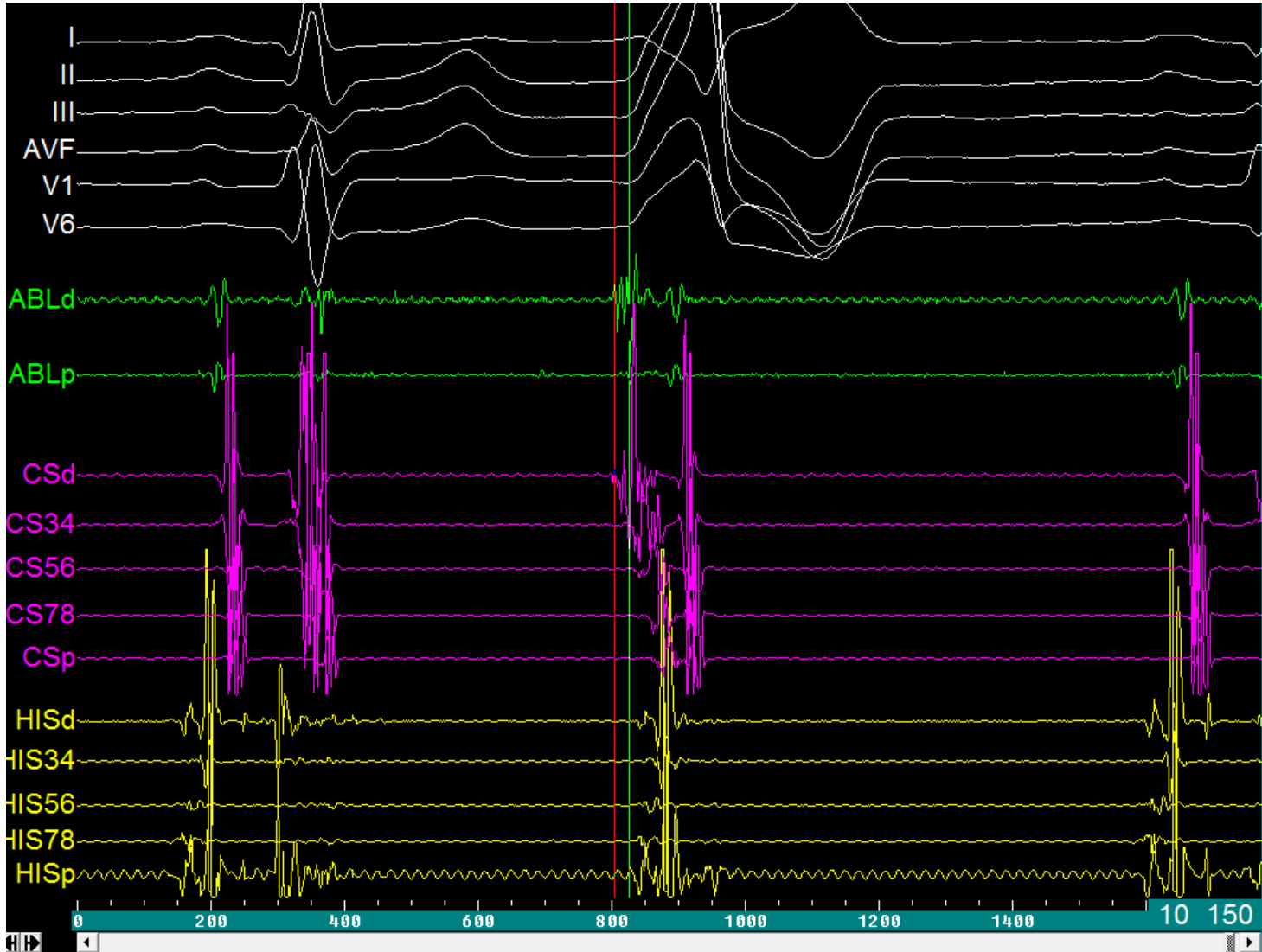
His kaydı kötü, ablasyon kateteri mitral anülüs anterolateral bölgede

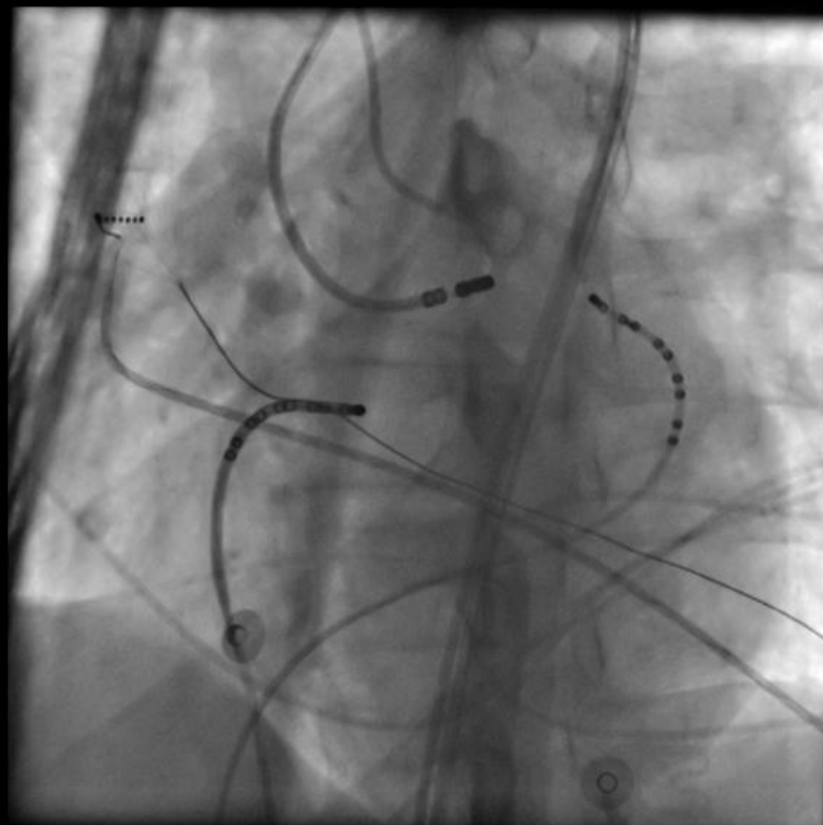




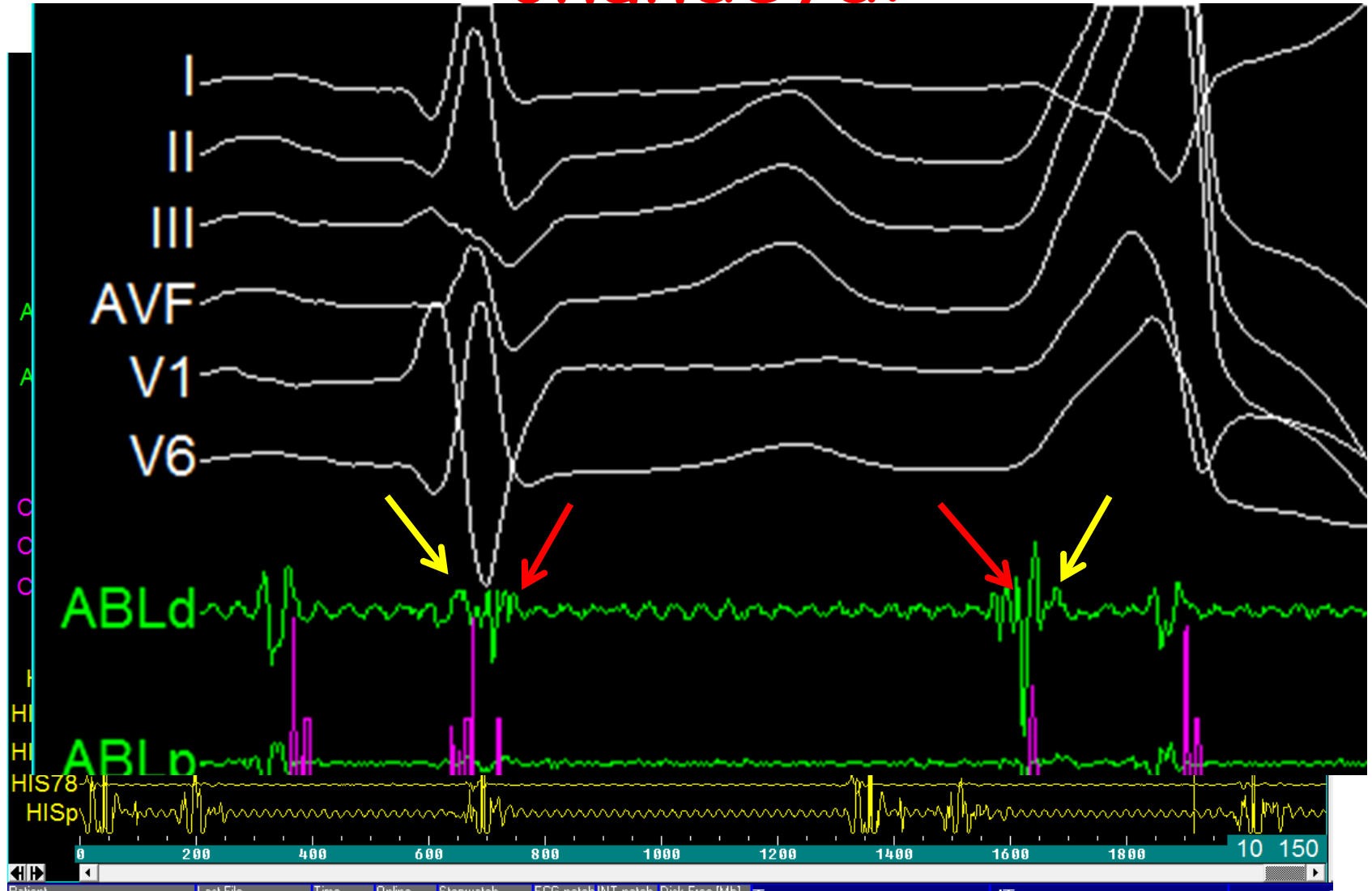
Abl ile CS başabaş.

Abl: Aorta mitral bileşke bölgesinde

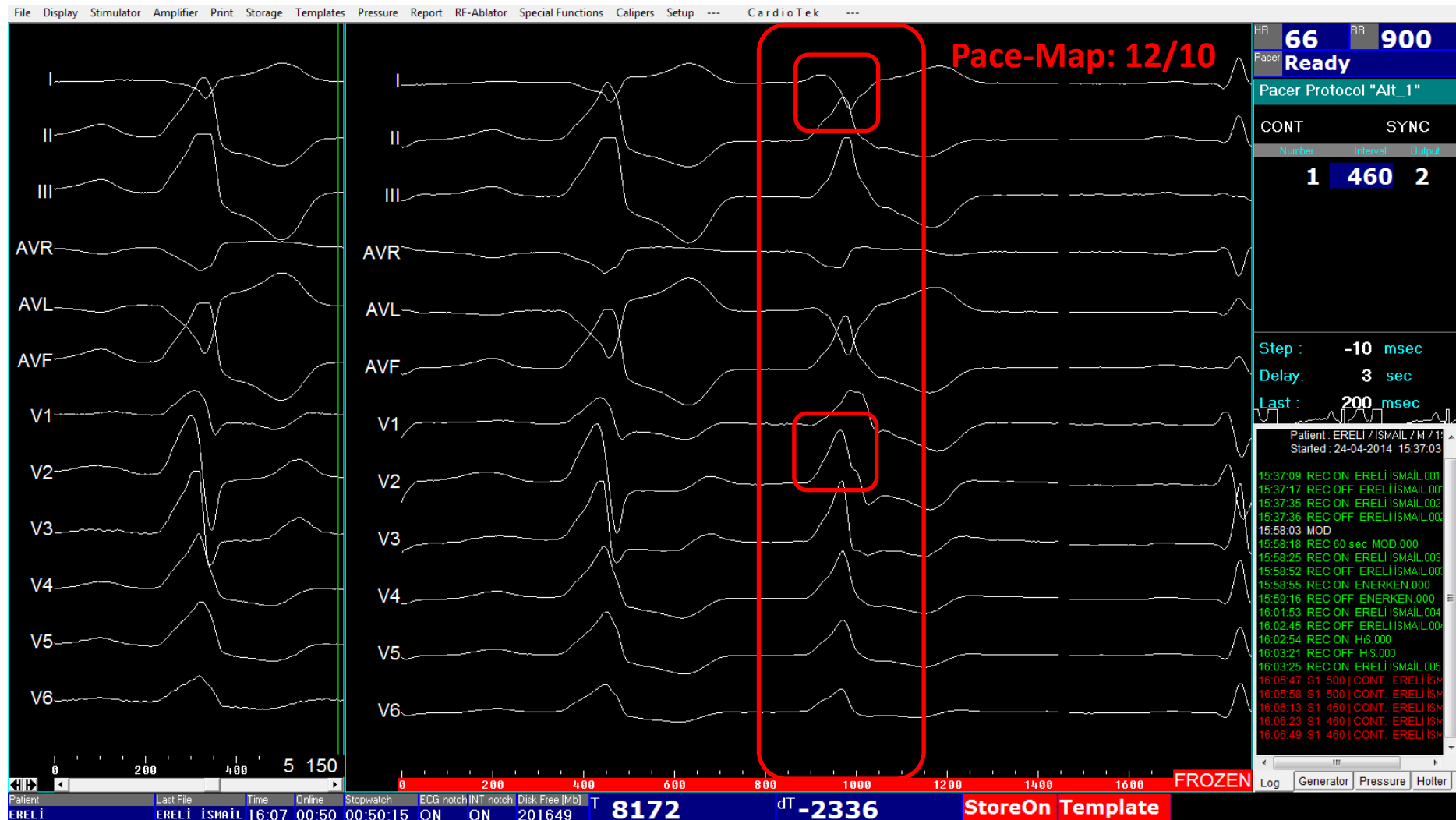




Ablasyon çok az farkla CS'nin önündeydi

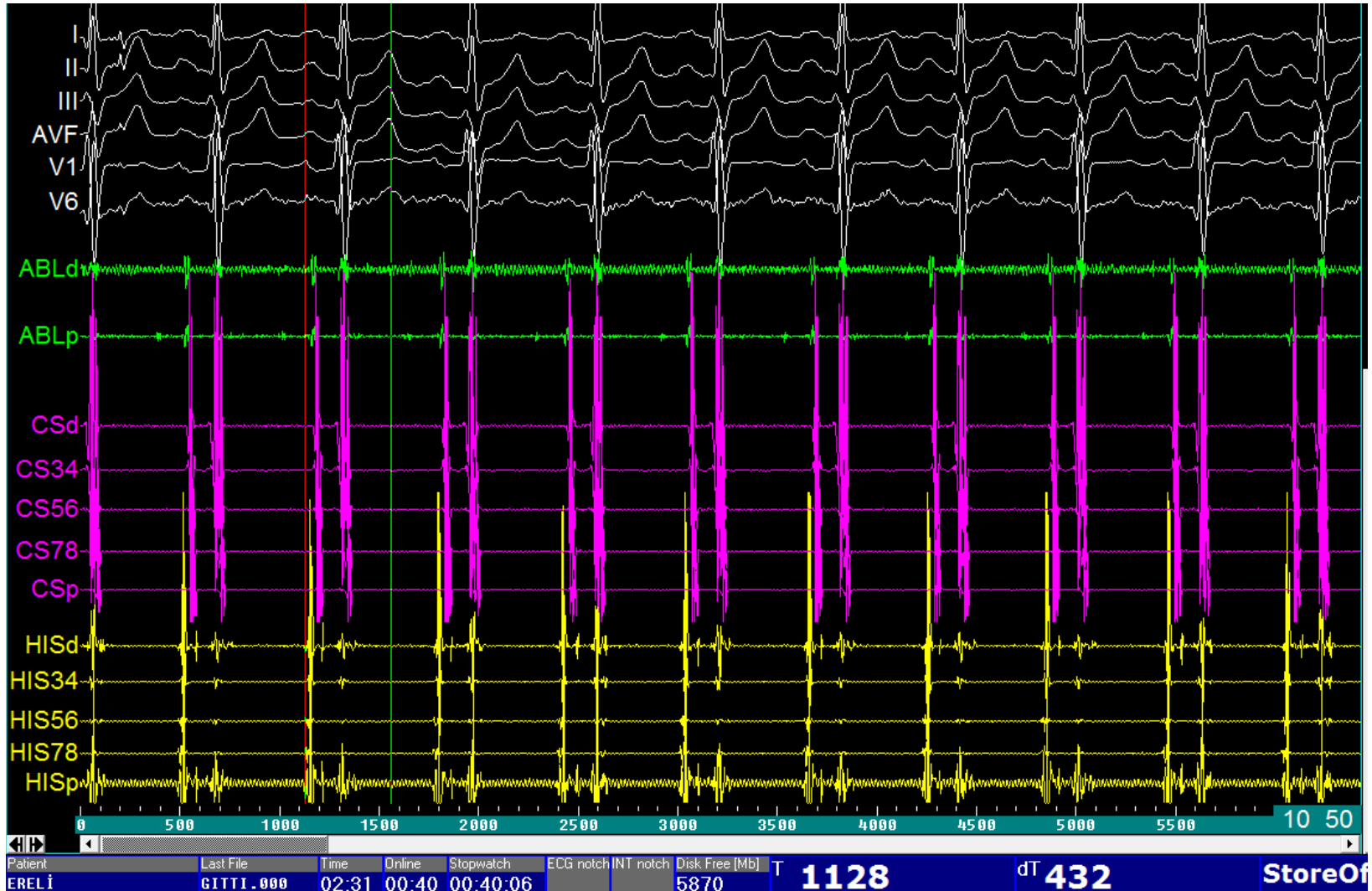


Olgu-2

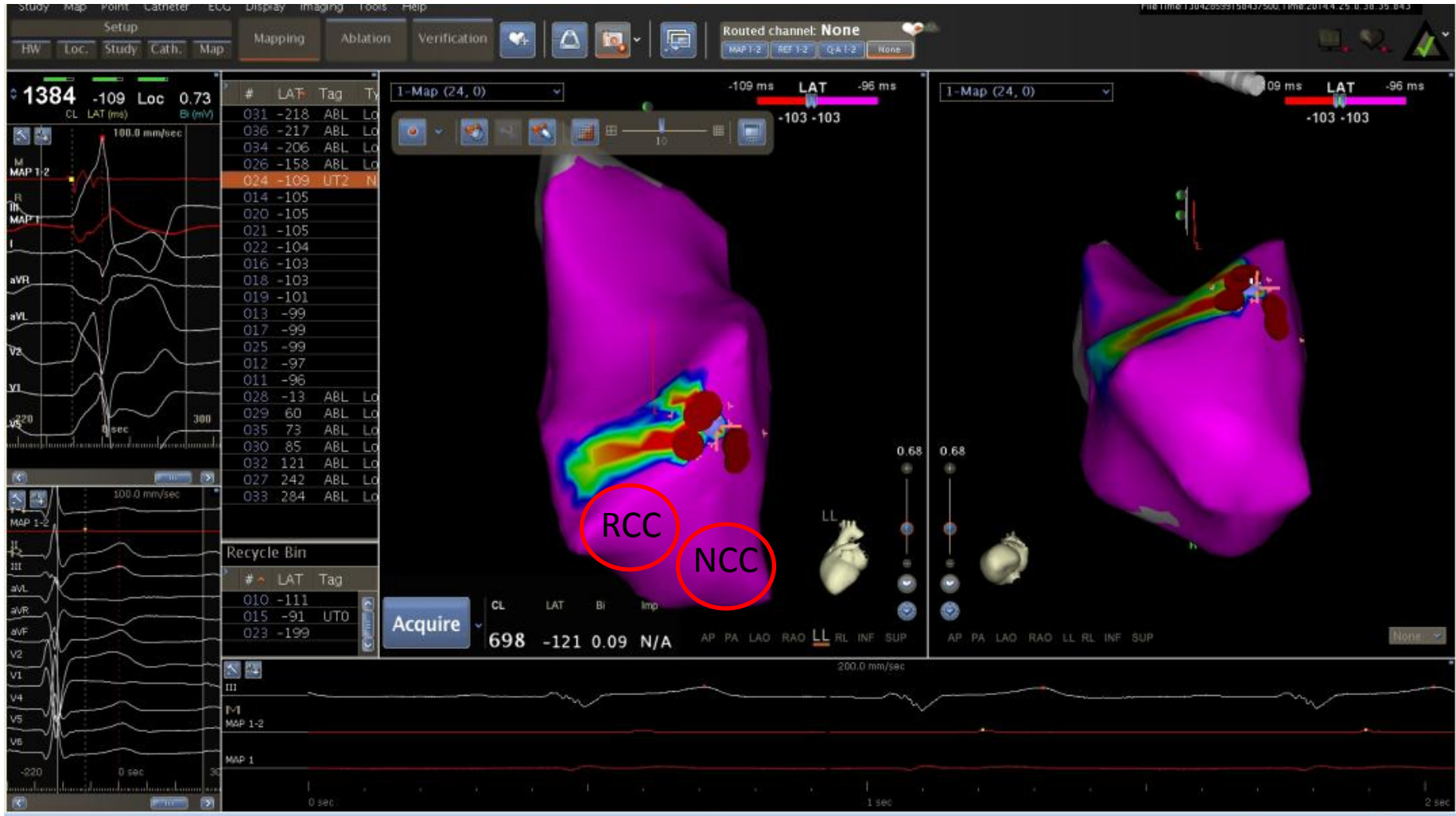


İs Ere

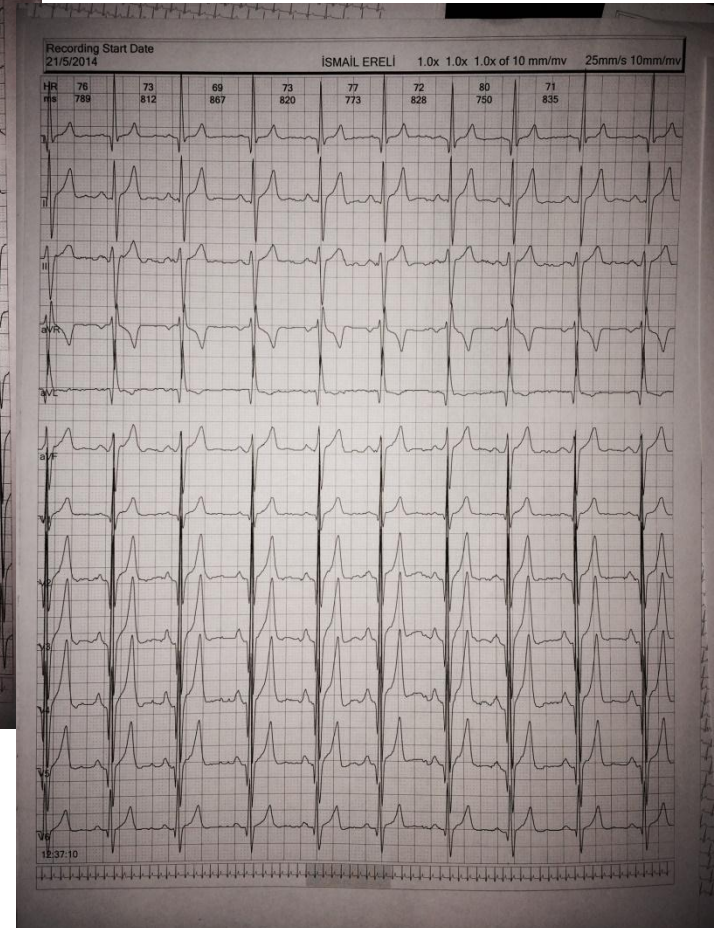
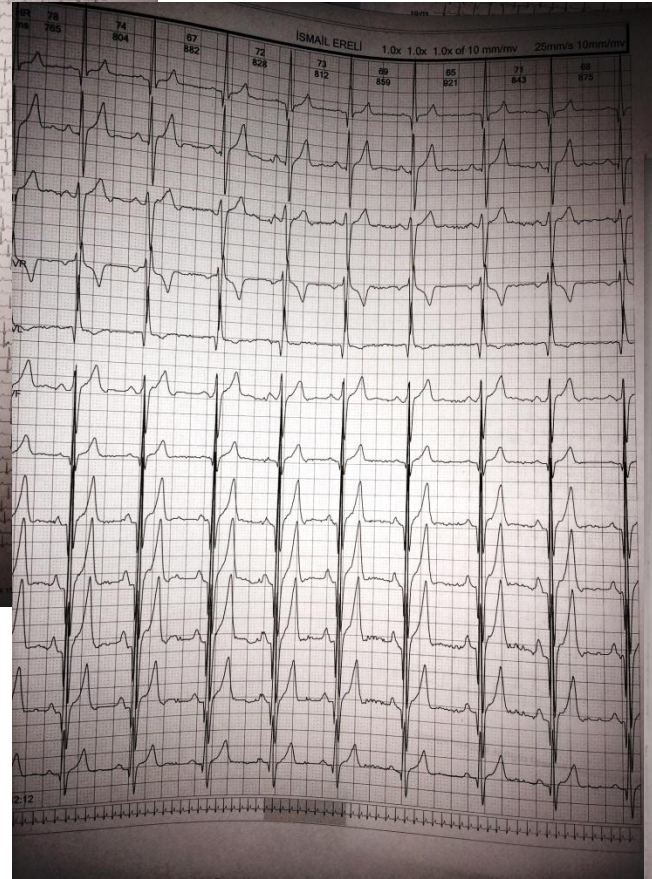
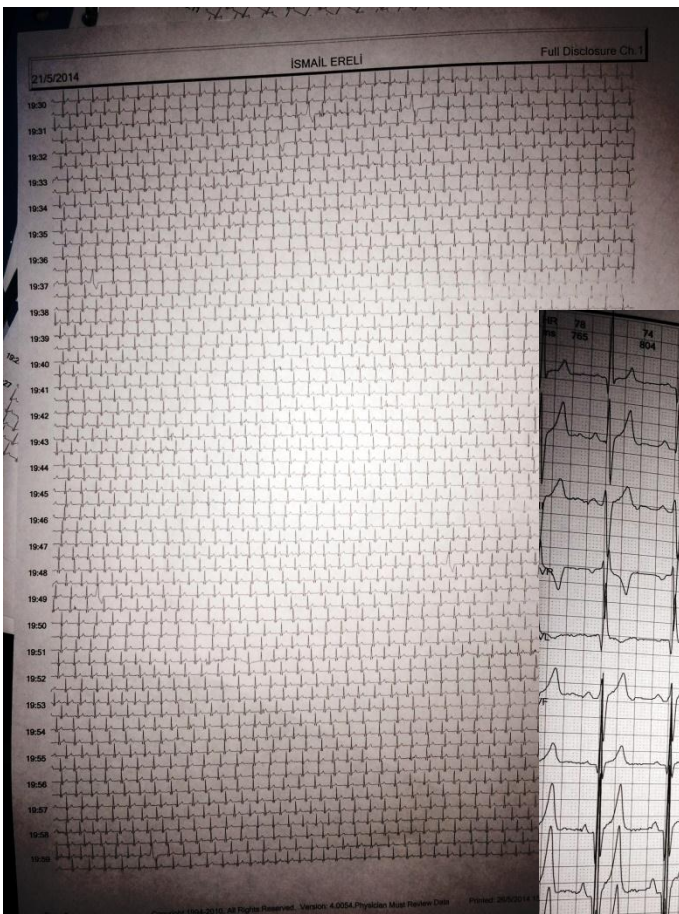
İlk RF uygulamada VES kayboldu



LCC başarılı ablasyon noktası

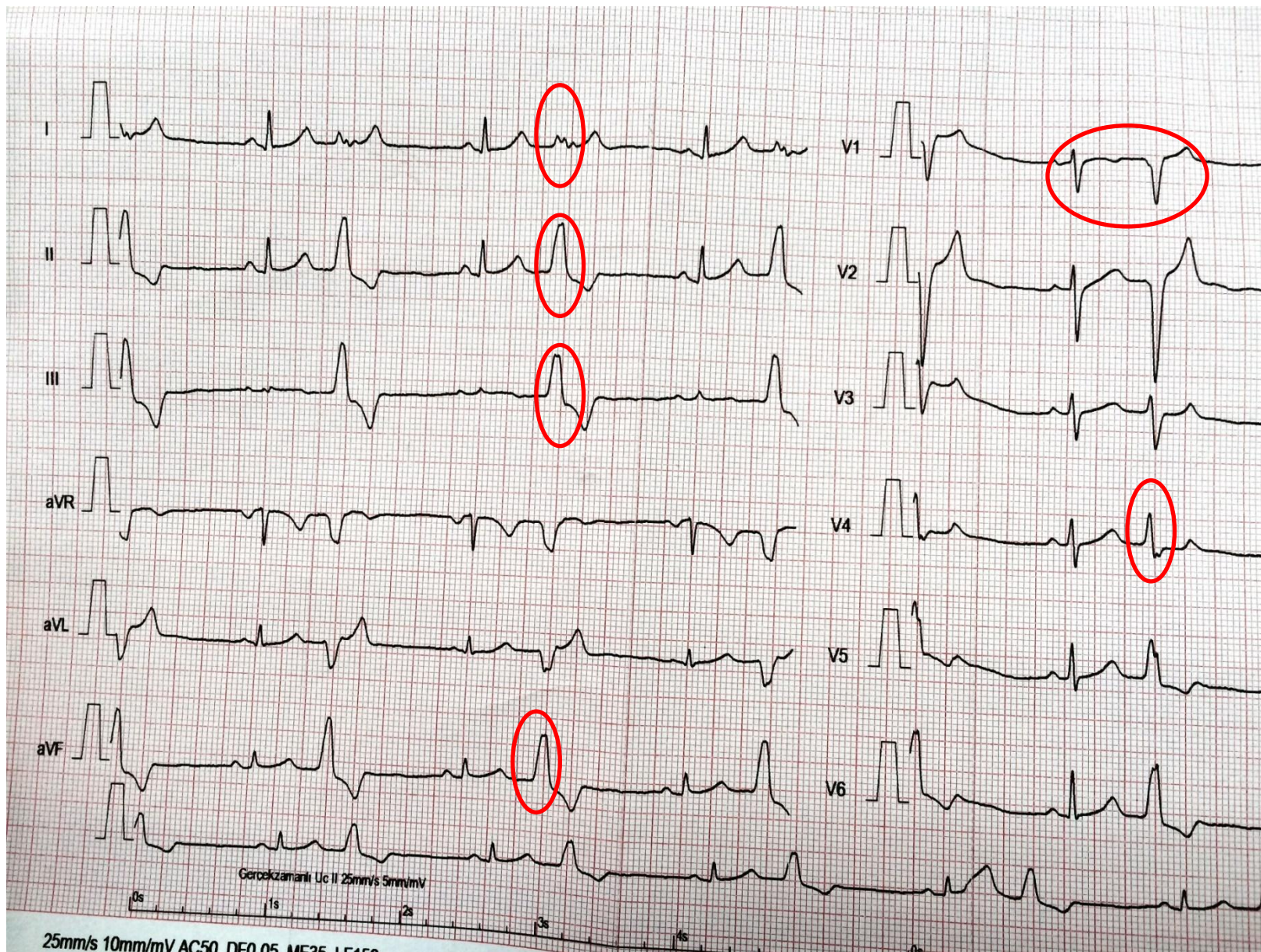


1 ay sonraki kontrol

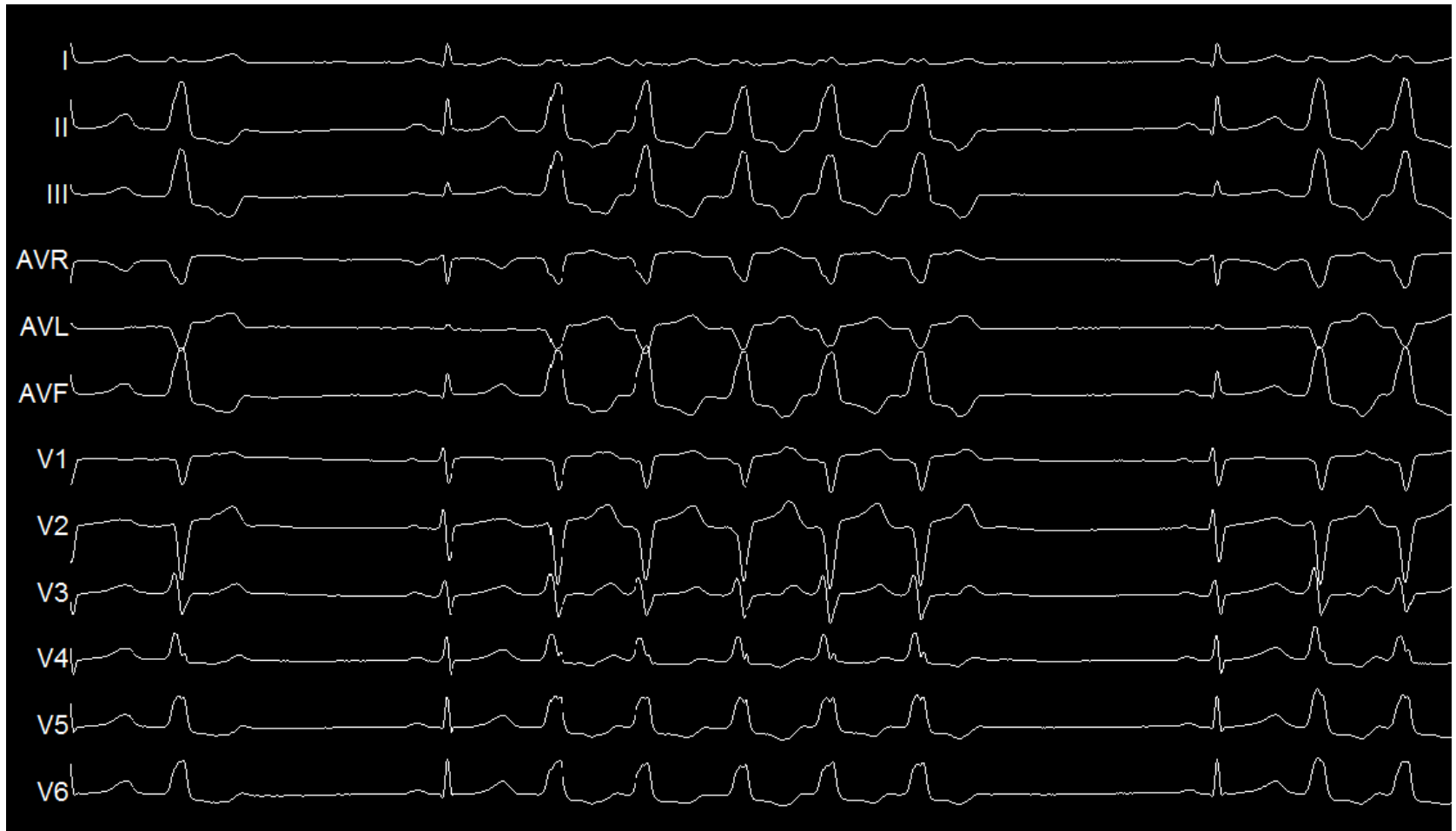


Olgu-3

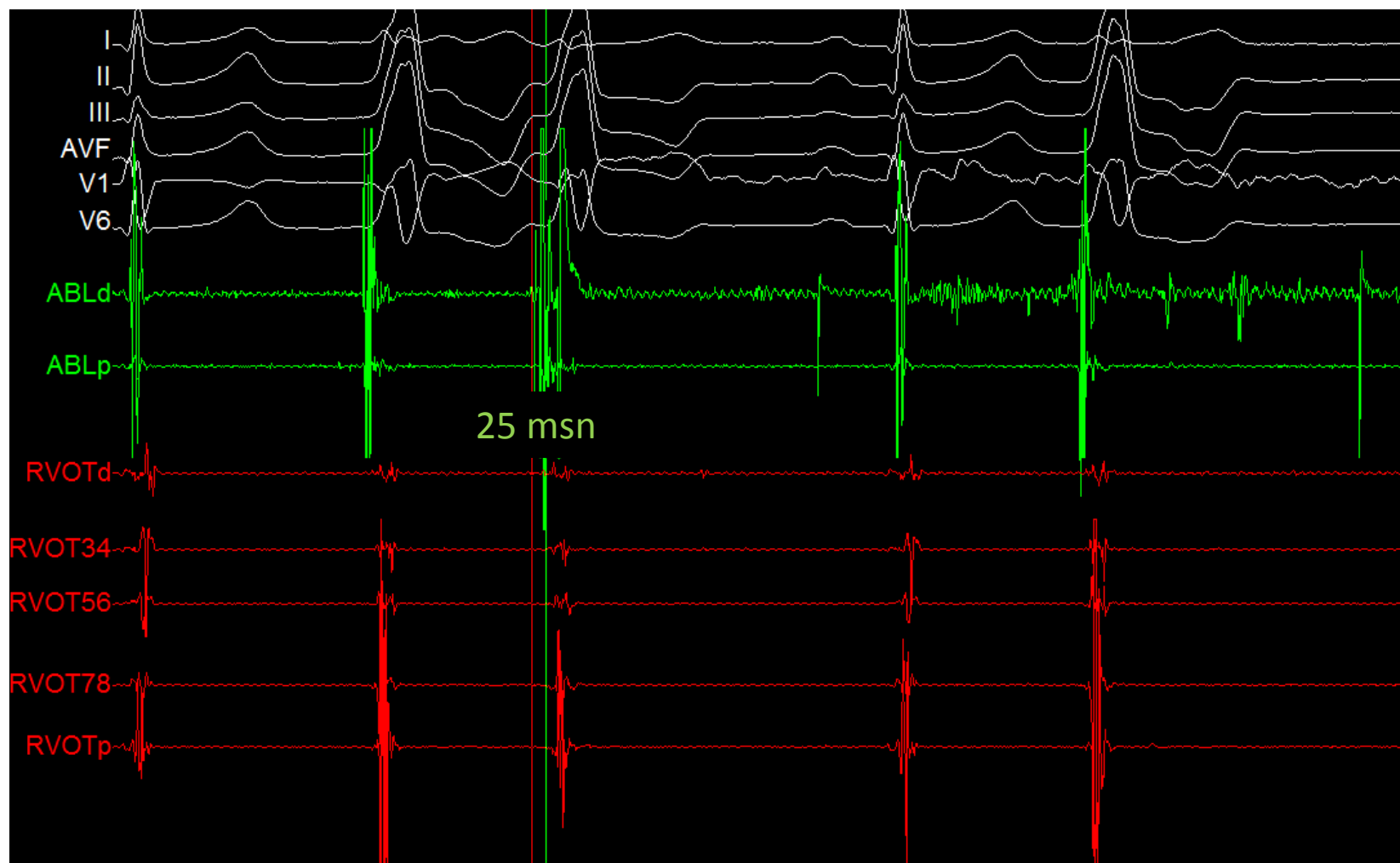
- 30 yaşında bayan hasta
- EKO normal
- 3 yıldır çarpıntı şikayeti var
- İlaç tedavisi etkisiz (BB, KKB)
- Birkaç kez presenkop tarifliyor

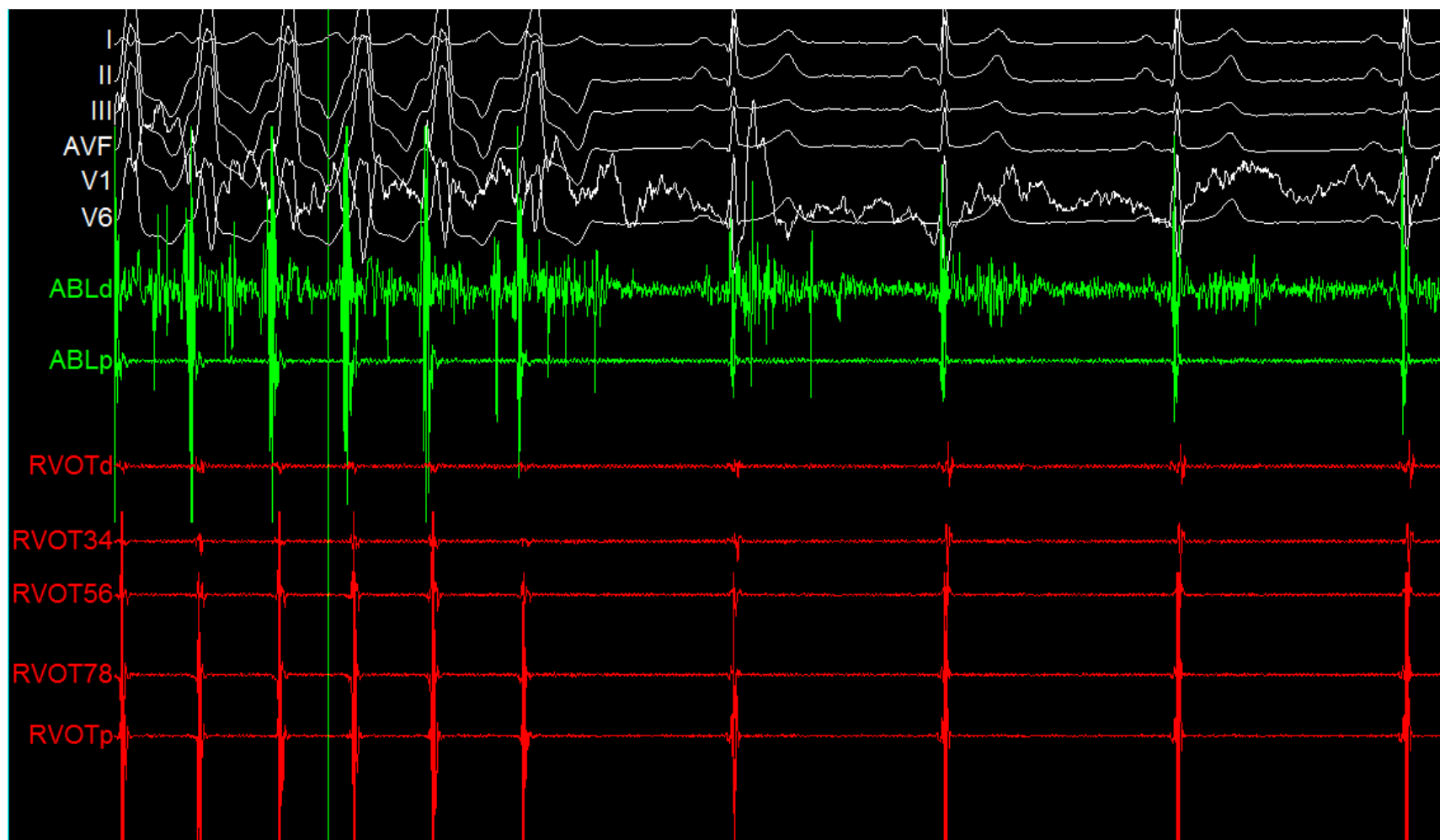


Olgu-3



RVOT mid (Haf Cey)





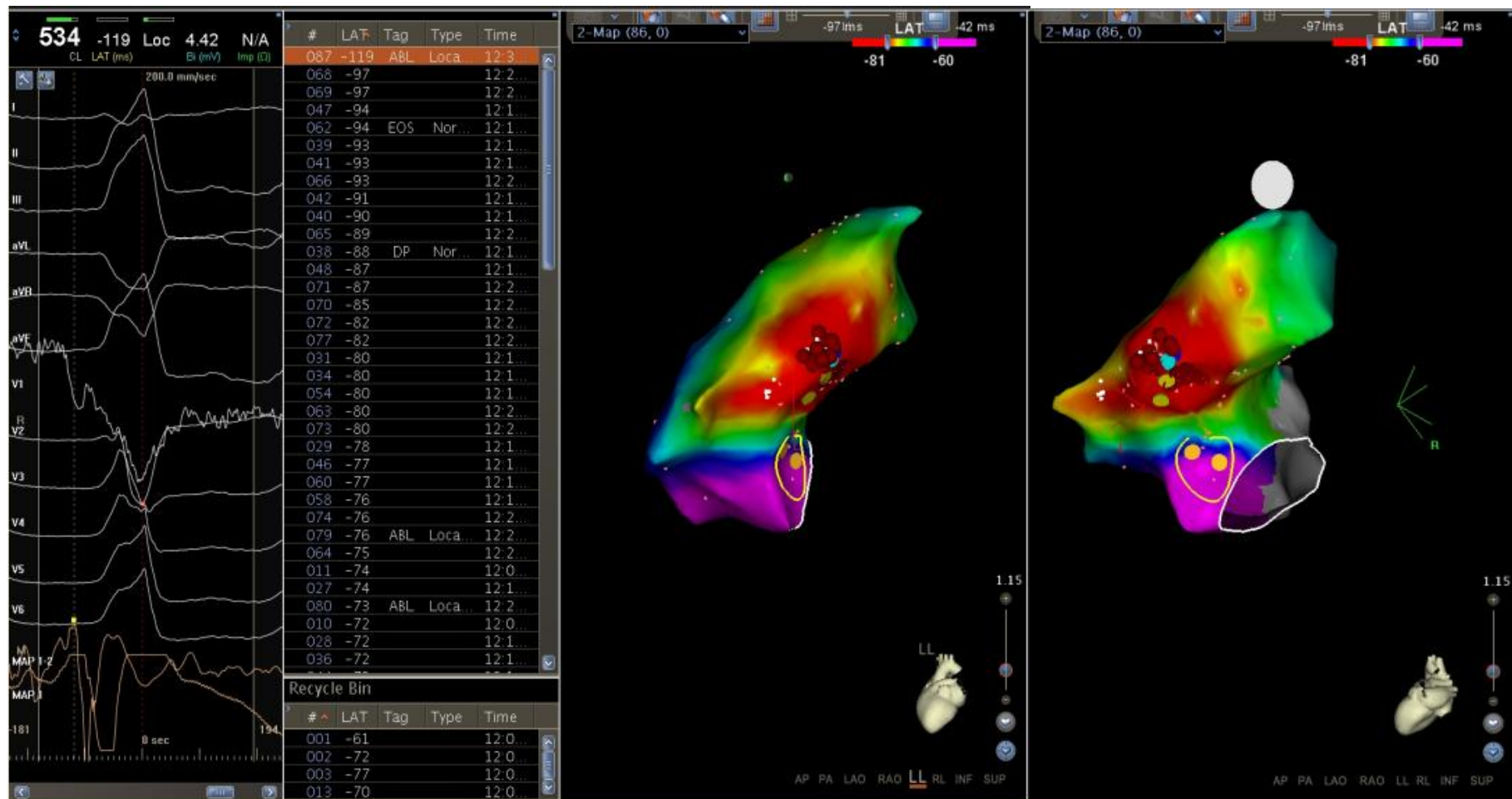
RVOT mid septal-RAO



RVOT mid septal- LAO

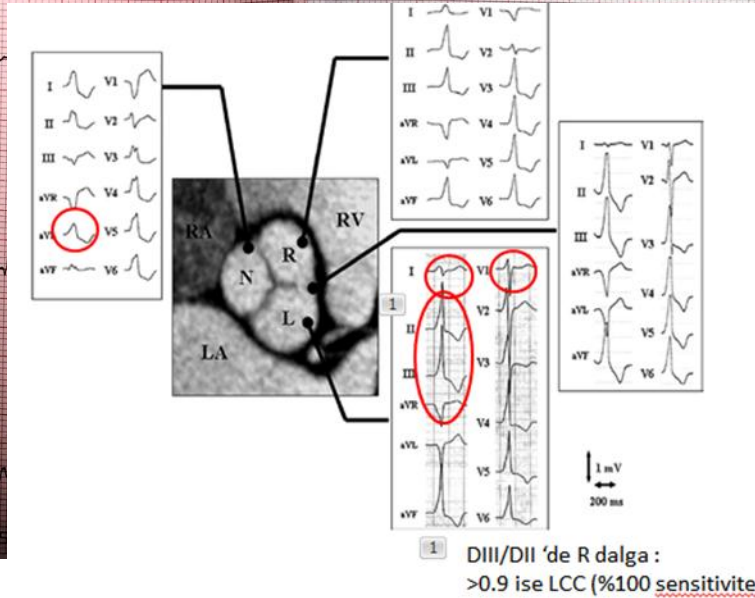
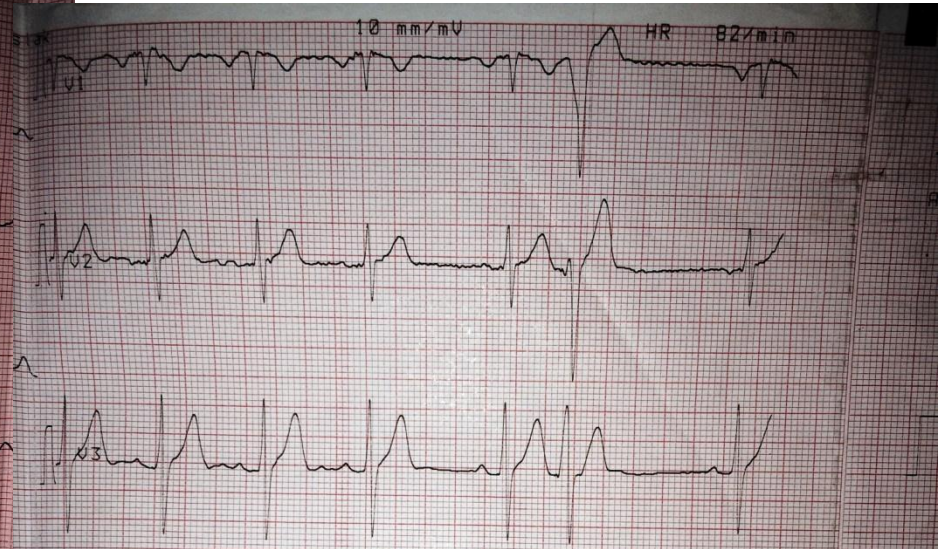
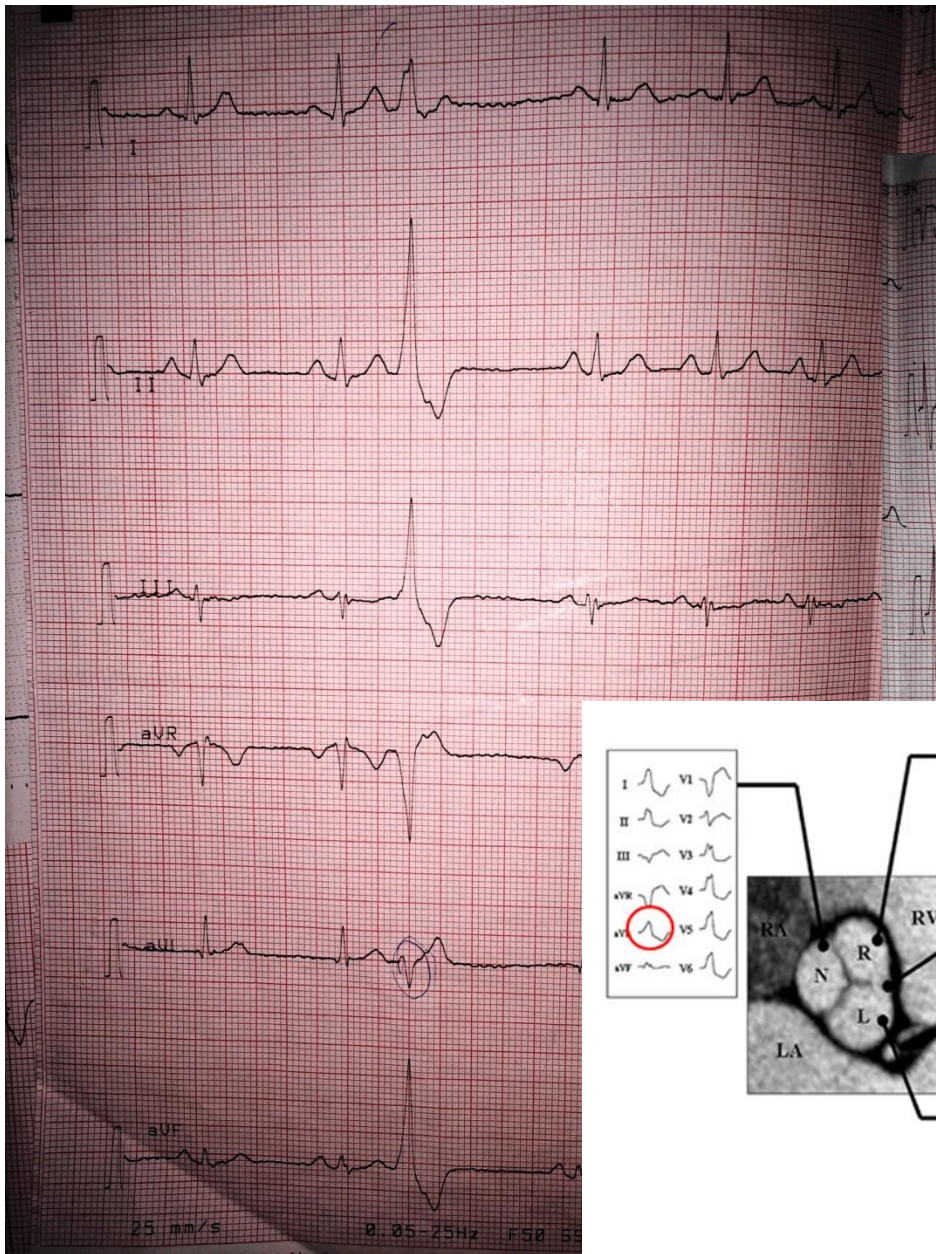


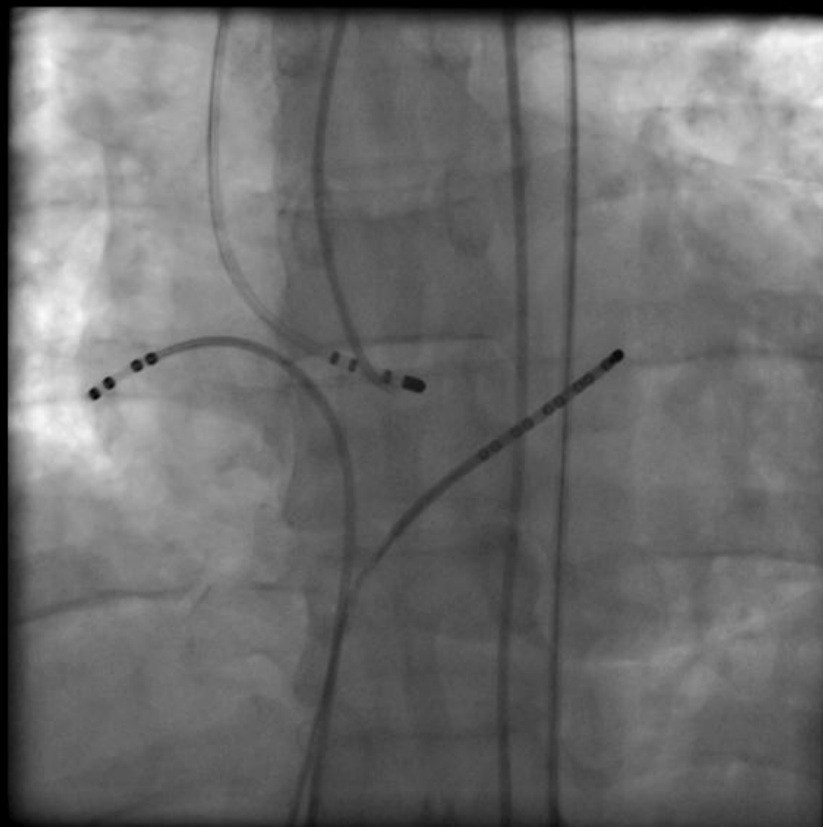
RVOT- 3D

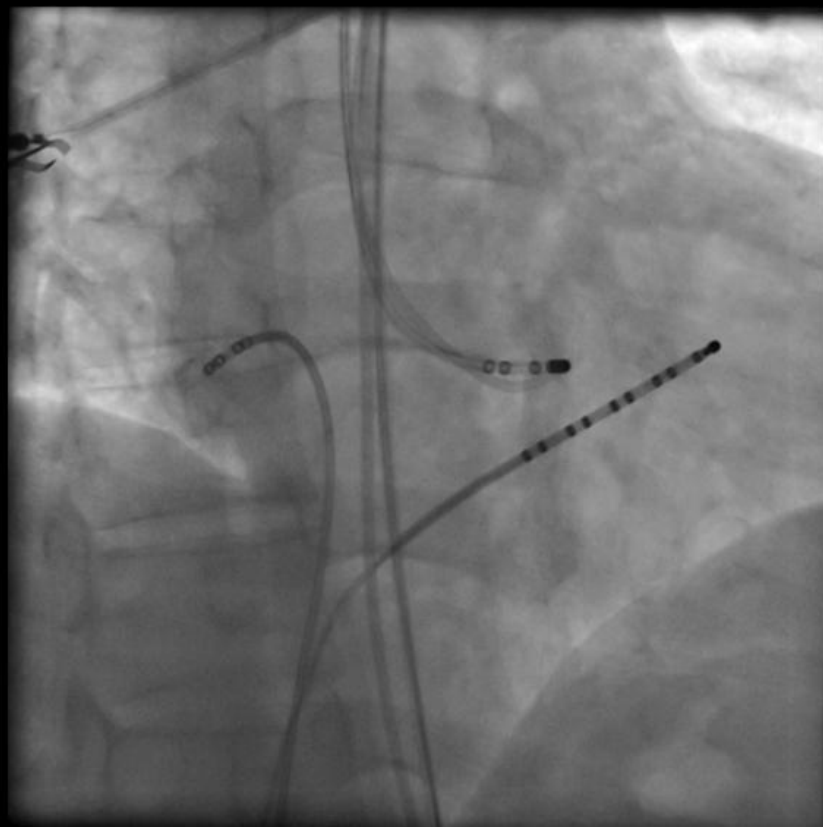


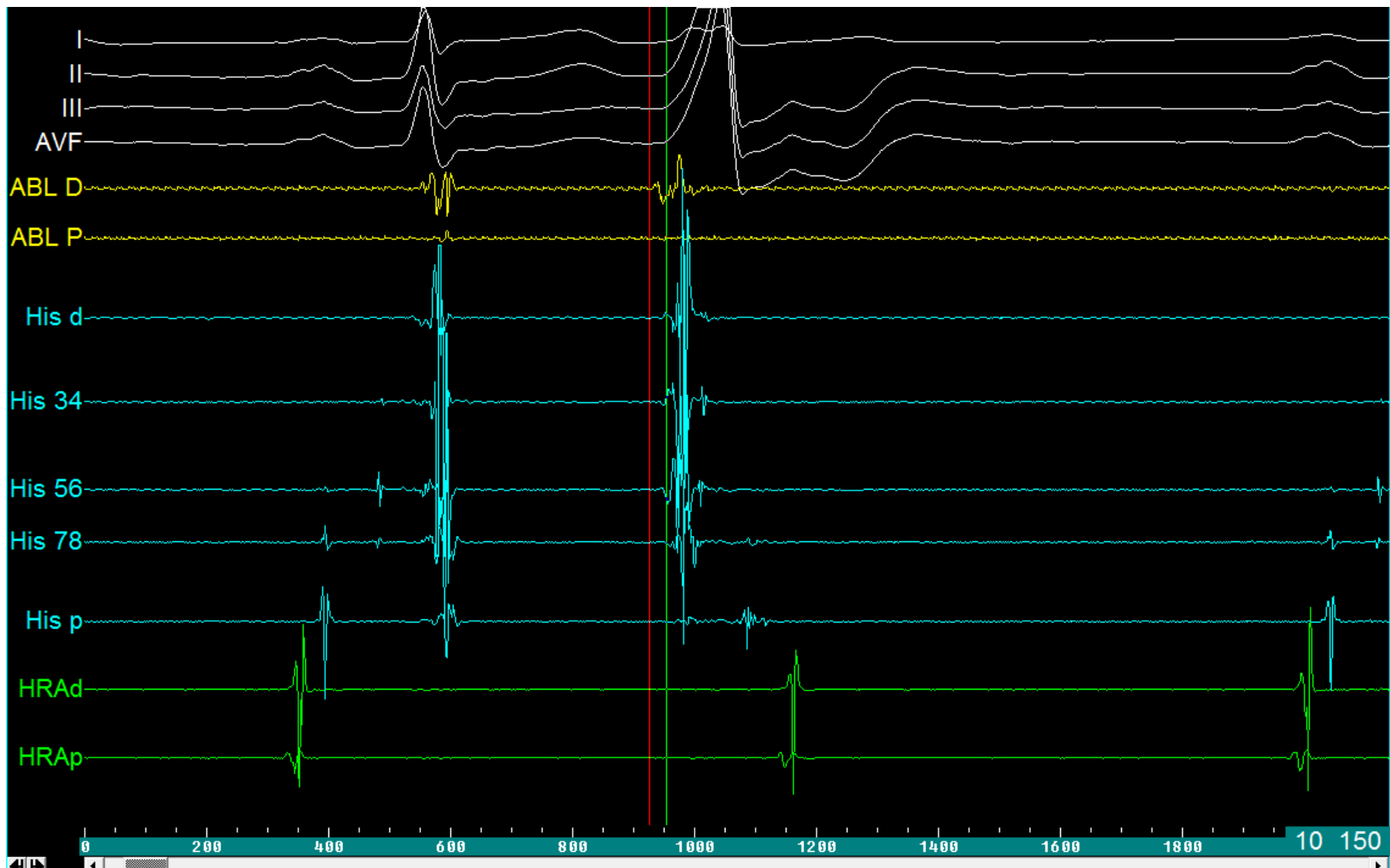
Olgu-4

- 40 yaşında erkek hasta
- EKO normal
- 5 yıldır aralıklı çarpıntı şikayeti var
- Düzensiz ilaç kullanım öyküsü var: kısmen fayda var
- Bir kaç kez çarpıntı + presenkop
- Senkop yok

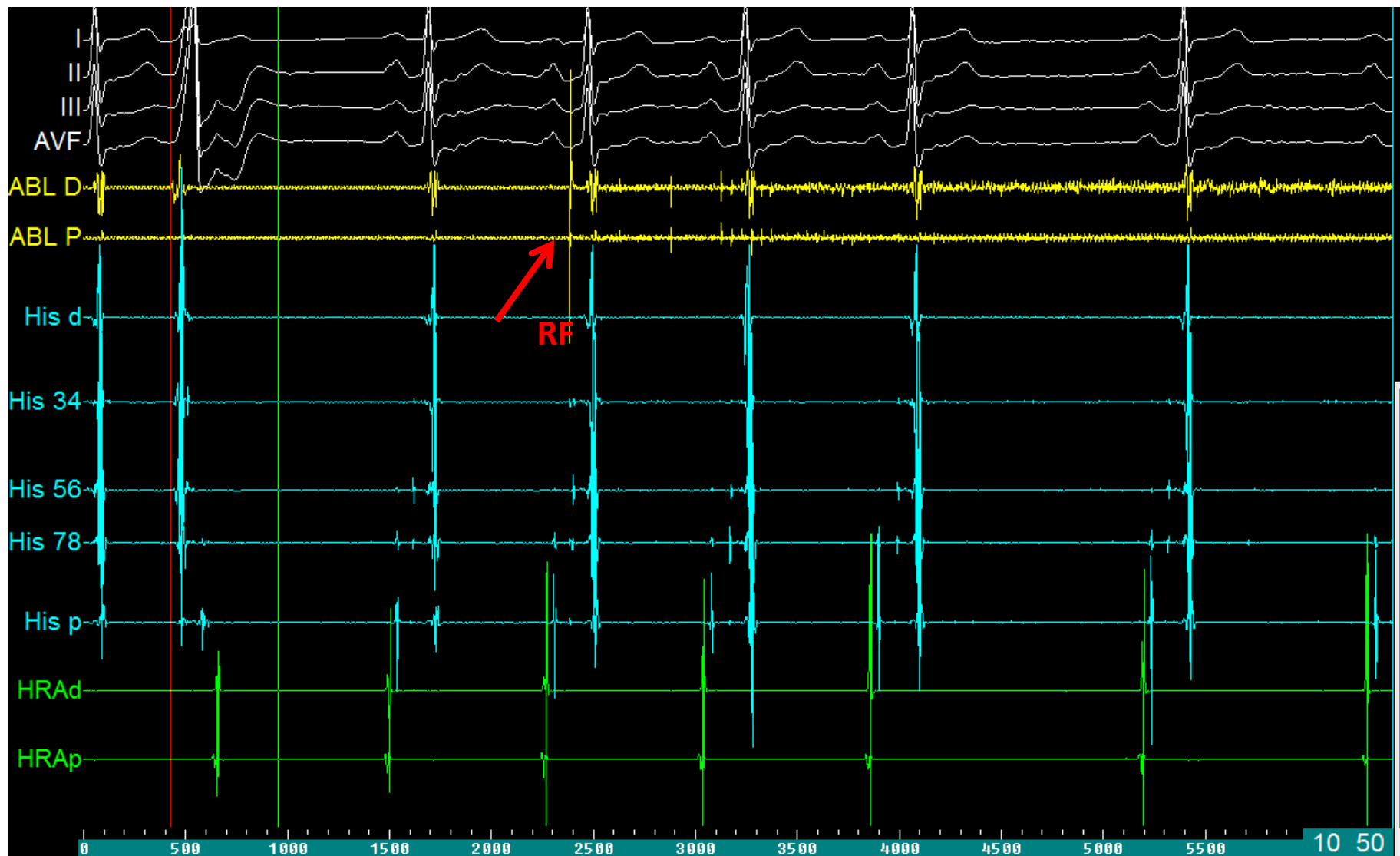








Patient	Last File	Time	Online	Stopwatch	ECG notch	INT notch	Disk Free [Mb]	T	dT	StoreOf
TASLAK	TASLAK HALİL	01:59	00:05	00:05:40			2210	1796	28	

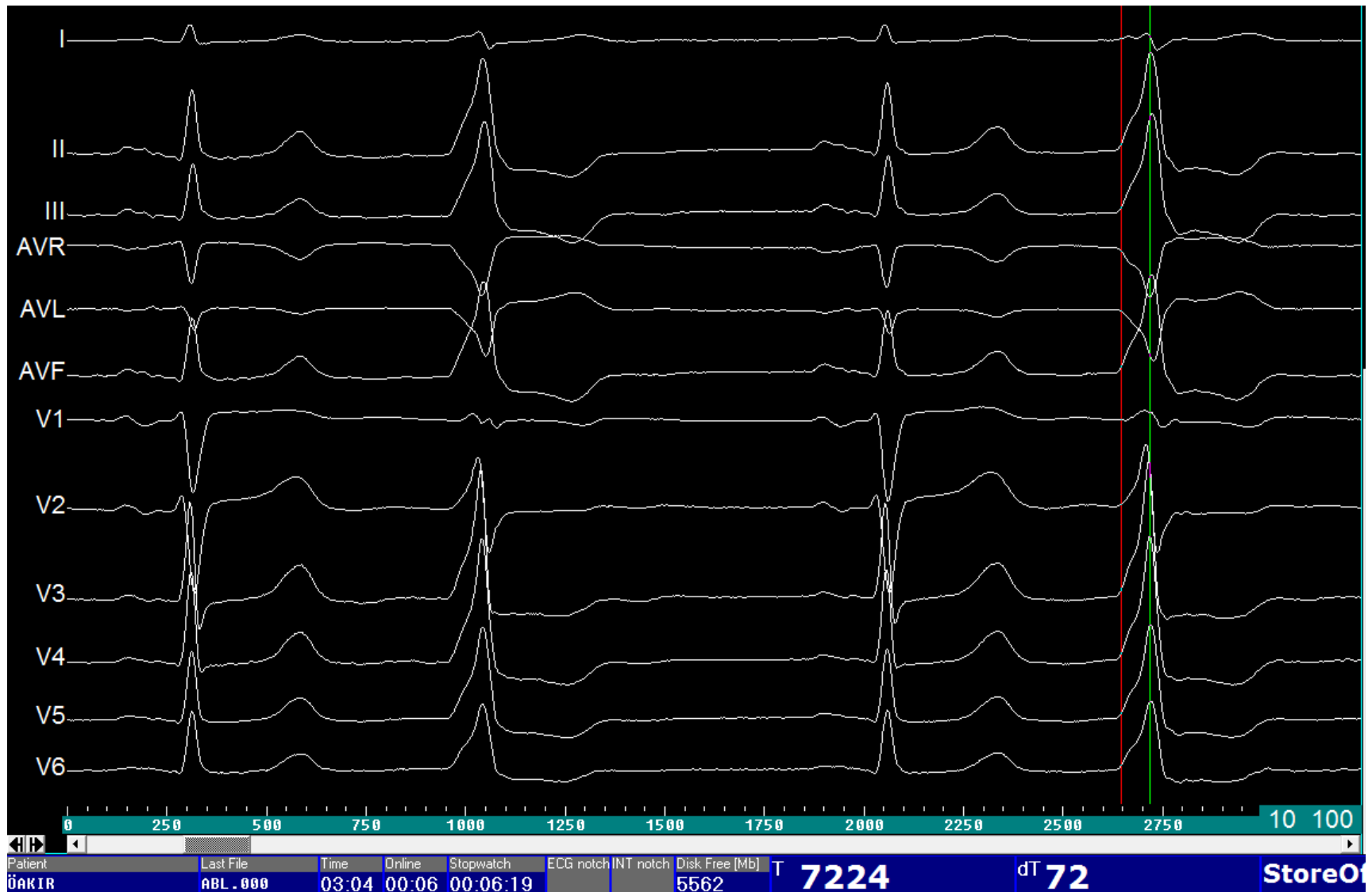


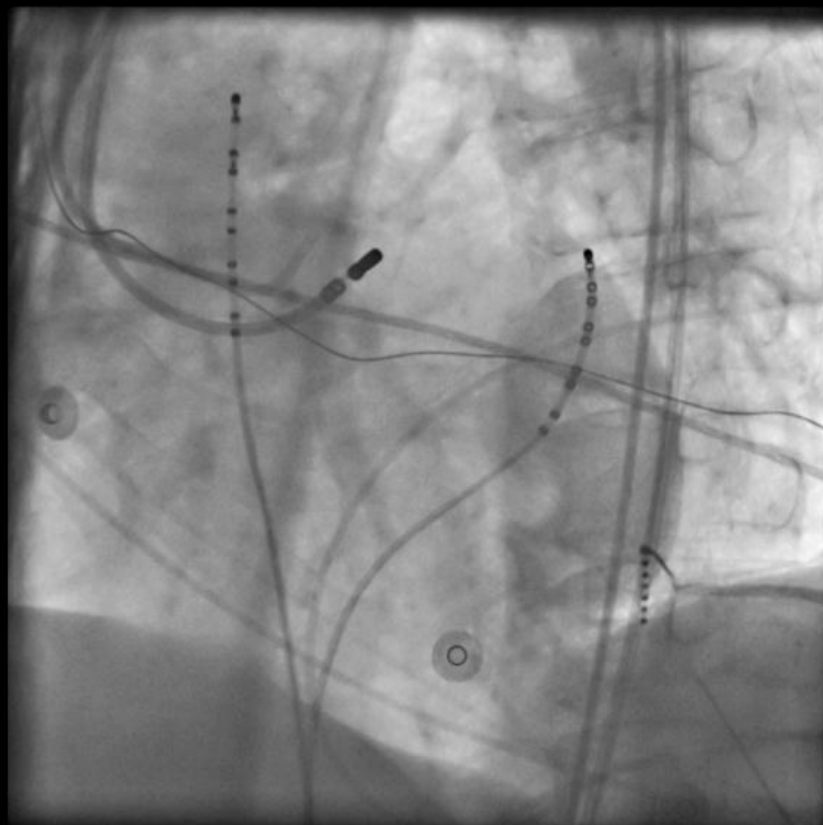


Olgu-5

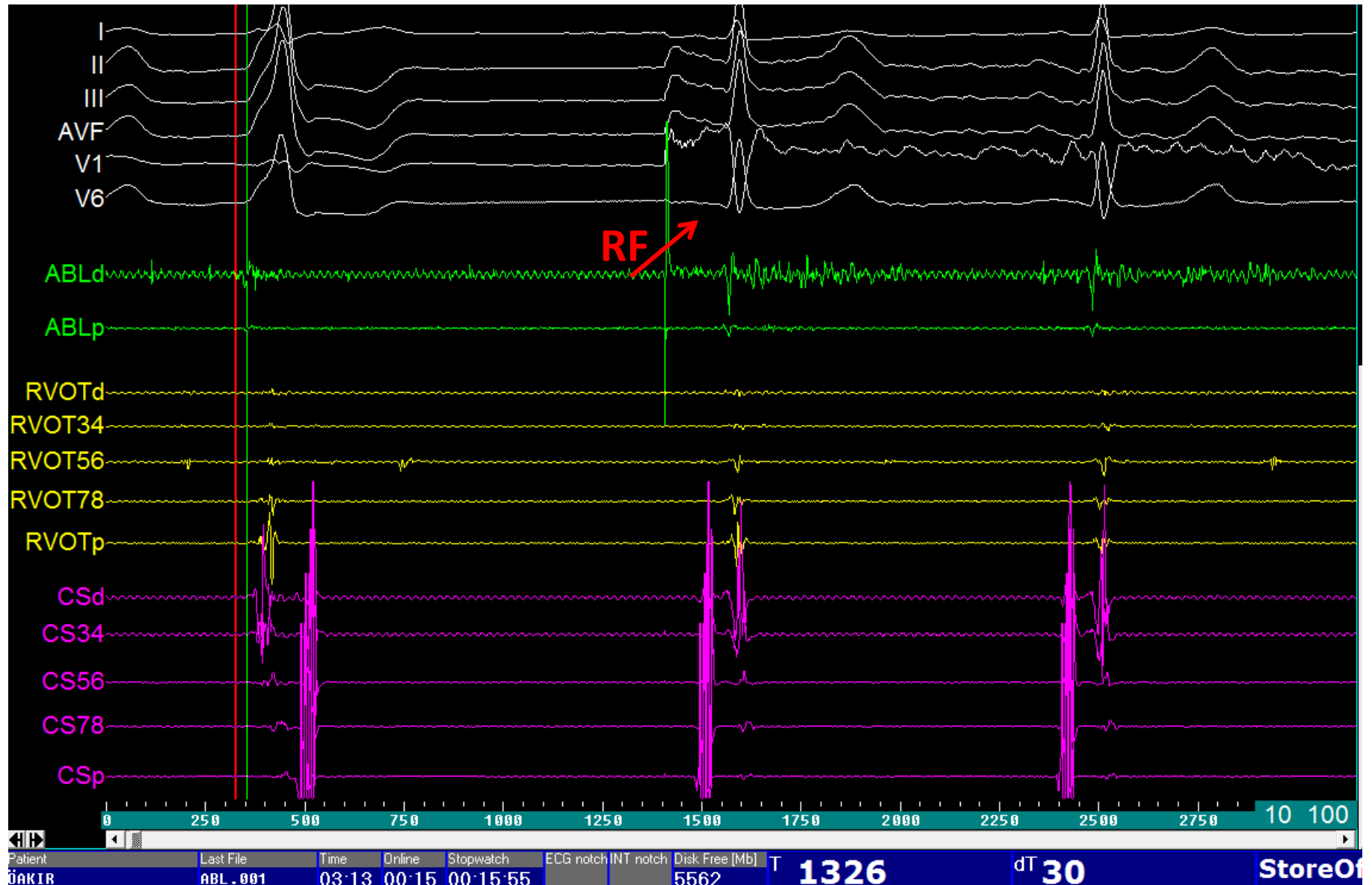
- 25 yaşında erkek hasta
- EKO: LVEF değeri %50 (52/41). Kapak fonk.normal
- 1 yıldır çarpıntı şikayeti var
- İlaç tedavisi (BB, KKB, Propafenon) etkisiz
- 1 kez başarısız ablasyon öyküsü var

Olgu-5

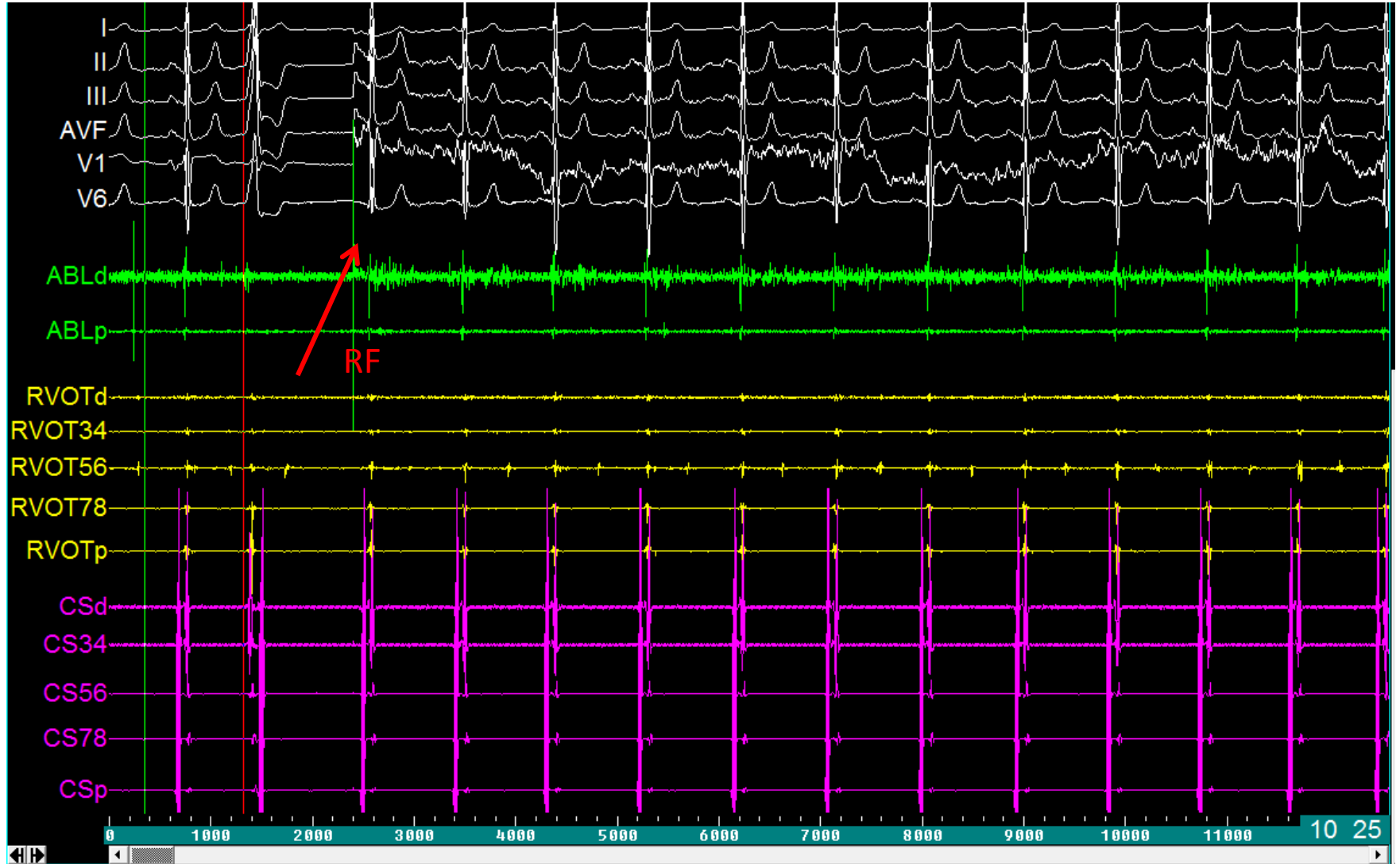




LCC



İlk RF ile birlikte VES kayboldu

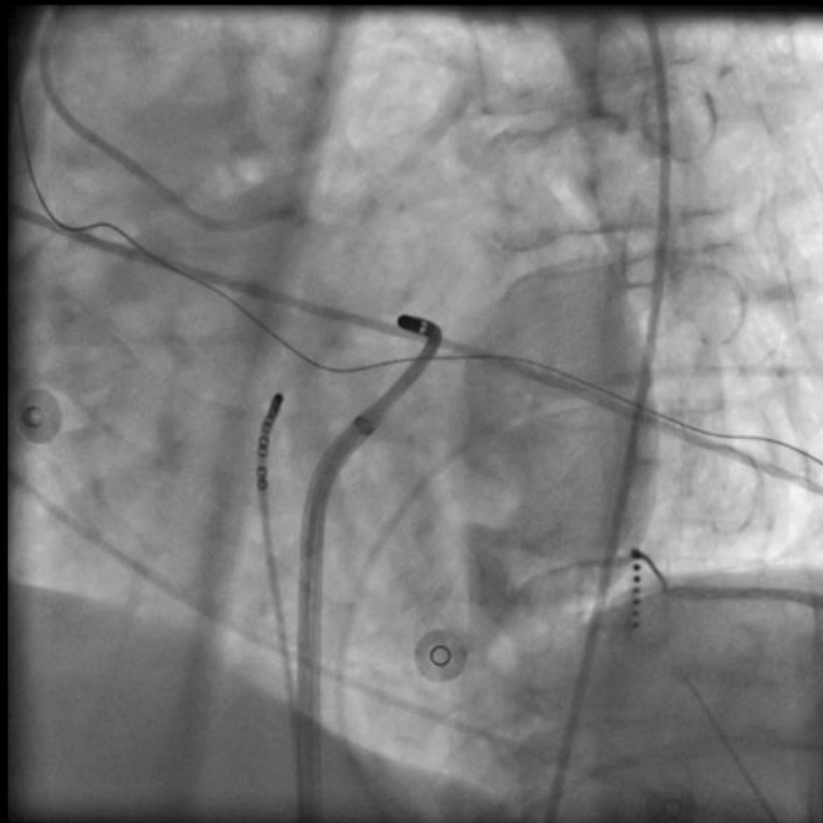


Ancak 5 dk sonra VES'ler tekrar
nüks etti

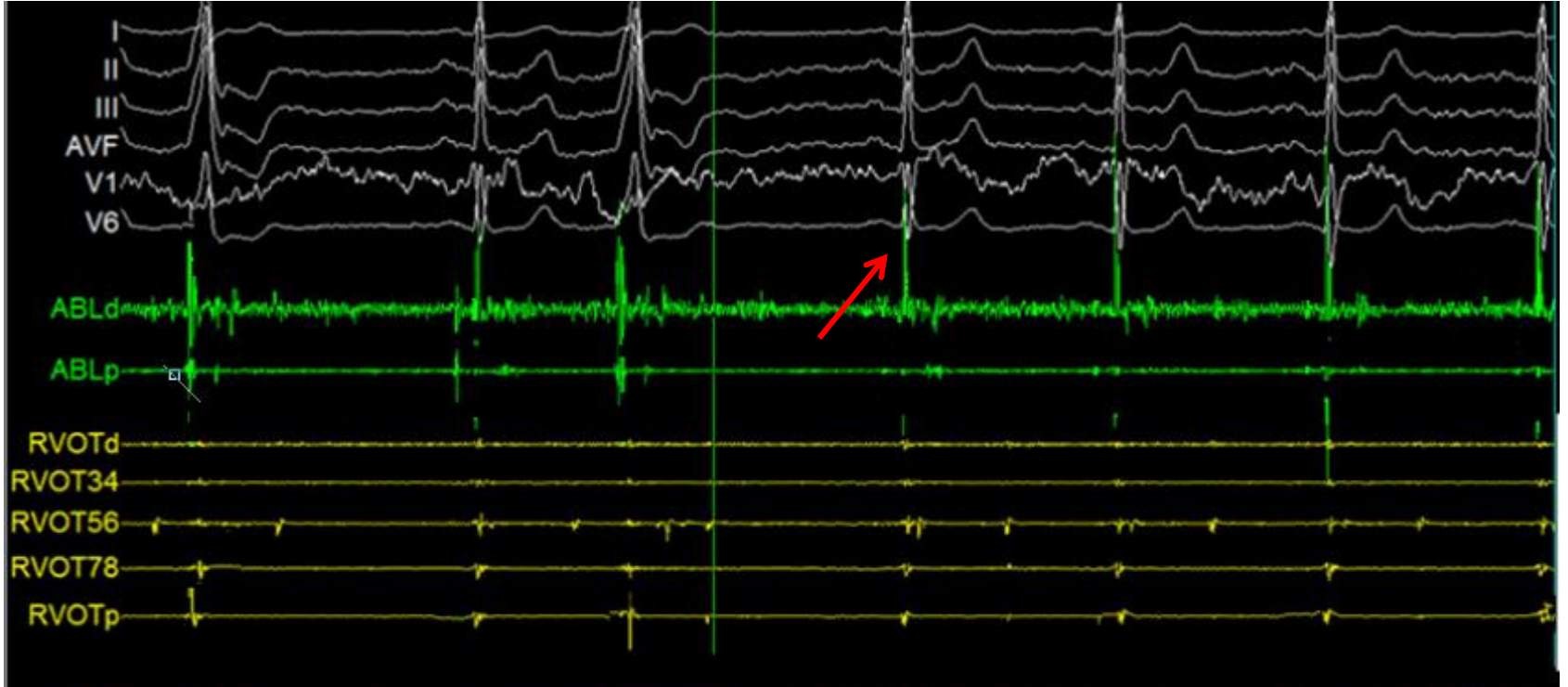
- Aynı noktaya 5-6 RF uygulaması daha yapıldı....ancak her defasında 3-5 dk içinde tekrar nüks gözlemlendi

Transeptal yol ile
anterograd olarak

LCC altına yaklaşmaya karar verildi.



Transeptal yolla kapak altına ulaşıldı.
(kayıt başabaş)



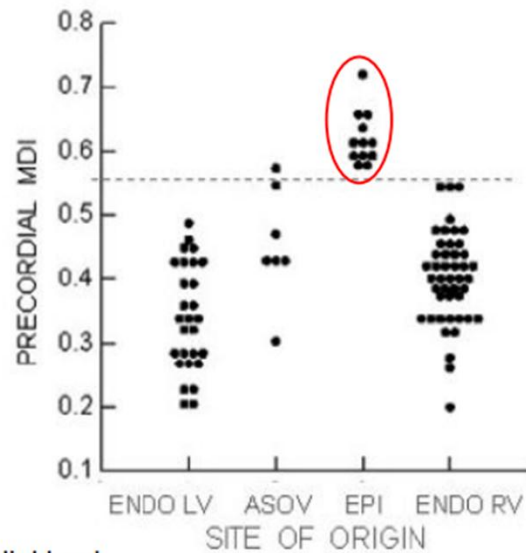
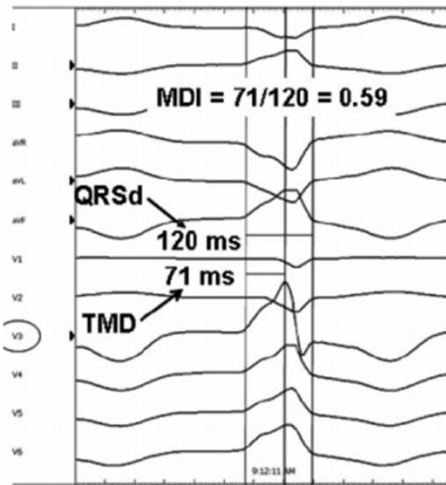
Yine de Enerji verildi ve yaklaşık 6 sn
sonra VES kayboldu (ok)



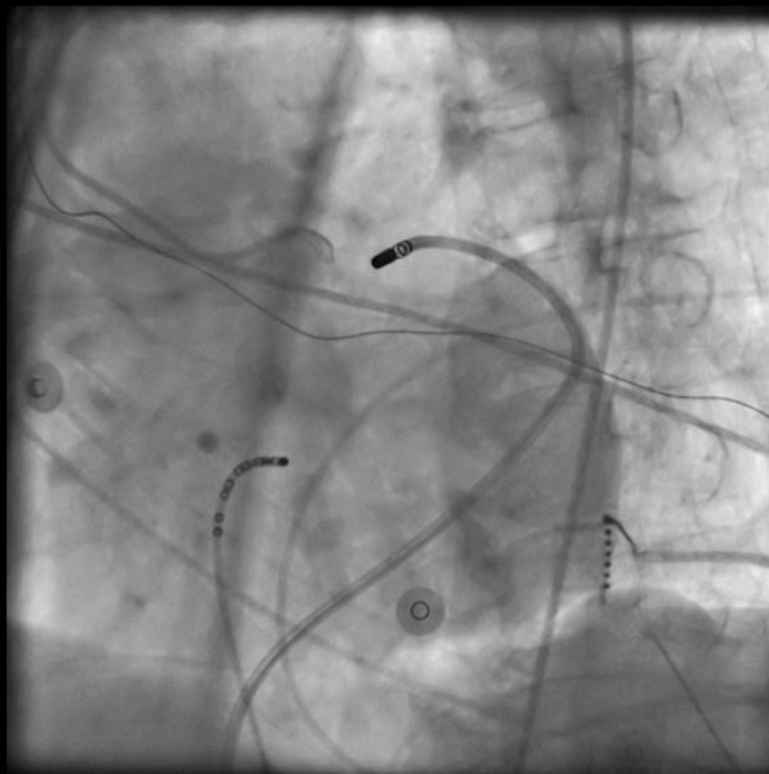
Ancak 15-20 dk sonra VES'ler tekrar nüks etti

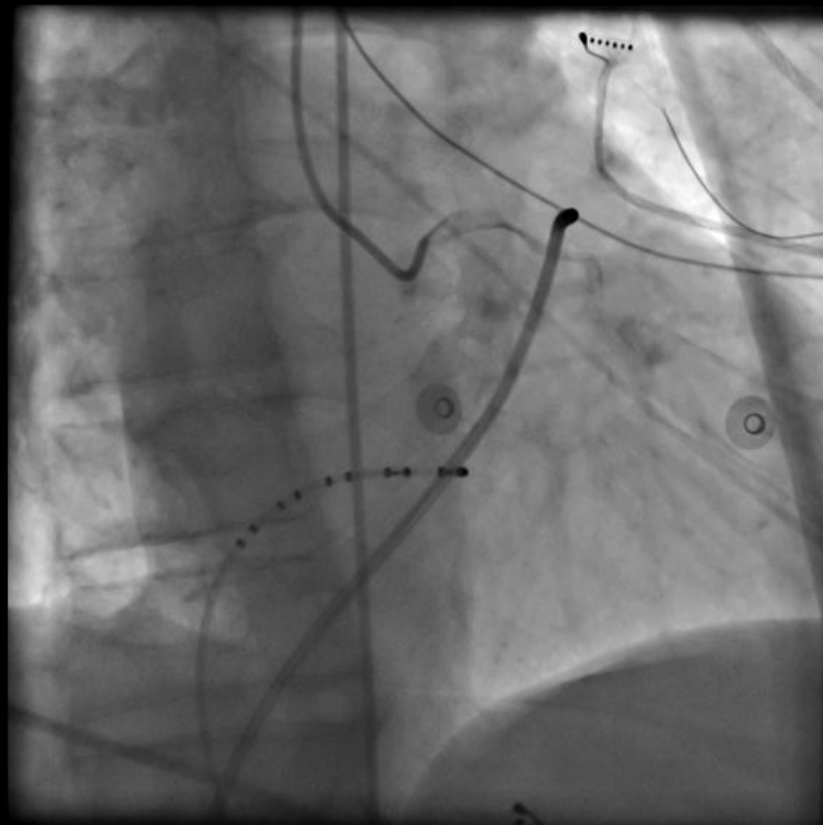
Bunun üzerine odağın epikardial olabileceği düşünülerek CS içinden aynı bölgeye ulaşmaya karar verildi

- Precordial MDI >0.55 reliably identified EPI VT.

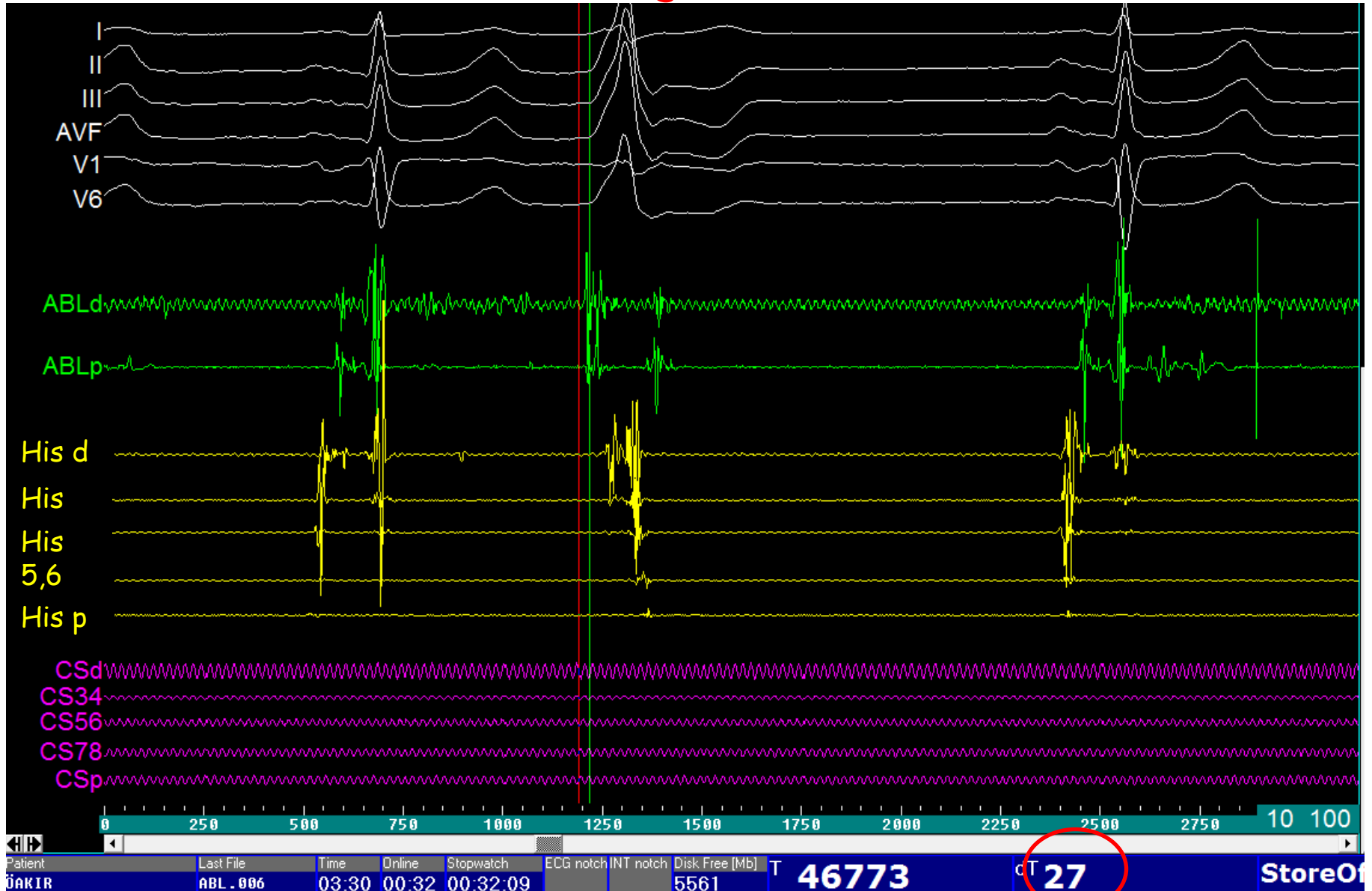


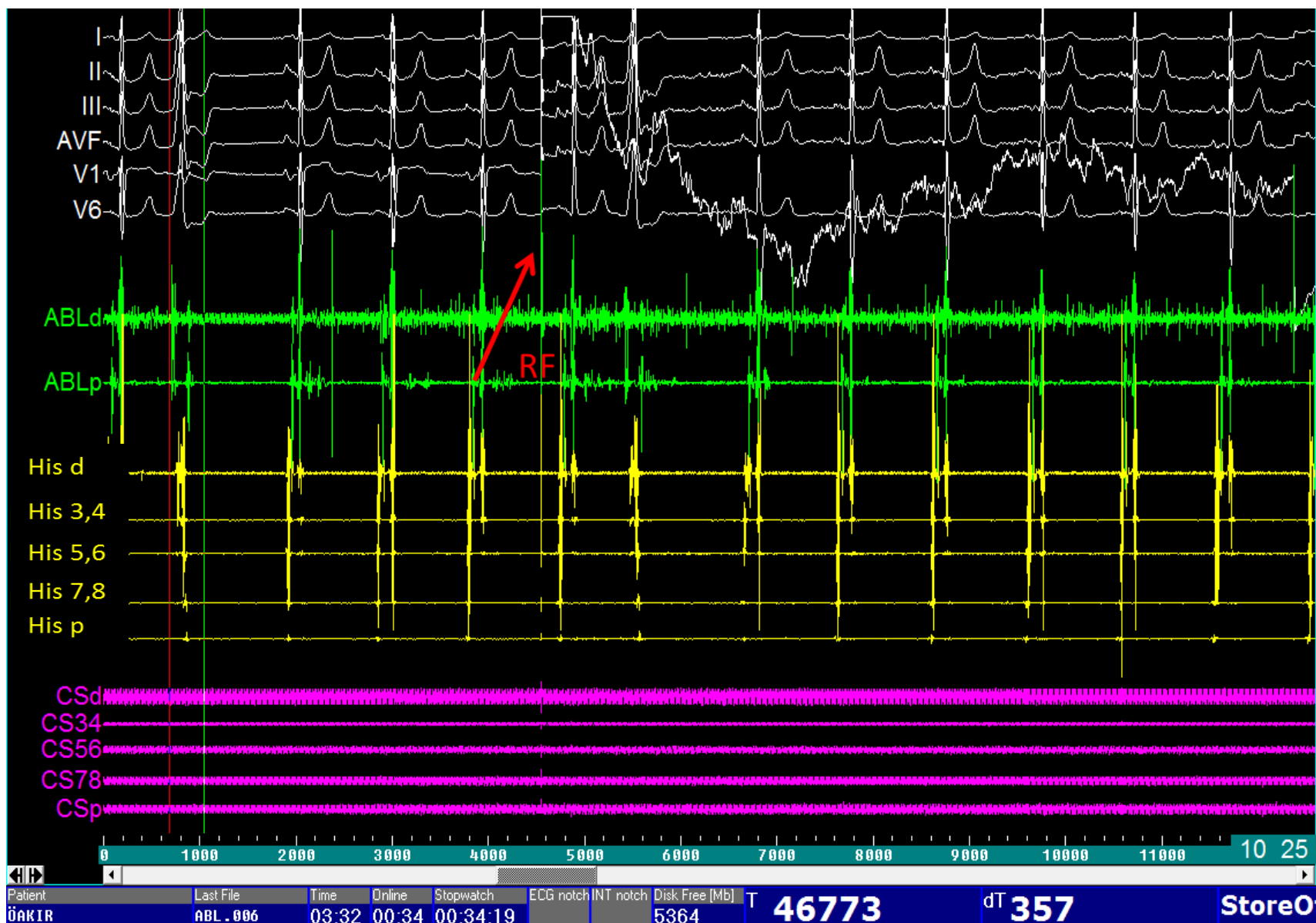
MDI : the maximum deflection index
TMD: time to maximum deflection in precordial lead





CS içinden





FOR NIHON KOHDEN

Name: 2-140

Male

Birth Date:

Years

Medication: FOR NIHON KOHDEN

Apr-25-2014 5:14 AM

cm

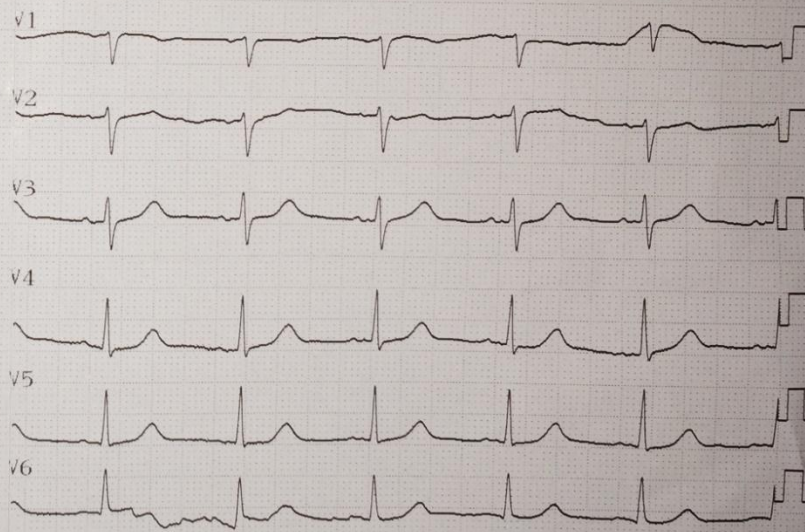
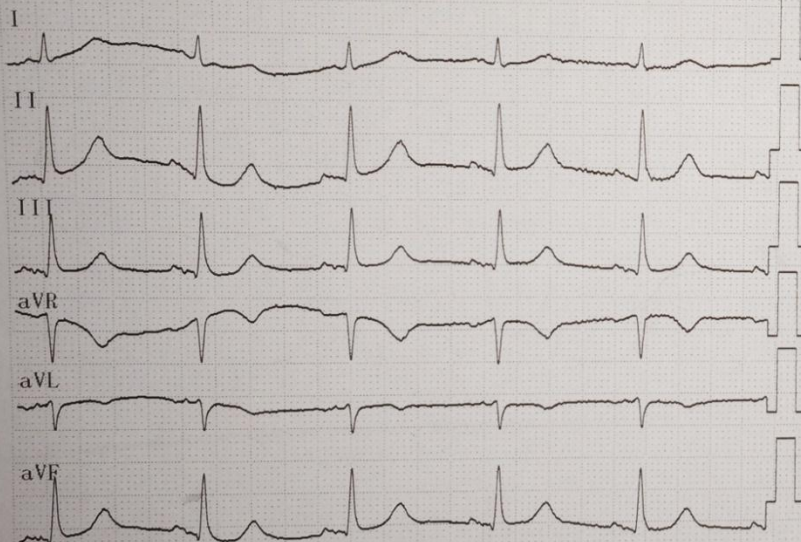
kg

mmHg

70 bpm

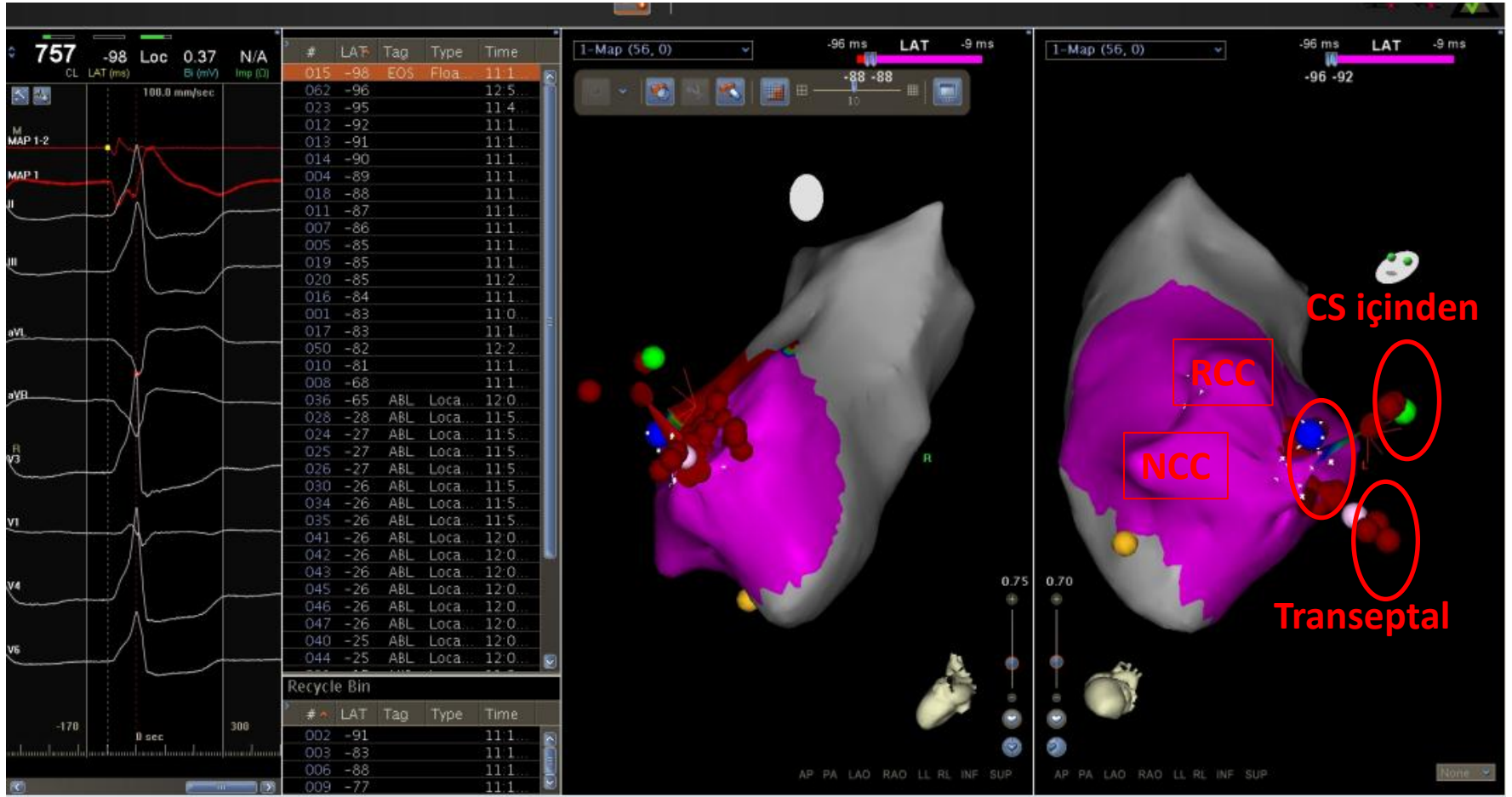
10 mm/mV 25 mm/s Filter: H50 d 35 Hz

5 mm/mV



1250K 04-01 03-02 Dept.:

Exam:



Başarısız ablasyon nedenleri

- Hatalı mapping
- VT indüklenememesi
- Kateter stabilitesinin kötü olması
- Farklı VT odakları
 - PV, Anulus, ParaHisian
 - Epikardial
- Birden fazla VT morfolojisi

Çıkış yolu taşikardilerde EKG'den yola çıkarak ablasyon yaklaşımı

- **Mappinge Tranzisyon zonu**
 - V1-2'de ise direkt LVOT'dan başlanmalı (%100 spesifite)
 - V4-6 ise RVOT'dan başlanmalı (%100 spesifite)
- **Tranzisyon zonu V3'de ise sırasıyla;**
 - RVOT (%60)
 - Pulmoner arter
 - Koroner Sinüs distali (Great kardiyak ven ve distali)
 - Atriyal Cusp'lar: Özellikle sağ taraftan His kaydında erken aktivasyon varsa RCC veya NCC öncelikli düşünülmeli
 - Aorta mitral bileşke

Çıkış yolu taşikardi ablasyonunda dikkat edilmesi gereken noktalar

- Aortik cusp VT ablasyonunda
 - ◆ Koroner arterlerin görüntülenmesi önemlidir: Gerekiyorsa RF öncesi ve sonrasında KAG
 - ◆ Isı ve enerji düşük tutulmalıdır: 20-30 W aralığında, mümkünse irrigasyonlu kateter ve max 50 derece ısı kontrolünde
 - ◆ RCC ve NCC ablasyonlarında AV iletinin yakın takibi
- RVOT bölge ablasyonlarında da yine koroner arter komşuluğu nedeniyle dikkat etmeliyiz

Sabrınız için teşekkürler

Derhal mantıklı
bir açıklama
yapılmasını bekliyorum!

