

PAF ABLASYONU SONRASI REKÜRRENSLERİ OLAN ANCAK PULMONER
VENLERİ İZOLE OLAN HASTALARDA YAKLAŞIM

SÜPERİOR VENA KAVA İZOLASYONU

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NON-PV TRIGGERS

- **Süperior vena kava**
- Posterior duvar
- Koroner sinus
- Marshall ligament
- İnteratrial septum
- Sol atrial appendiks
- Krista terminalis

NON-PV TRIGGERS

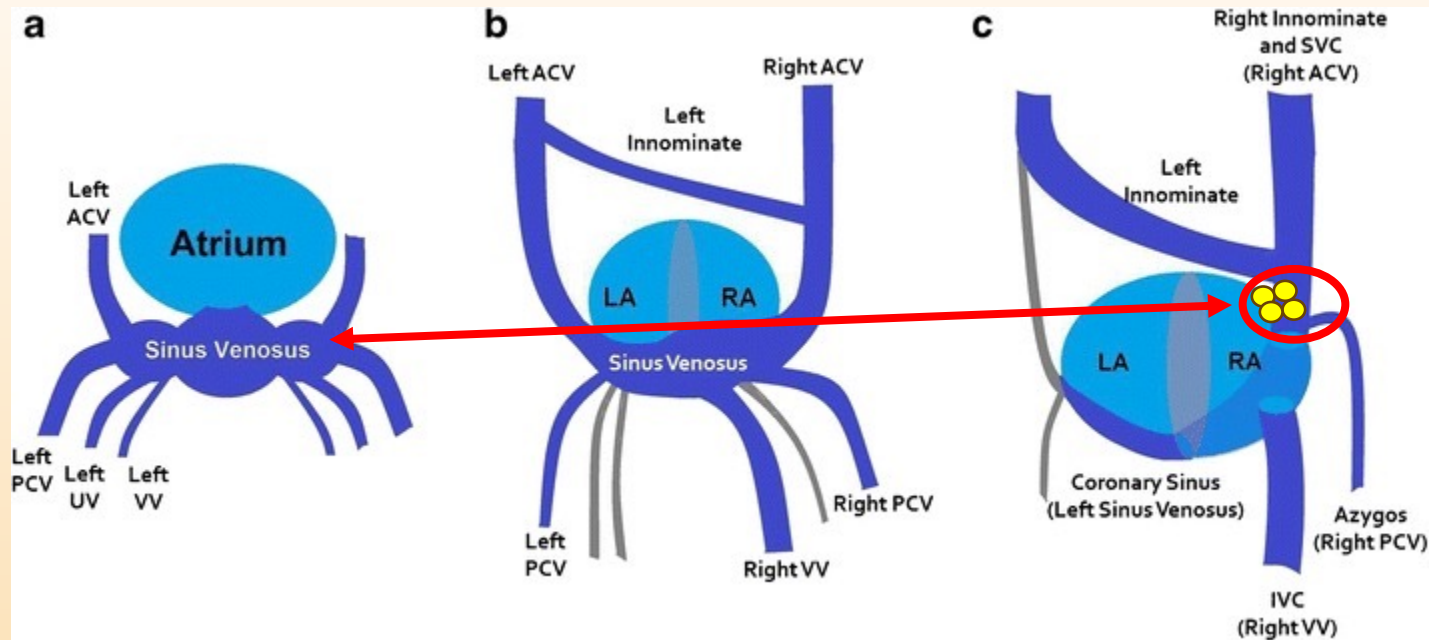
- Tetikleyici ektopik odak varsa

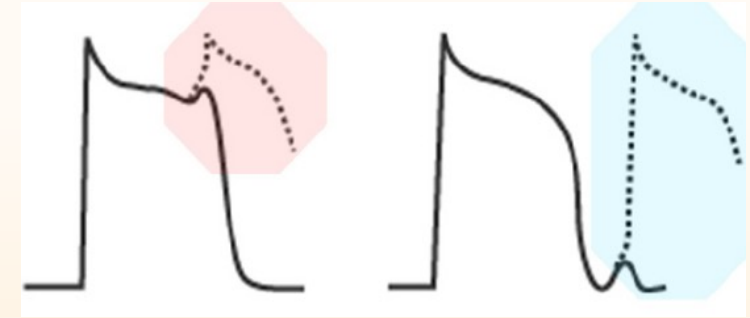
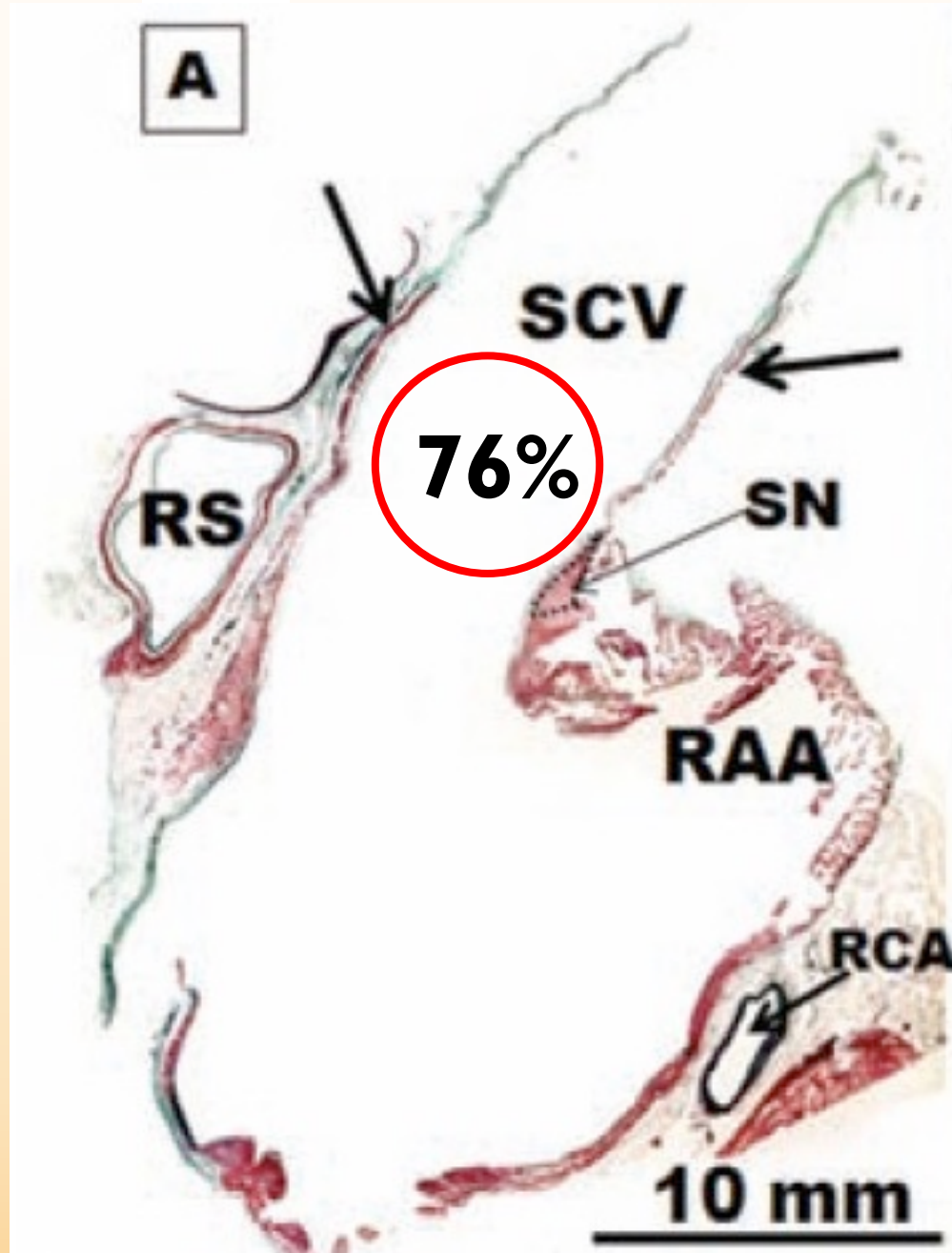
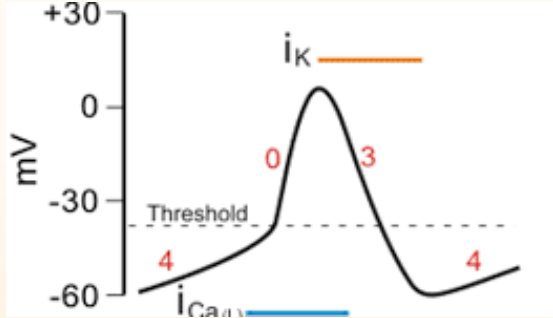


- Tetikleyici ektopik odak yoksa?

Ampirik SVC ablasyonu yapalım mı?

EMBRIYOLOJİ





13 mm uzunluk, 47 mm
1.2 mm kalınlık

SVC- TETİKLEDİĞİ PAF İNSİDANSI

- **%6** (Tsai CF, Circulation. 2000;102(1):67–74.)
- **%12.9** (Lee SH, J Am Coll Cardiol. 2005;46(6):1054–1059.)
- **%9.7** (Zhao Y, Heart Rhythm. 2016;13(1):141–149)

KİMLERDE SVC-TETİKLENMİŞ AF?

- Genç
- Obez
- Uyku apnesi olanlar
- Küçük sol atriyum
- Yapısal kalp hastalığı olmayan
- Hipertansiyonu olmayan

PAF


Long-standing persistan AF → %0.98

AMPIRİK SVC İZOLASYONU

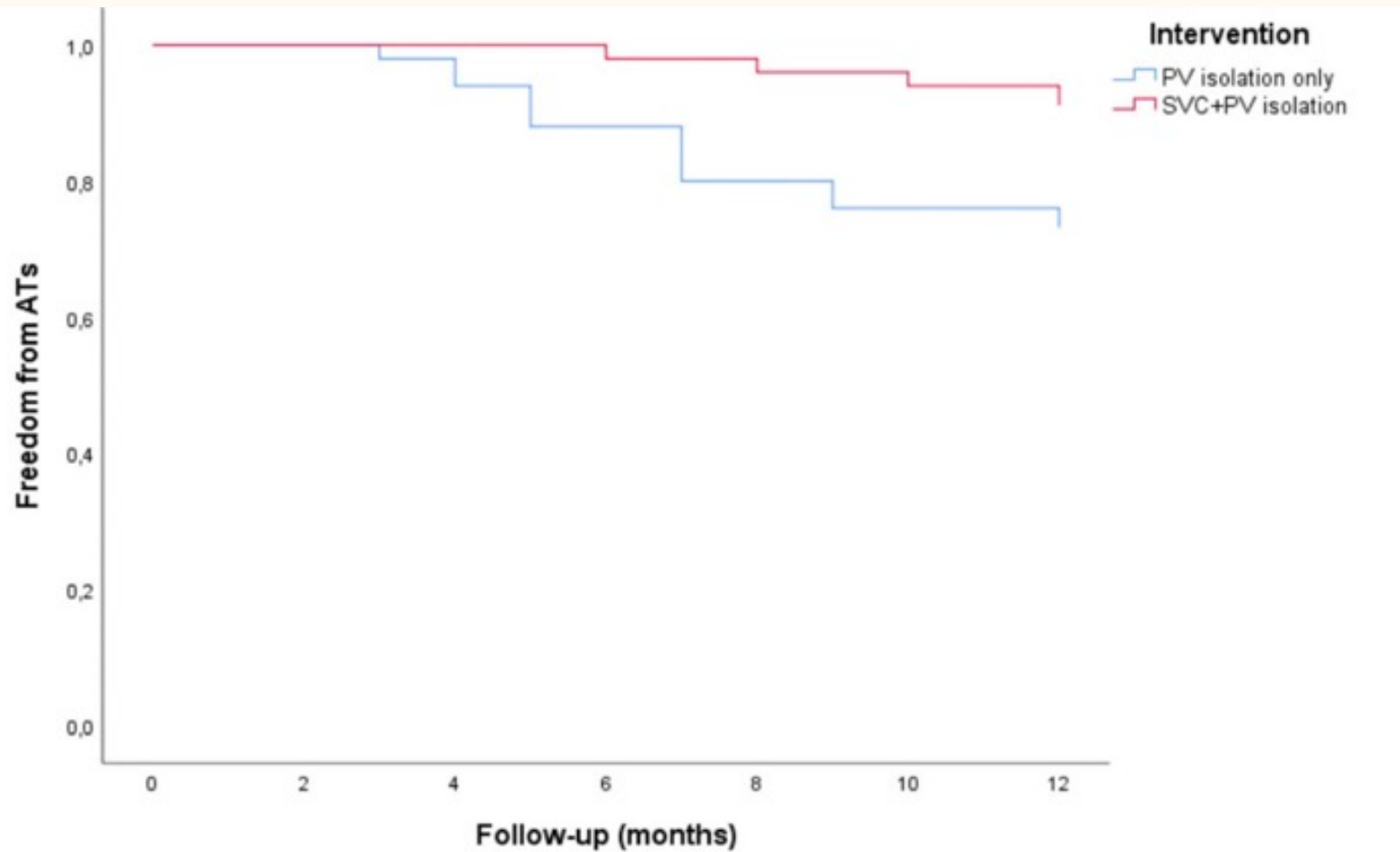
Journal of Interventional Cardiac Electrophysiology (2021) 62:579–586
<https://doi.org/10.1007/s10840-020-00932-6>



Comparison between superior vena cava ablation in addition to pulmonary vein isolation and standard pulmonary vein isolation in patients with paroxysmal atrial fibrillation with the cryoballoon technique

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	PVI and SVC isolation (<i>n</i> = 50)	PVI alone (<i>n</i> = 50)	<i>p</i> value
Males	33 (66.0%)	35 (70.0%)	0.83
Mean age	54.9 ± 11.5	55.7 ± 12.0	0.73
Mean BMI	28.6 ± 5.8	29.9 ± 4.5	0.20
Median CHA ₂ -DS ₂ -VASc score	1 (0–2)	1 (0–2)	0.49
CHA ₂ -DS ₂ -VASc score ≥ 2	15 (30.0%)	23 (46.0%)	0.15
Arterial hypertension	17 (34.0%)	24 (48.0%)	0.22
Diabetes mellitus	5 (10.0%)	6 (12.0%)	0.99
Dyslipidemia	13 (26.0%)	18 (36.0%)	0.38
Coronary artery disease	5 (10.0%)	4 (8.0%)	0.99
Valvular heart disease**	10 (20.0%)	10 (20.0%)	0.99
TIA	3 (6.0%)	4 (8.0%)	0.99
Normal LVEF*	45 (90%)	39 (78%)	0.17
Mean indexed LA volume	33.0 ± 8.7	32.7 ± 9.3	0.86
Beta-blocker	13 (26.0%)	18 (36.0%)	0.38
Class Ic anti-arrhythmic	22 (44.0%)	25 (50.0%)	0.68
Class III anti-arrhythmic	8 (16.0%)	5 (10.0%)	0.99
Oral anticoagulant	31 (62.0%)	29 (58.0%)	0.83



Log-rank test: $p=0.017$, HR=0.31, 95%CI=0.13-0.82

Cox regression: $p=0.026$, HR=0.31, 95%CI=0.11-0.87

	No ATs recurrence	With ATs recurrence
Standard PVI only	36 (72%)	14 (28%)
SVC + PV isolation	45 (90%)	5 (10%)

Fisher's exact test: $p = 0.039$, OR = 0.80, 95%CI = 0.63–0.96
 Binary logistic regression: $p = 0.027$, OR = 0.28, 95%CI = 0.09–0.86

AMPIRİK SVC İZOLASYONU

Impact of Systematic Isolation of Superior Vena Cava in Addition to Pulmonary Vein Antrum Isolation on the Outcome of Paroxysmal, Persistent, and Permanent Atrial Fibrillation

Ablation: Results from a Randomized Study

ANDREA CORRADO, M.D.,* ALDO BONSO, M.D.,* MICHELA MADALOSSO, M.D.,* ANTONIO ROSSILLO, M.D.,* SAKIS THEMISTOCLAKIS, M.D.,* LUIGI DI BIASE, M.D.,†,‡ ANDREA NATALE, M.D.,† and ANTONIO RAVIELE, M.D.*



Empiric SVCI in addition to PVAI has improved the outcome of AF ablation solely in patients manifesting paroxysmal AF.

Impact of an Empiric Isolation of the Superior Vena Cava in Addition to Circumferential Pulmonary Vein Isolation on the Outcome of Paroxysmal Atrial Fibrillation Ablation

Koichiro Ejima, MD, PhD*, Ken Kato, MD, Yuji Iwanami, MD, Ryuta Henmi, MD, Daigo Yagishita, MD, Tetsuyuki Manaka, MD, PhD, Keiko Fukushima, MD, PhD, Kotaro Arai, MD, PhD, Kyomi Ashihara, MD, PhD, Morio Shoda, MD, PhD, and Nobuhisa Hagiwara, MD, PhD



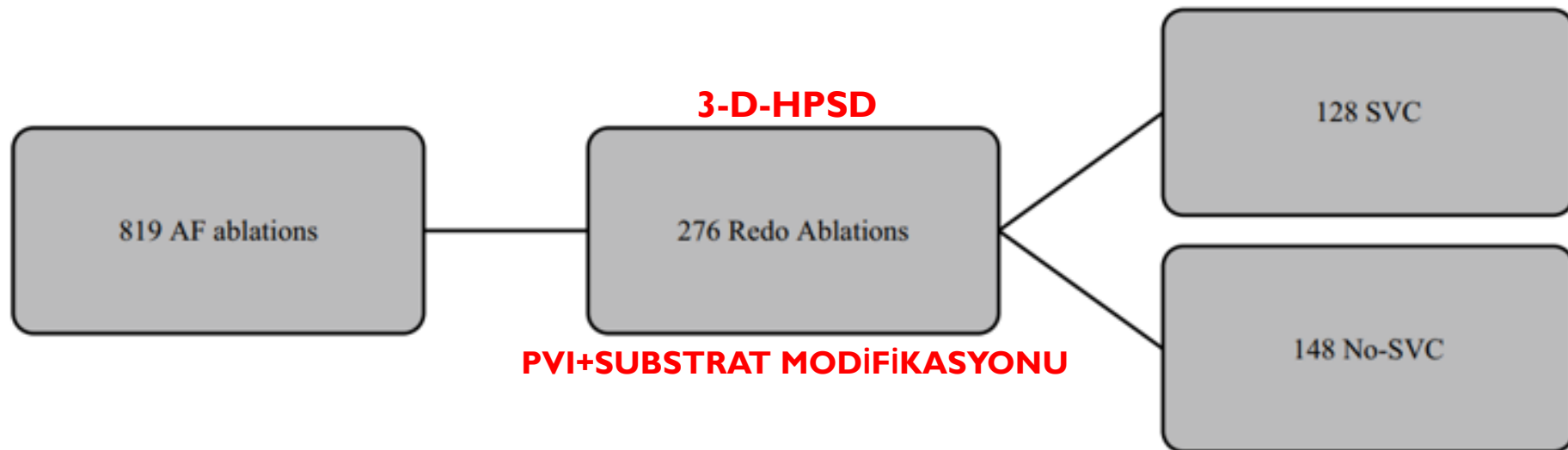
An empiric SVCI in addition to the CPVI improved the outcome of AF ablation

AMPIRİK SVC İZOLASYONU-REDO VAKALAR

Empirical superior vena cava isolation in patients undergoing repeat catheter ablation procedure after recurrence of atrial fibrillation

Gelu Simu^{1,2} · Thomas Deneke¹ · Elena Ene¹ · Karin Nentwich^{1,3} · Artur Berkovitz¹ · Kai Sonne¹ · Philipp Halbfass^{1,3} · Eleni Arvaniti¹ · Christian Waechter³ · Julian Müller^{1,3,4} 

AMPIRİK SVC İZOLASYONU-REDO VAKALAR













Characteristic	Paroxysmal AF (<i>n</i> = 78)			Persistent AF (<i>n</i> = 188)		
	SVC (<i>n</i> = 39; 44%)	No SVC (<i>n</i> = 49; 56%)	<i>p</i> -value	SVC (<i>n</i> = 89; 47%)	No SVC (<i>n</i> = 99; 53%)	<i>p</i> -value
Intrahospital AF recurrence	3 (8)	5 (10)	0.684	14 (16)	10 (10)	0.248
AF recurrence during 3-month blanking period	8 (21)	9 (18)	0.800	17 (19)	13 (13)	0.264
Sinus rhythm at 12 months	29 (74)	34 (69)	0.607	64 (72)	75 (76)	0.548

AF, atrial fibrillation; *SVC*, superior vena cava

AMPIRİK SVC İZOLASYONU-REDO VAKALAR

Role of empirical isolation of the superior vena cava in patients with recurrence of atrial fibrillation after pulmonary vein isolation—a multi-center analysis

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Jan Vognstrup¹ · Nikola Pavlovic⁴  · Sime Manola⁴  · Stefan Osswald^{1,2}  · Michael Kühne^{1,2}  ·
Christian Sticherling^{1,2} 

AMPIRİK SVC İZOLASYONU-REDO VAKALAR

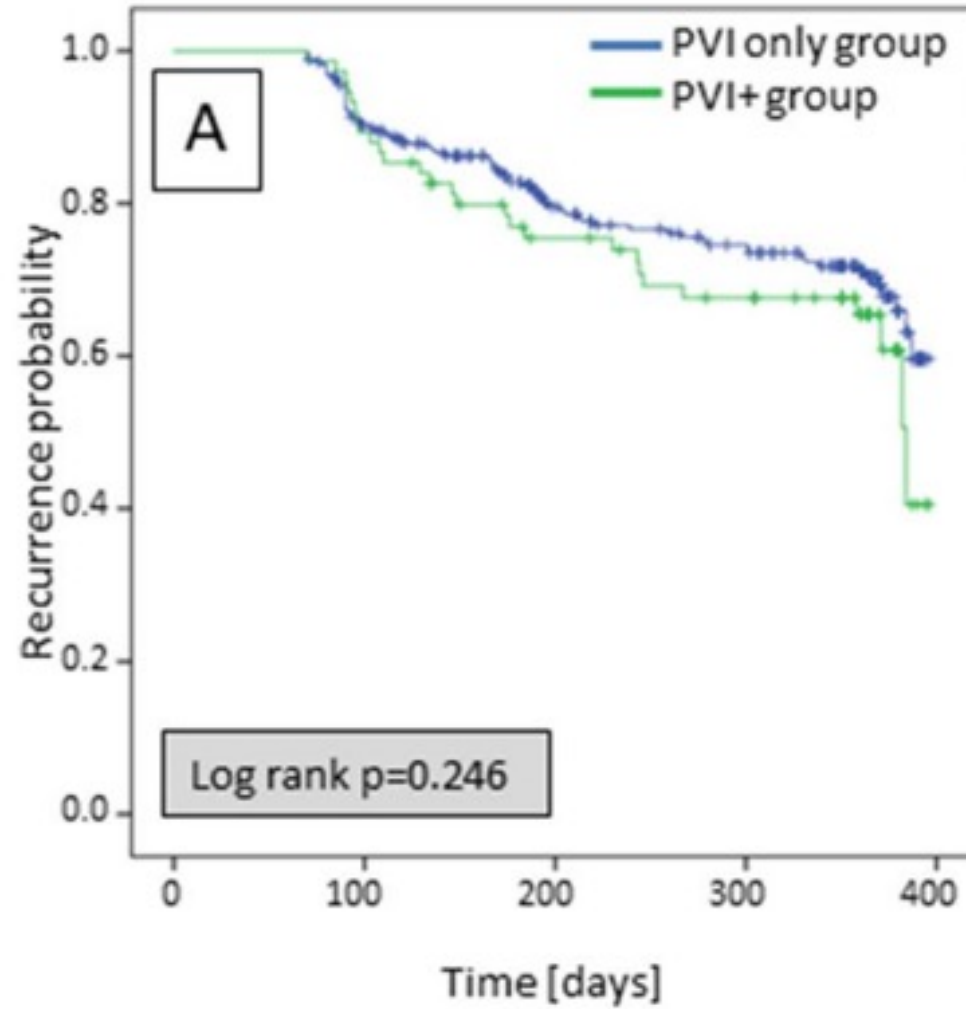
≥2 PV
REKONNEKSİYONU+

1 PV
REKONNEKSİYONU+

Parameter	All (n = 344)	PVI group n = 269	PVI + group n = 75	P-value
Demographics				
Male sex	251 (73%)	195 (72%)	56 (75%)	0.770
Age (years)	60 ± 10 (61)	60 ± 10 (61)	61 ± 9 (62)	0.421
BMI (kg/m ²)	28 ± 4 (27)	28 ± 4 (27)	26 ± 4 (27)	0.006
Paroxysmal AF	228 (66%)	180 (67%)	48 (64%)	0.679

SADECE PVI

PVI+SVCI



Patients at risk

—	269	235	167	141
—	75	67	50	42

AMPIRIK SVC İZOLASYONU-REDO VAKALAR

Effect of Combined Pulmonary Vein and Superior Vena Cava Isolation on the Outcome of Second Catheter Ablation for Paroxysmal Atrial Fibrillation

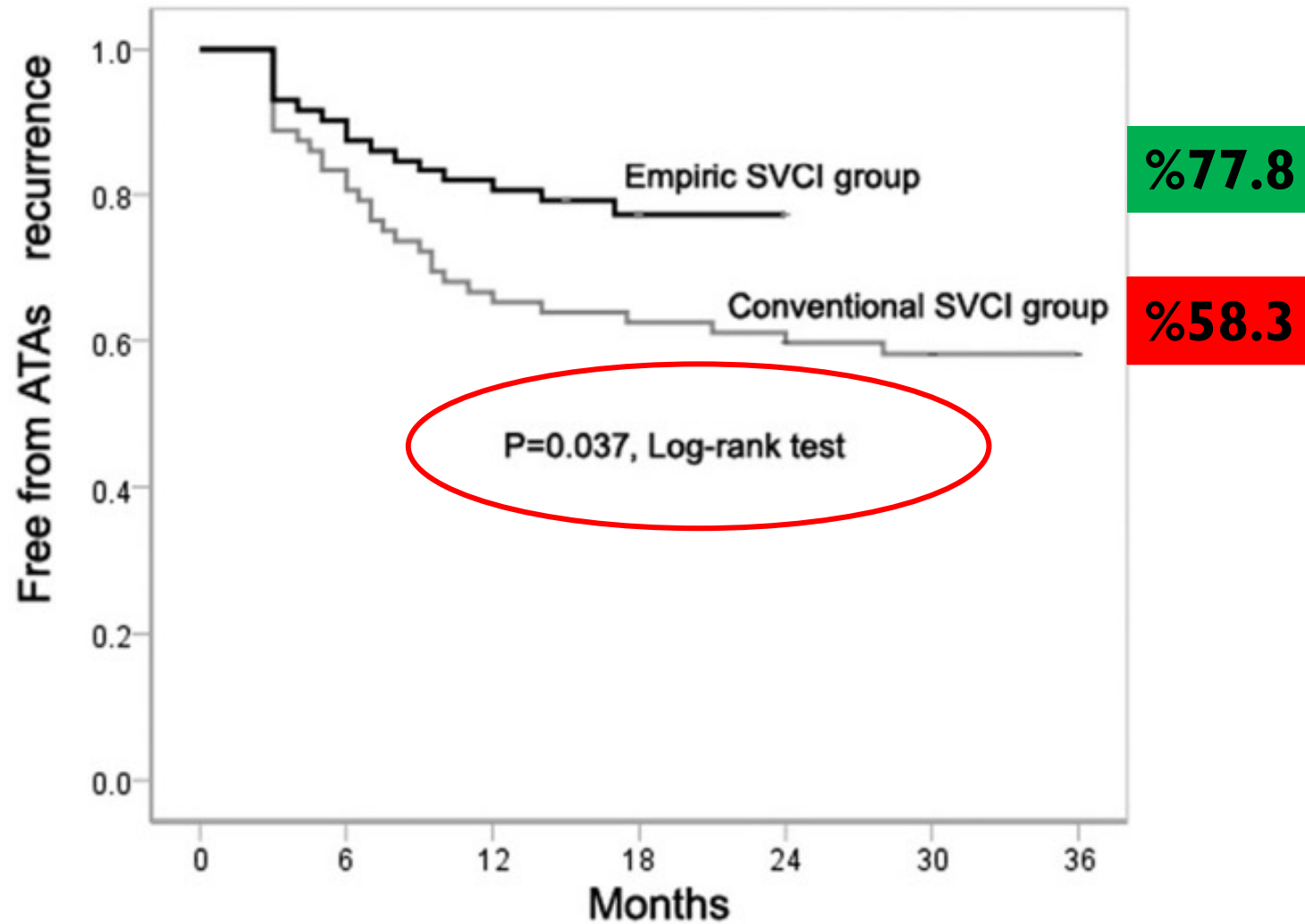


Tao Zhang, MD¹, Yunlong Wang, MD¹, Zhuo Liang, MD¹, Hua Zhao, MD¹, Zhihong Han, MD¹,
Ye Wang, MD¹, Yongquan Wu, MD¹, and Xuejun Ren, MD^{1,*}

Variable	Conventional SVC isolation group (N = 72)	Empiric SVC isolation group (N = 72)	p Value
Age (years)	63.9 ± 10.2	64.1 ± 10.0	0.73
Men	30 (42%)	34 (47%)	0.502
Hypertension	11 (15%)	9 (13%)	0.63
Diabetes mellitus	9 (13%)	8 (11%)	0.796
LVEF (%)	58.3 ± 7.2	58.1 ± 6.0	0.743
Left atrial diameter (mm)	41.7 ± 6.4	43.3 ± 6.0	0.127
paroxysmal AF duration before second procedure (months)	31.6 ± 6.0	32.2 ± 5.9	0.547
CHA ₂ DS ₂ -VASc score	1.6 ± 1.1	1.6 ± 1.1	0.938
BMI (kg/m ²)	25.4 ± 3.2	25.8 ± 2.8	0.441
Coronary artery disease	7 (10%)	5 (7%)	0.546
Prior antiarrhythmic drugs	1.4 ± 0.7	1.5 ± 0.9	0.34
History of cavotricuspid isthmus ablation	13(18%)	16 (22%)	0.533

Data are presented as mean ± SD or n (%).AF = atrial fibrillation; BMI = body mass index; LVEF = left ventricular ejection fraction; SVC = superior vena cava.

6/72



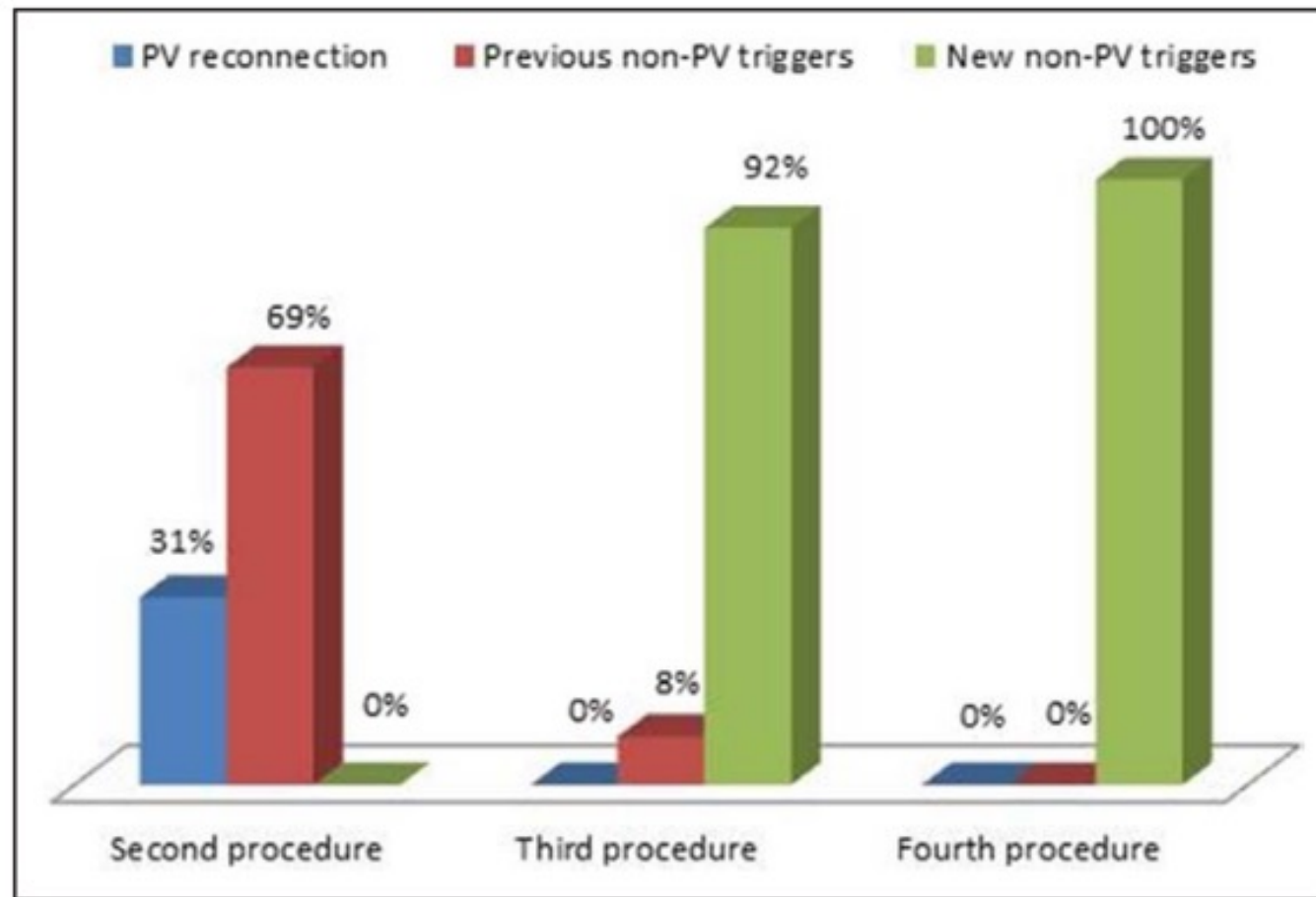
Ort 19 ay takip

Pulmonary Vein Antrum Isolation in Patients With Paroxysmal Atrial Fibrillation More Than a Decade of Follow-Up

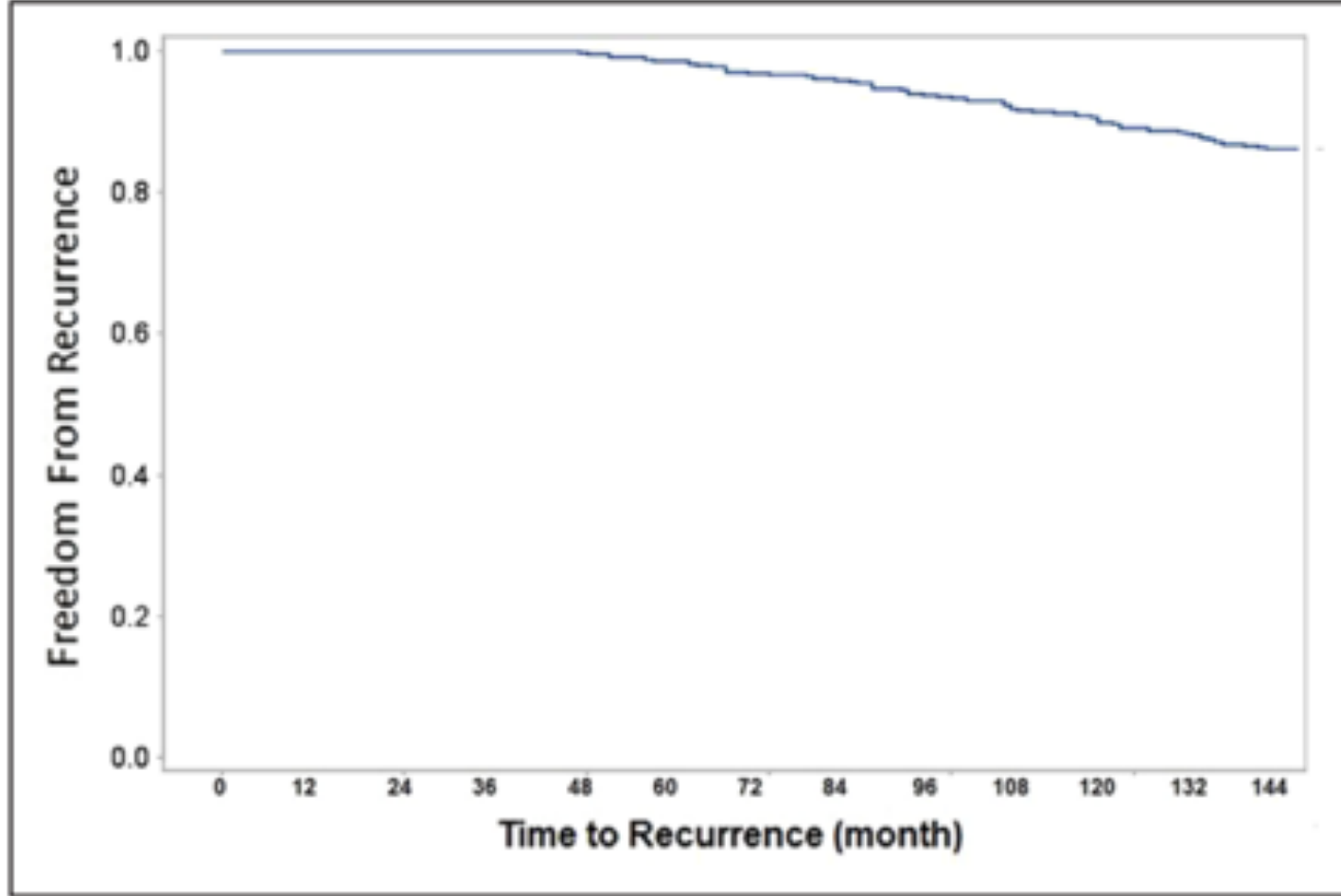
Yalçın Gökoğlan, MD; Sanghamitra Mohanty, MD, MS, FHRS; Mahmut F. Güneş, MD;
Chintan Trivedi, MD, MPH; Pasquale Santangeli, MD; Carola Gianni, MD; Issa K. Asfour, BS;
Rong Bai, MD, FHRS; J. David Burkhardt, MD, FHRS; Rodney Horton, MD, FHRS;
Javier Sanchez, MD; Steven Hao, MD; Richard Hongo, MD; Salwa Beheiry, RN;
Luigi Di Biase, MD, PhD, FHRS; Andrea Natale, MD, FHRS, FESC

Background—We report the outcome of pulmonary vein (PV) antrum isolation in paroxysmal atrial fibrillation (AF) patients over more than a decade of follow-up.

Methods and Results—A total of 513 paroxysmal AF patients (age 54 ± 11 years, 73% males) undergoing catheter ablation at our institutions were included in this analysis. PV antrum isolation extended to the posterior wall between PVs plus empirical isolation of the superior vena cava was performed in all. Non-PV triggers were targeted during repeat procedure(s). Follow-up was performed quarterly for the first year and every 6 to 9 months thereafter. The outcome of this study was freedom from recurrent AF/atrial tachycardia. At 12 years, single-procedure arrhythmia-free survival was achieved in 58.7% of patients. Overall, the rate of recurrent arrhythmia (AF/atrial tachycardia) was 21% at 1 year, 11% between 1 and 3 years, 4% between 3 and 6 years, and 5.3% between 6 and 12 years. Repeat procedure was performed in 74% of patients. Reconnection in the PV antrum was found in 31% of patients after a single procedure and in no patients after 2 procedures. Non-PV triggers were found and targeted in all patients presenting with recurrent arrhythmia after ≥ 2 procedures. At 12 years, after multiple procedures, freedom from recurrent AF/atrial tachycardia was achieved in 87%.



CS (59%),
 Crista terminalis (22%)
 Interatrial septum (17%),
 SVC (13%).
 LAA (10%)



%87
Çoklu işlem başarısı

SVC İZOLASYONU

- SCV-RA bileşkesi 5-10 mm distali
- Sirküler / Pentaray haritalama kateteri
- En erken aktivasyon
- Frenik sinir etkilenmesi

KOMPLİKASYON

- Frenik sinir hasarı
- Sinüs nod disfonksiyonu
- Süperior vena kava stenozu

OLGU

- 57 yaşında kadın hasta F. E.
- 4-5 yıldır çarpıntı şikayeti
- Son 1 yıldır 3-4/ay çarpıntı atağı
- **6 ay önce AF için 3-D haritalama eşliğinde RF ablasyon öyküsü**
- Amiodarone, Propafenon, Sotalol ve beta bloker kullanım öyküsü var.
- EKO: Hafif MY, **LA çapı 43 mm**. LVEF %60. LV çapları normal.

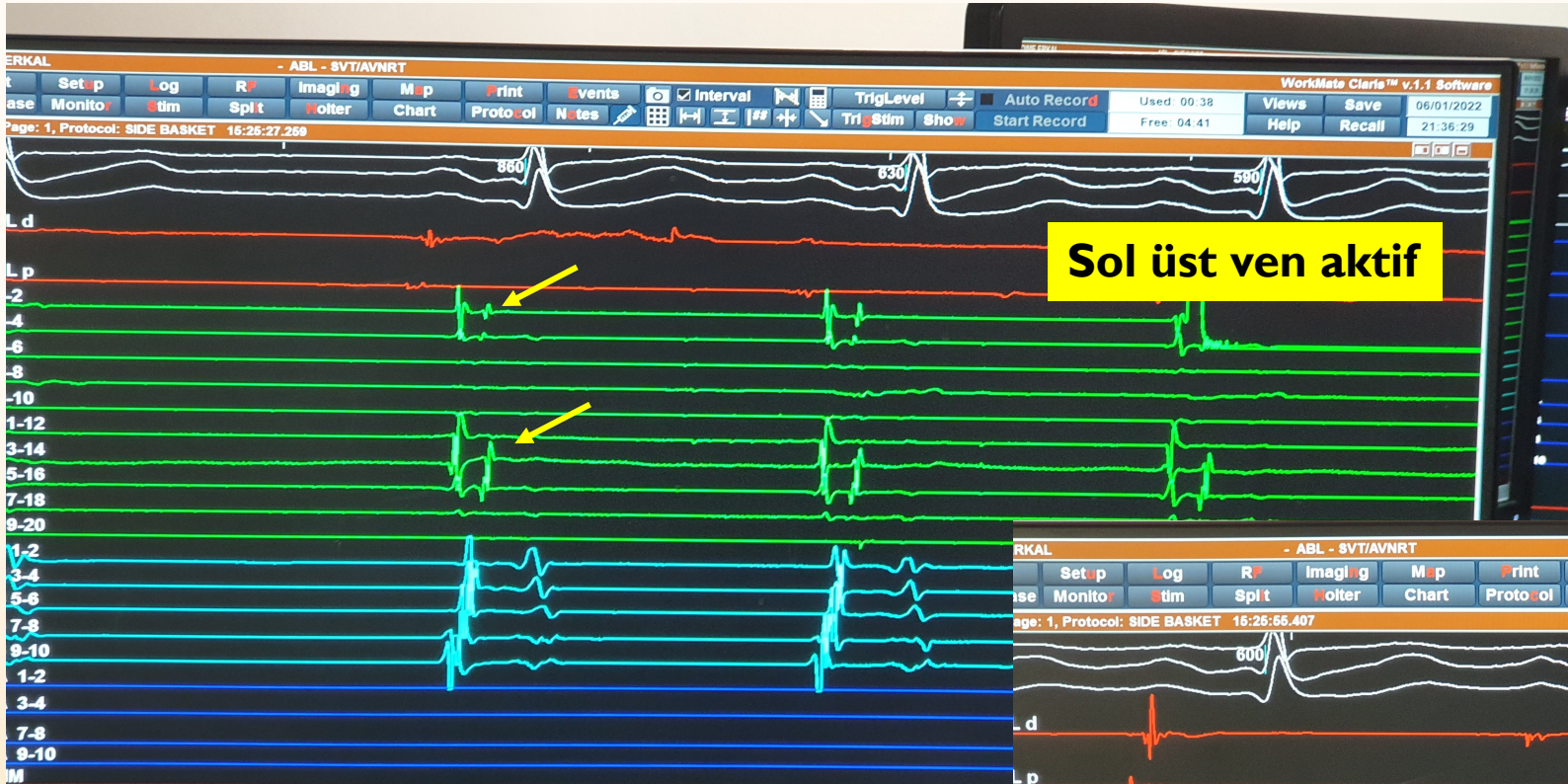


Speed: 25 mm/sec Limb: 20 mm/mV Chest: 20 mm/mV

F 50~ 0.15-150 Hz

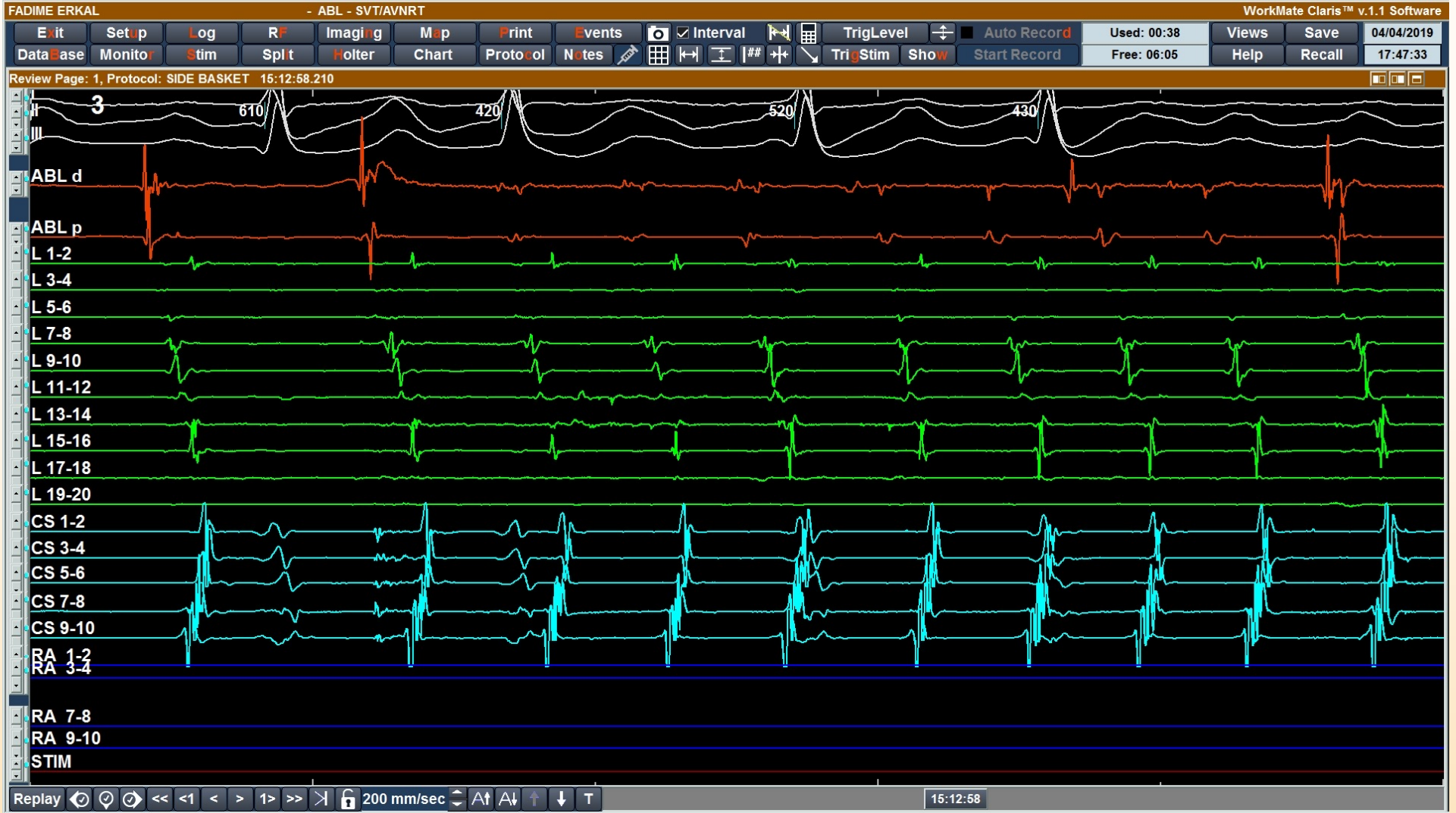
P2

Dev:





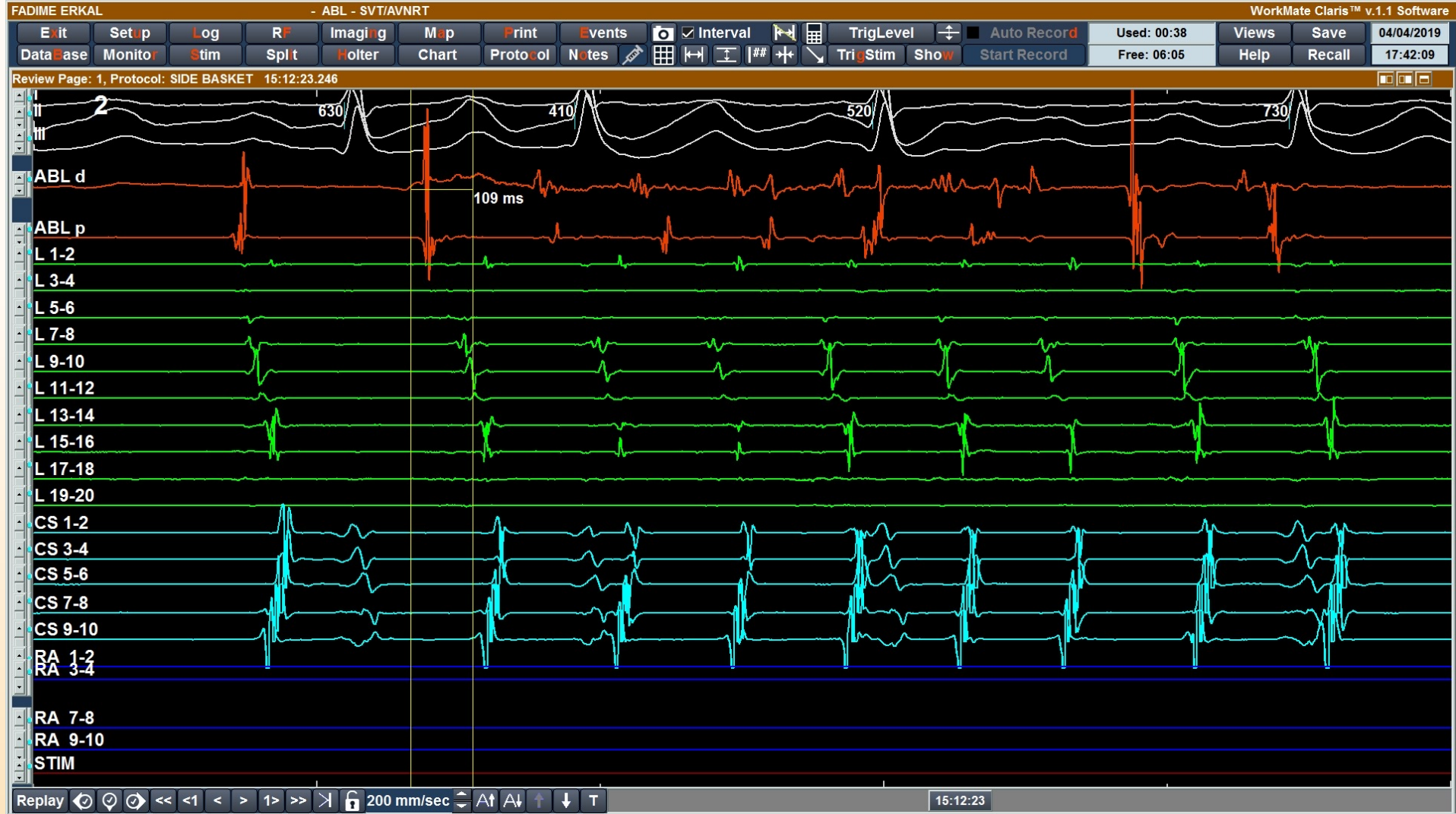
CS prox erken, sirküler kateter LAA'da



Ablasyon kateteri VCS'da



**Taşikardide spontan sonlanma ve tekrar başlama
Ablasyon kateteri VCS'da
Sinüs ve taşikardi sırasında aktivasyon paterni değişmiyor**



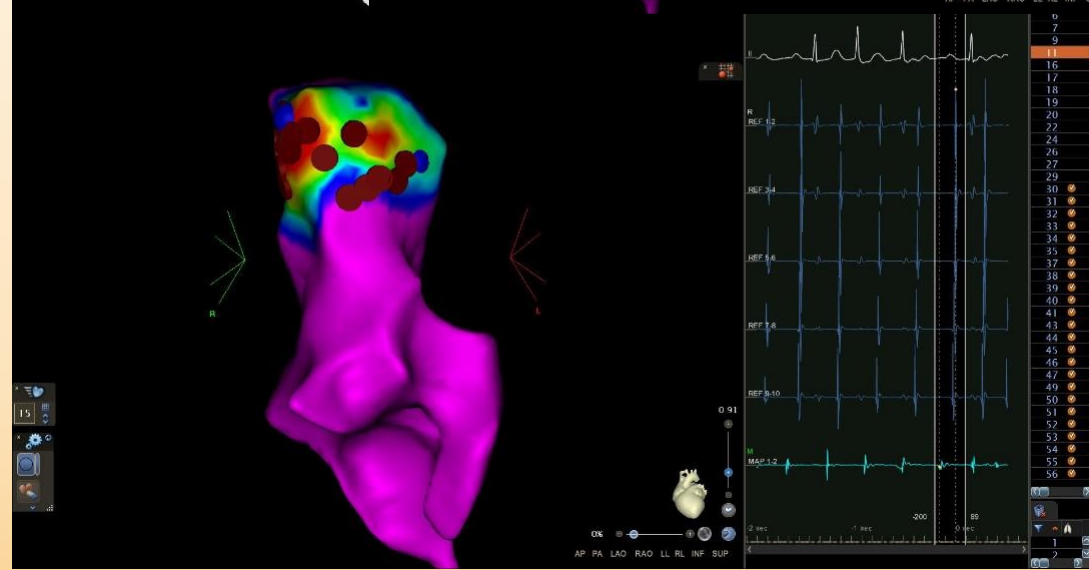
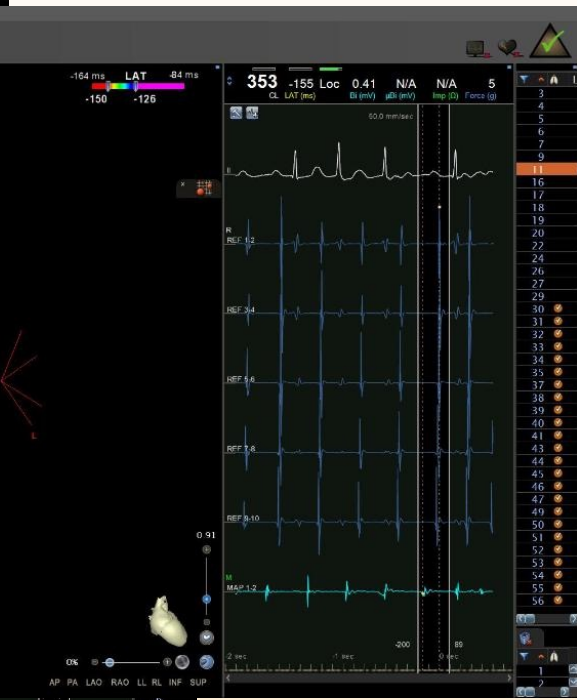
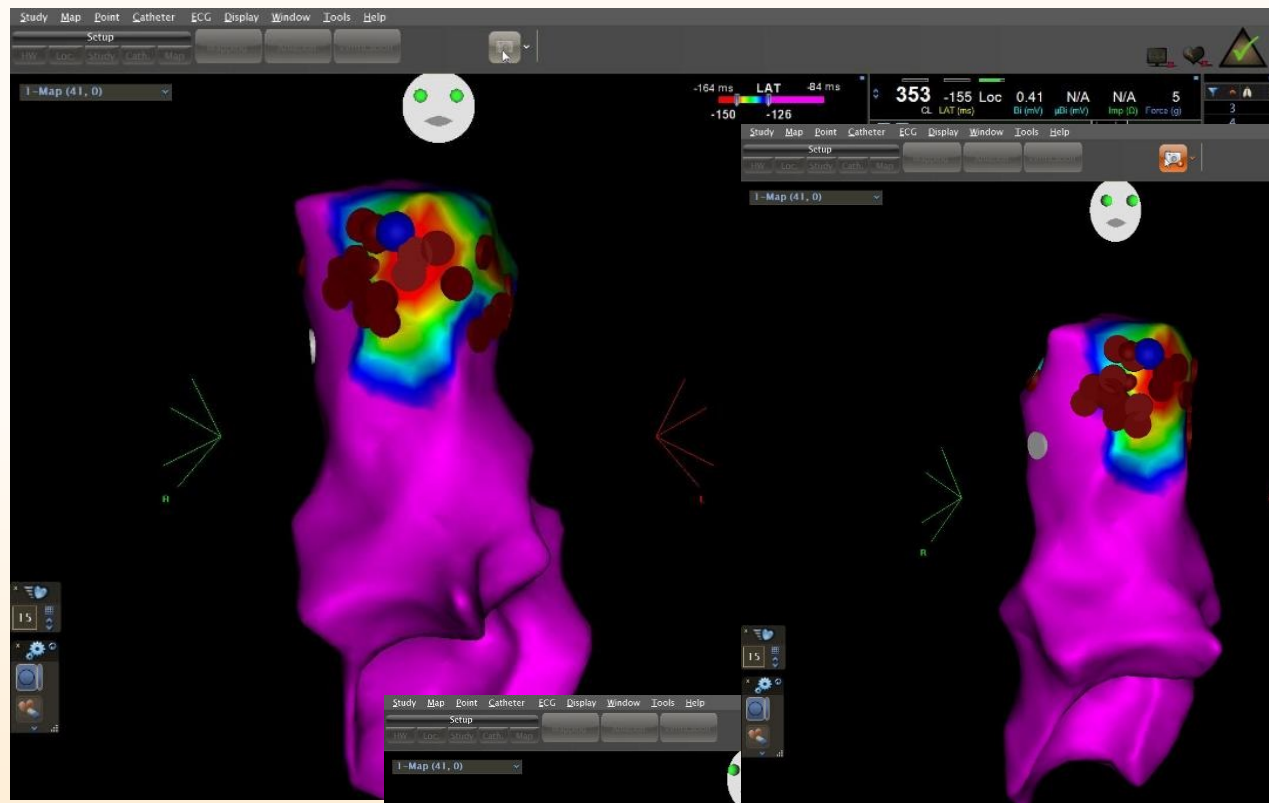
En erken aktivasyon VCS'da



VCS izolasyonuna karar veriliyor
Sirküler kateter VCS'da
RA'dan pace ile giriş noktasına bakılıyor

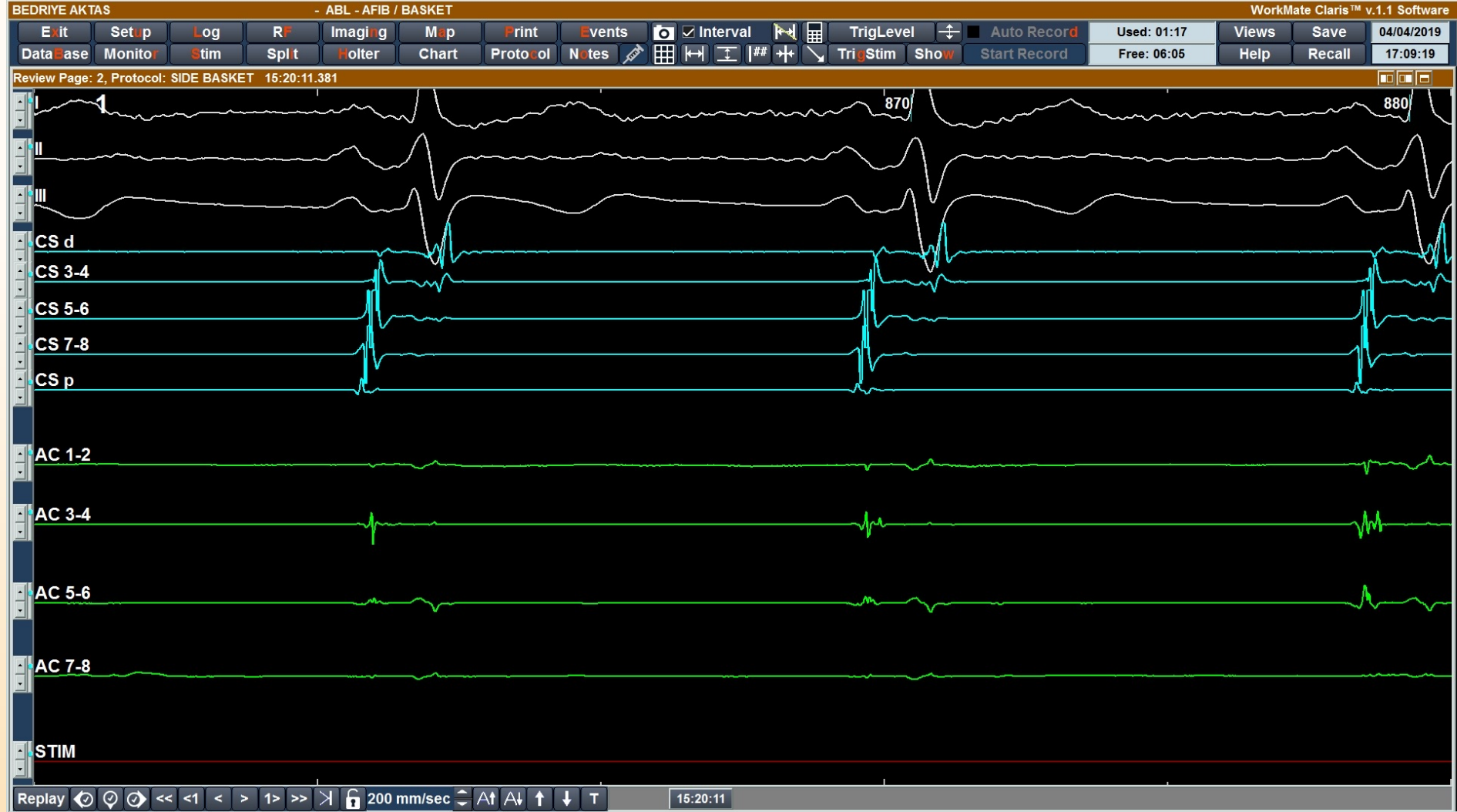


VCS izolasyonu ile stabil sinüs ritmi

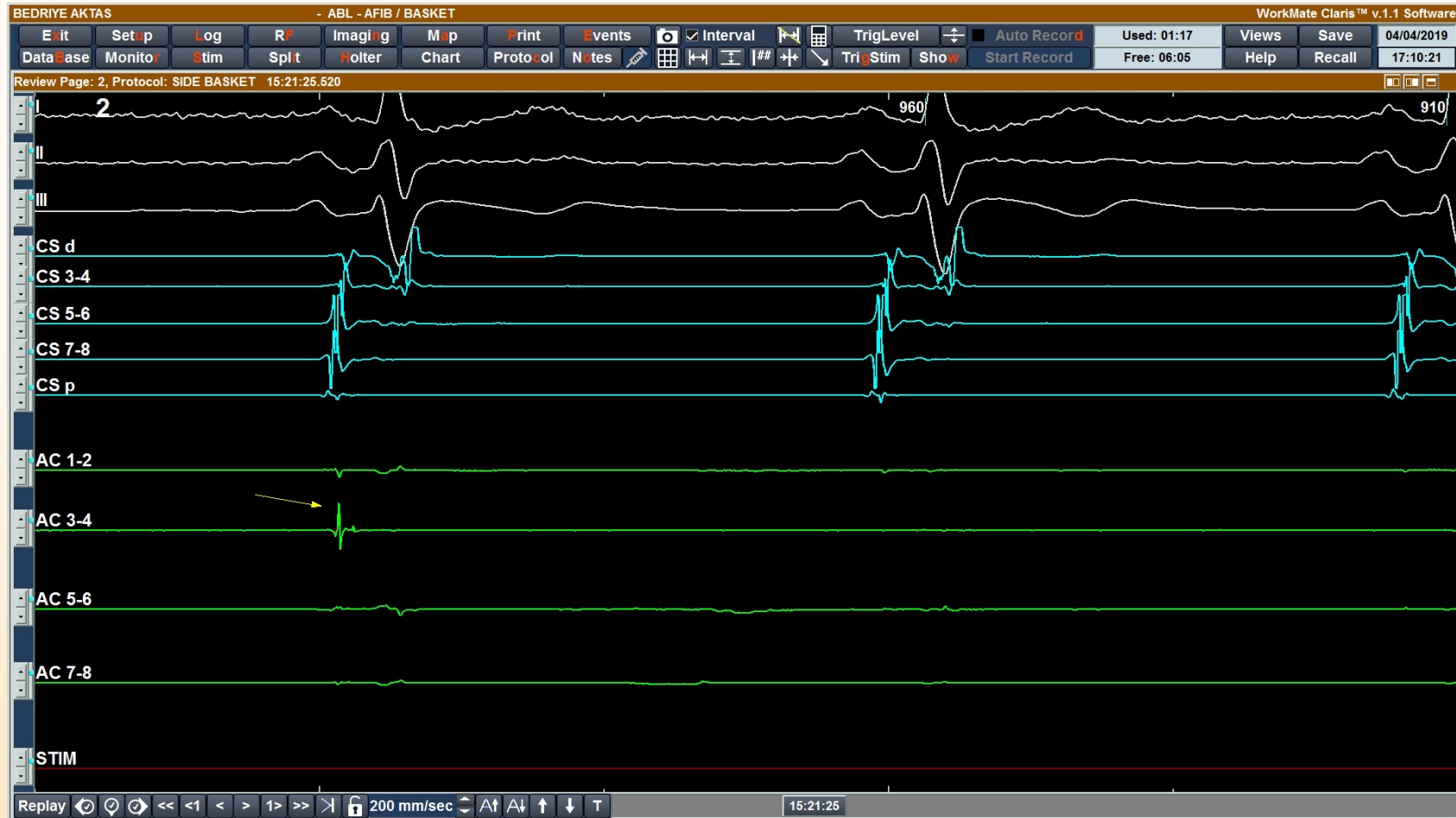


OLGU 2

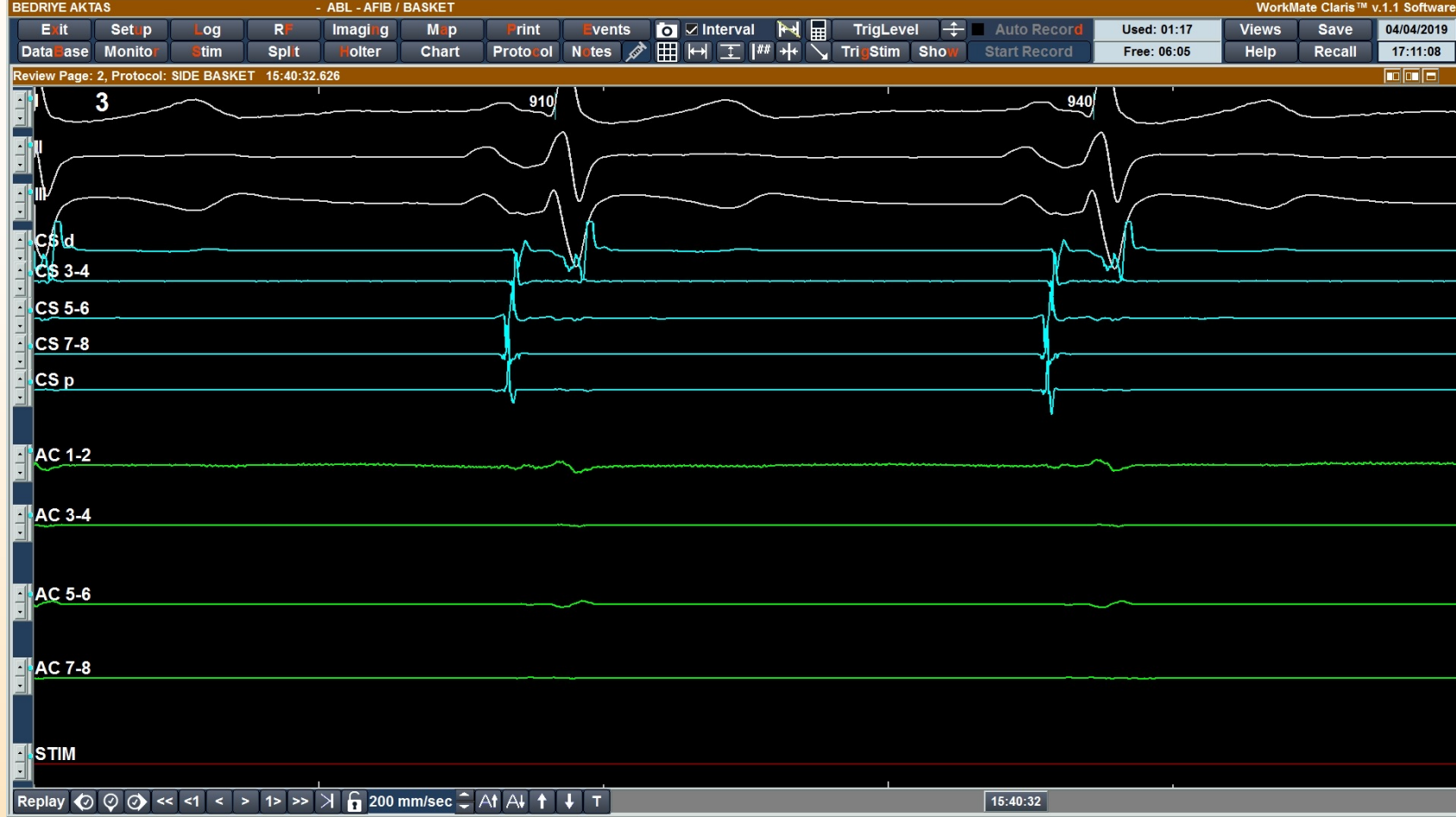
- 70 yaşında kadın hasta B.Akts.
- 9-10 yıldır PAF hastası.
- 3 yıl önce ablasyon ??? öyküsü...Rapor yok
- Ablasyondan sonra şikayetleri geçmemiş, son 1 yıldır çarpıntı atakları artmış (ayda 3-4 atak)
- Amiodarone, propafenon ve beta bloker kullanım öyküsü var. Son 6 aydır düzensiz ilaç kullanımı..
- EKO: Hafif MY, **LA çapı 46 mm**. LVEF %60. LV çapları normal.



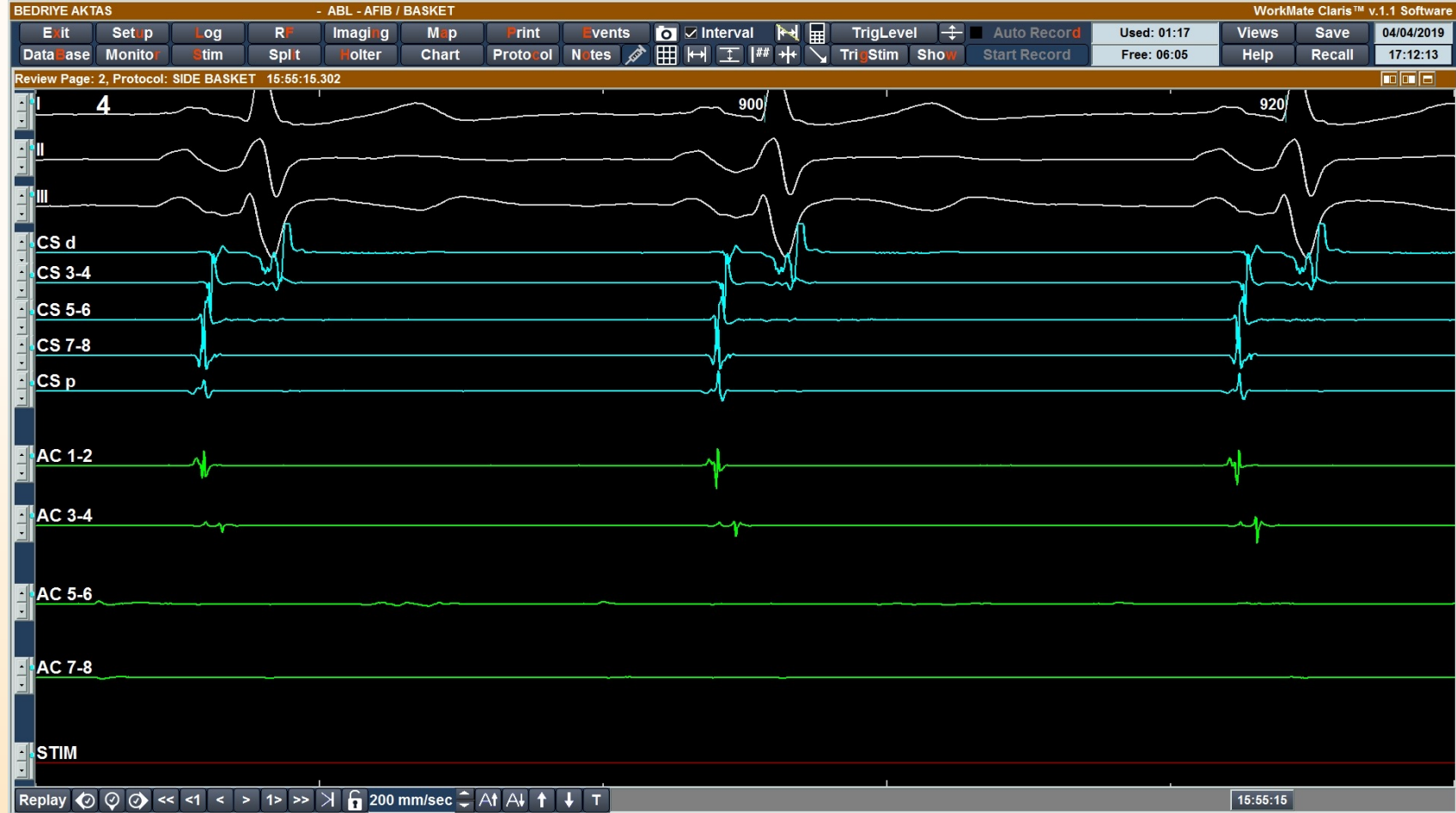
Sol üst ven aktif



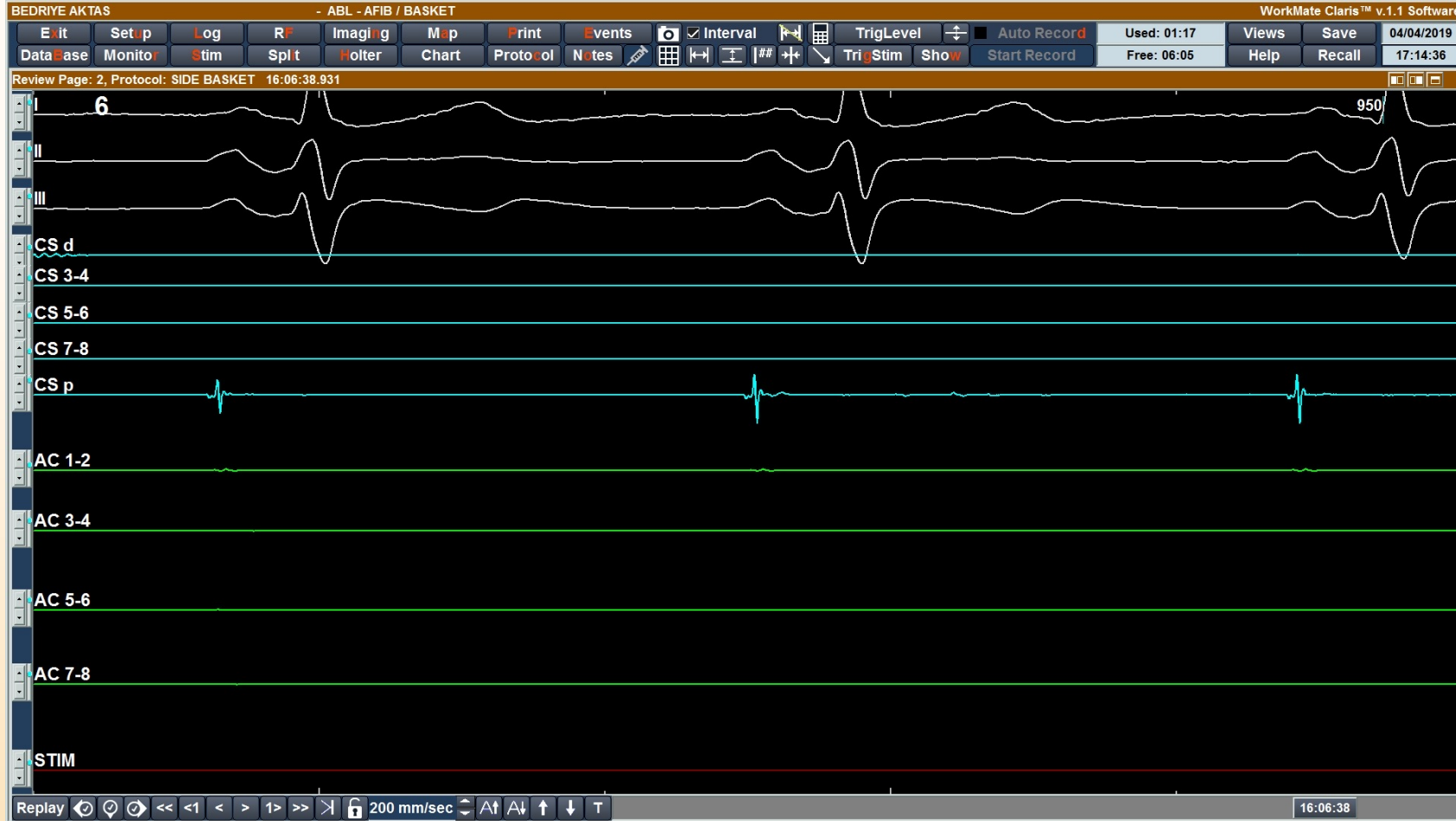
Sol üst pulmoner ven izole



Sol alt pulmoner ven aktif değil



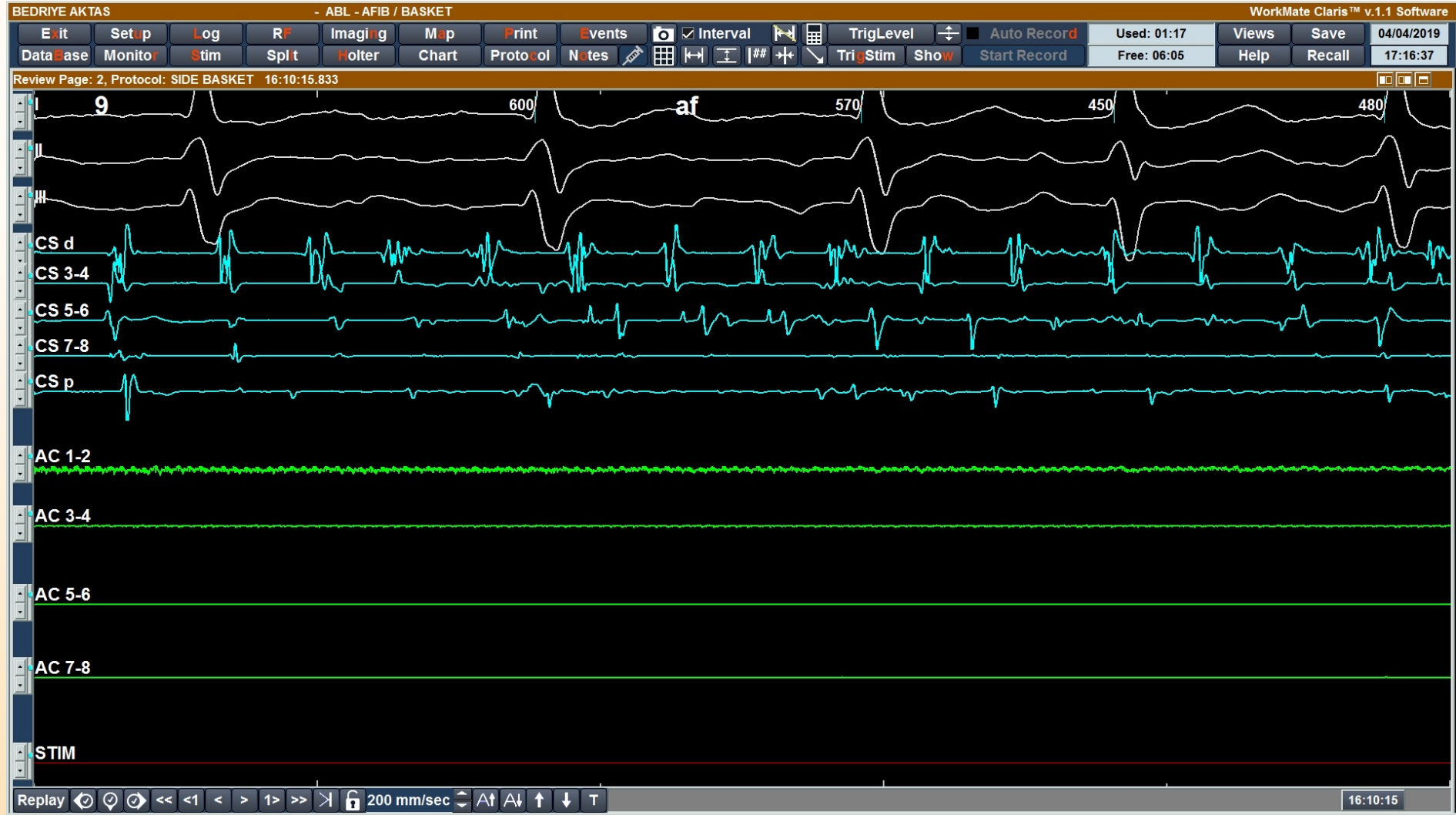
Sağ alt pulmoner ven aktif



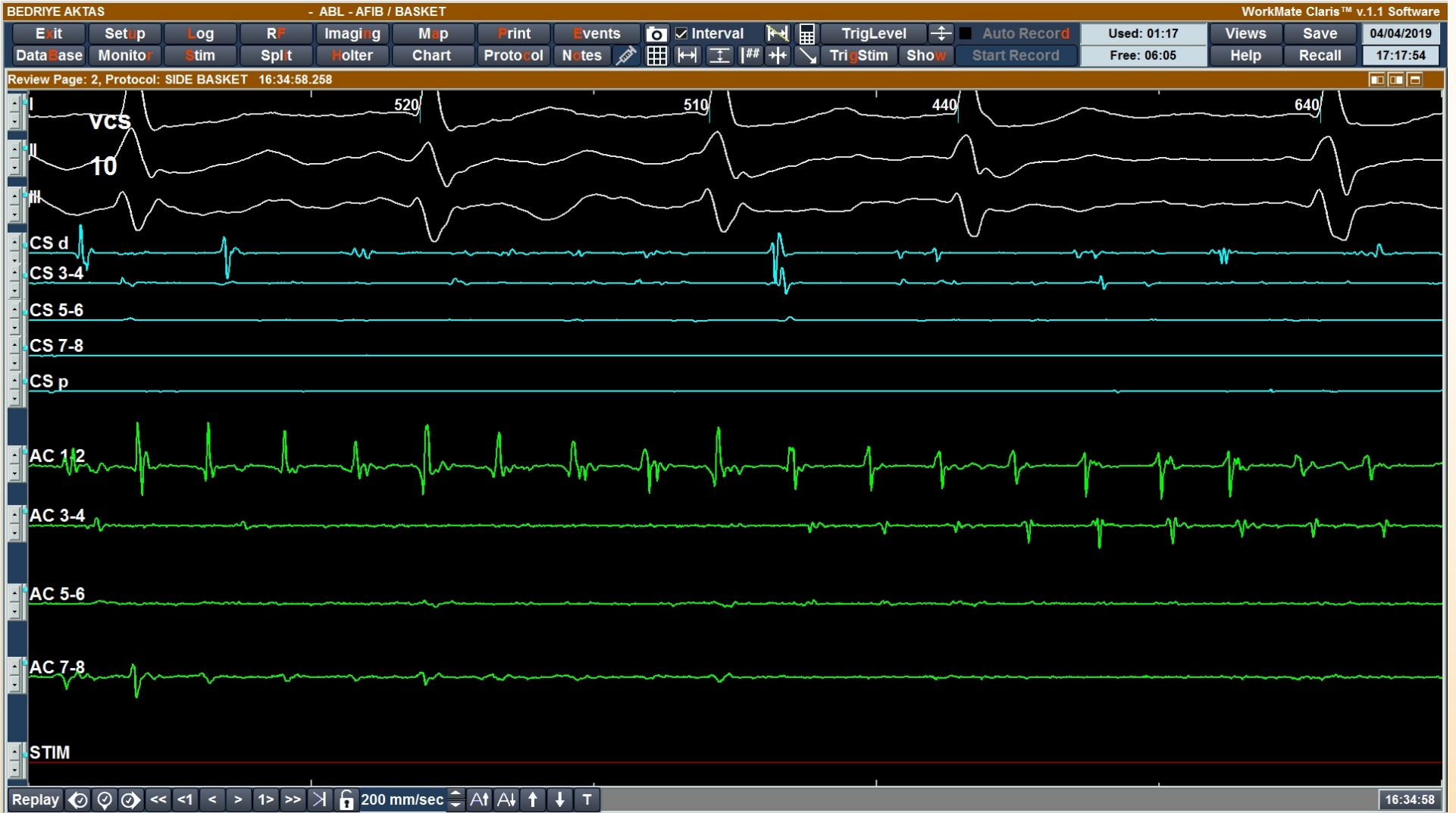
Sağ alt pulmoner ven izole



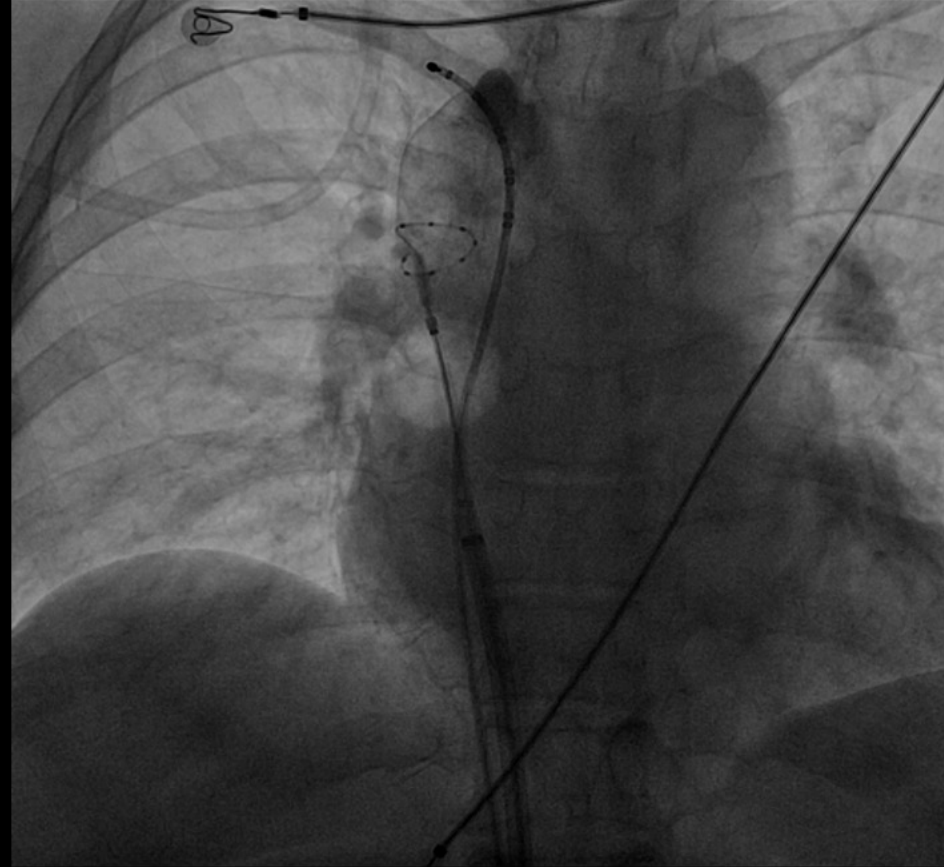
**Sağ üst pulmoner ven aktif değil ama yine de balon şişiriliyor
Ve dondurma sırasında spontan AF başlıyor**



CS kateteri Sağ atriumda

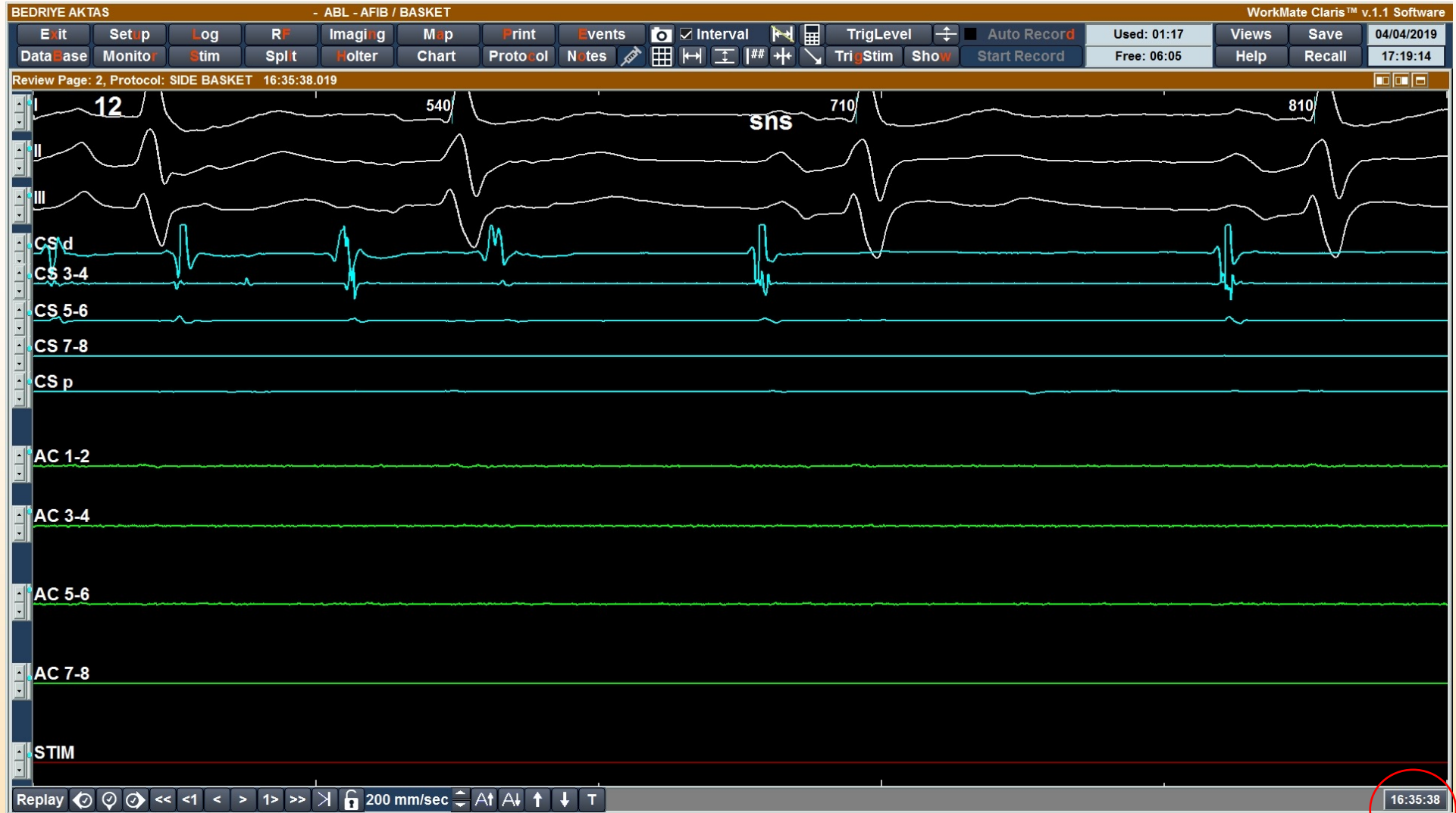


**Tüm pulmoner venlere bakıldı, inaktif
Sağa geçildi ve spiral kateter VCS'da**

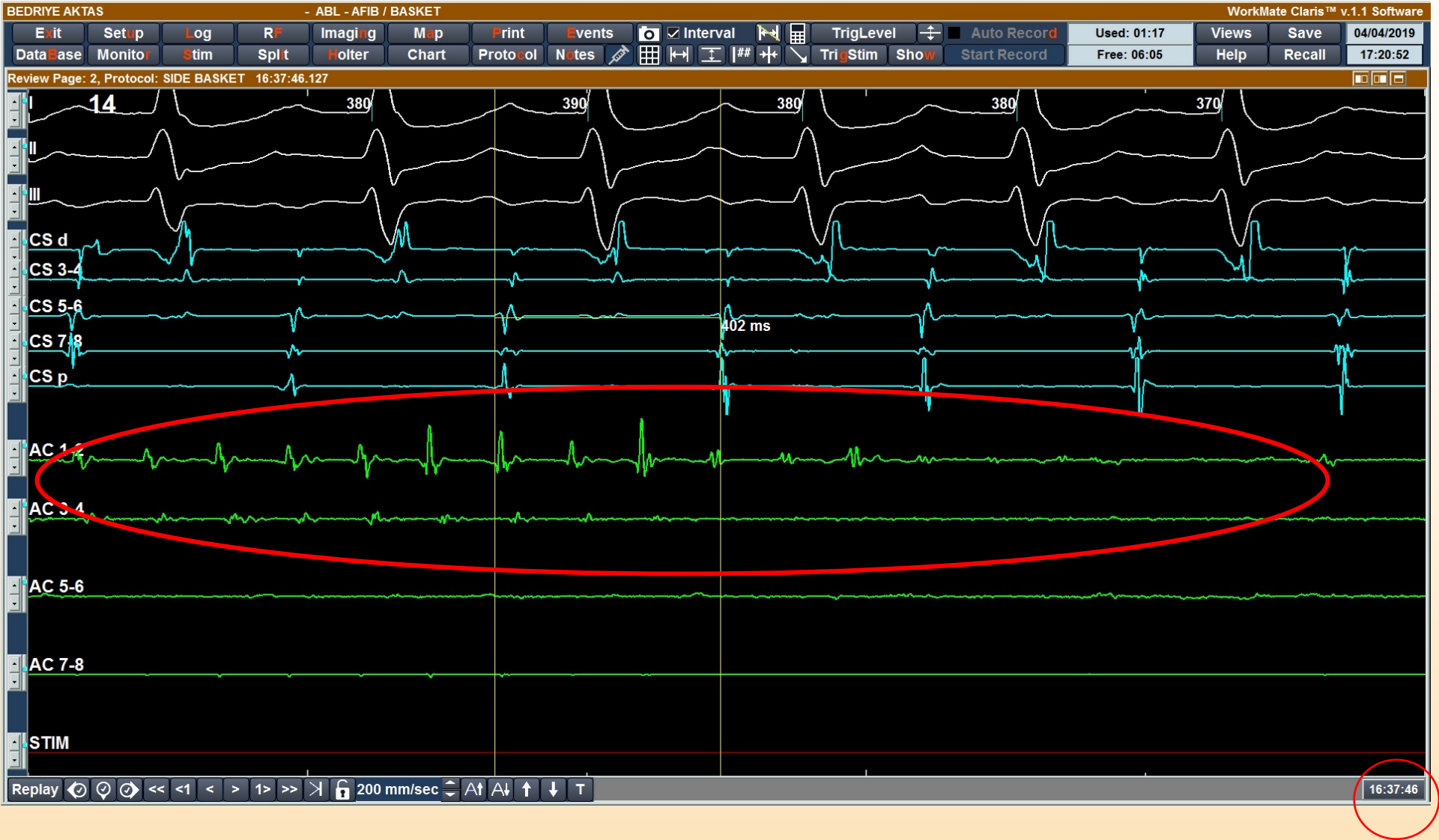




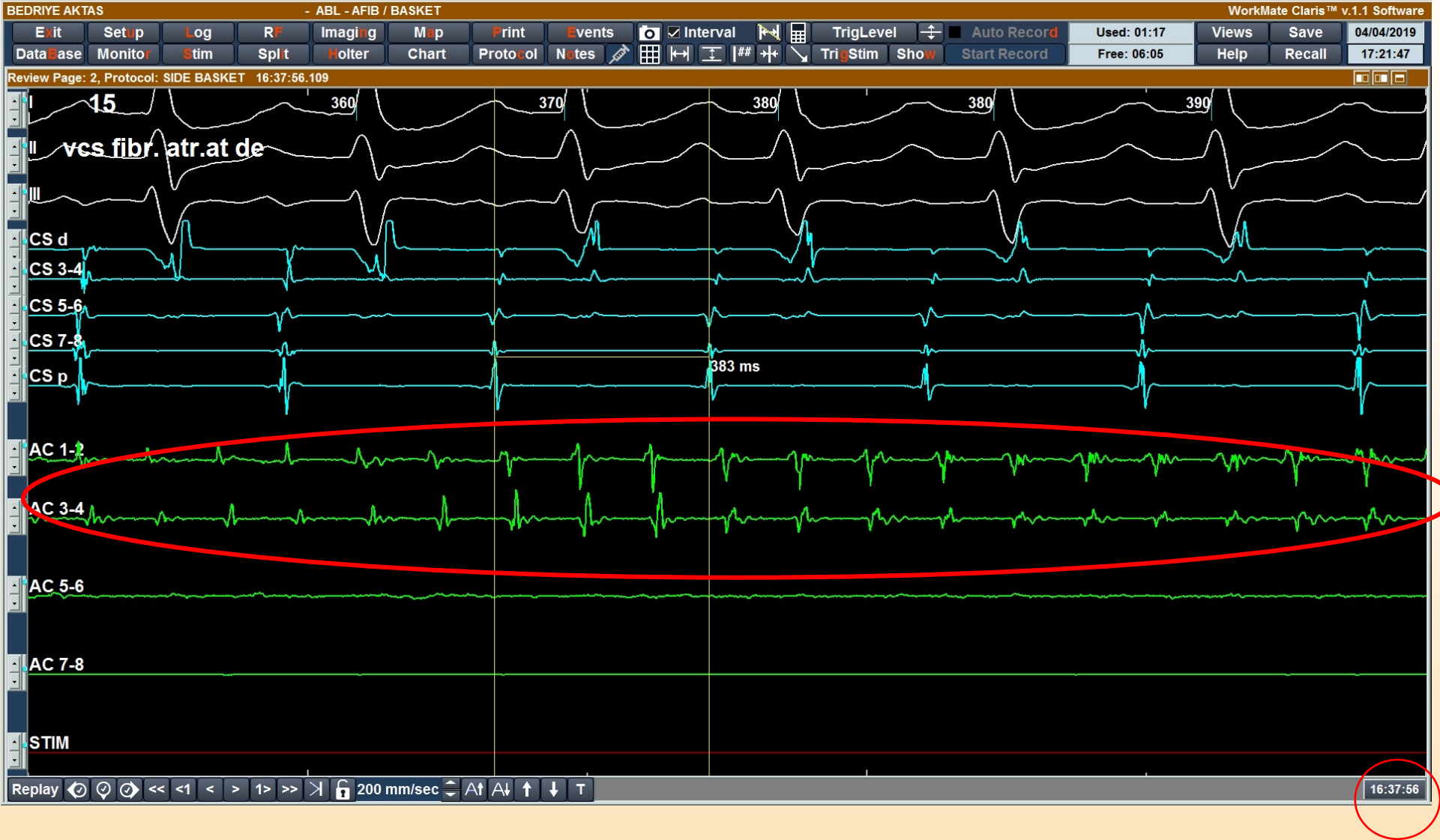
VCS izole edildi



VCS izolasyonu sonrası 30 sn içinde sinüs



VCS izole edildikten 2 dk sonra VCS'da spontan ateşleme



VCS'da 5-10 sn aralarla spontan ateşleme şiddetinde değişiklikler

EVE GÖTÜRÜLECEK MESAJLAR

- SVC en önemli PV-dışı tetikleyici odak
- SVCI komplikasyonları ciddi ama çok nadir
- Redo PAF hastalarında ampirik SCVI yararı net değil
- SVC elektriksel olarak aktif ise (aritmojenik özelliği gösterilemese bile), izolasyon açısından düşünülmelidir.

