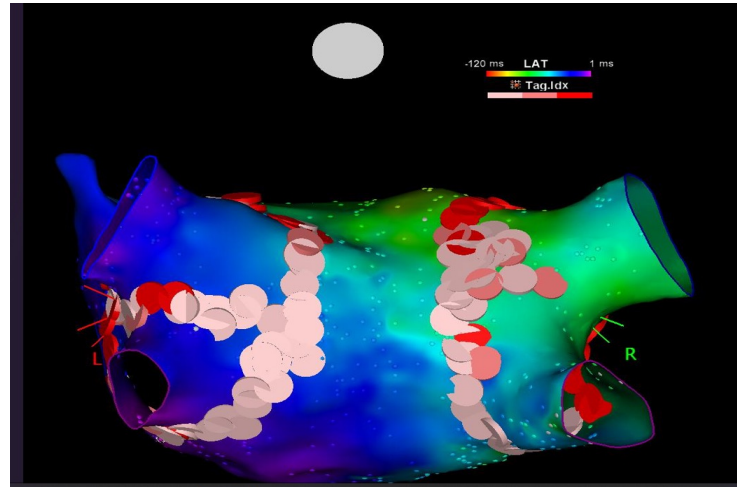


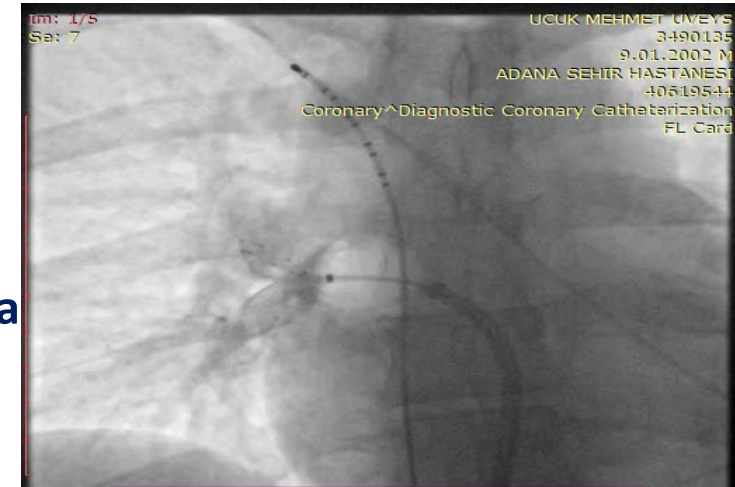
# KALP YETERSİZLİĞİNDE AF ABLASYONU



**Dr. Durmuş Yıldırım Şahin**

**S.B.Ü. Adana Şehir Eğitim ve Araştırma Hastanesi**

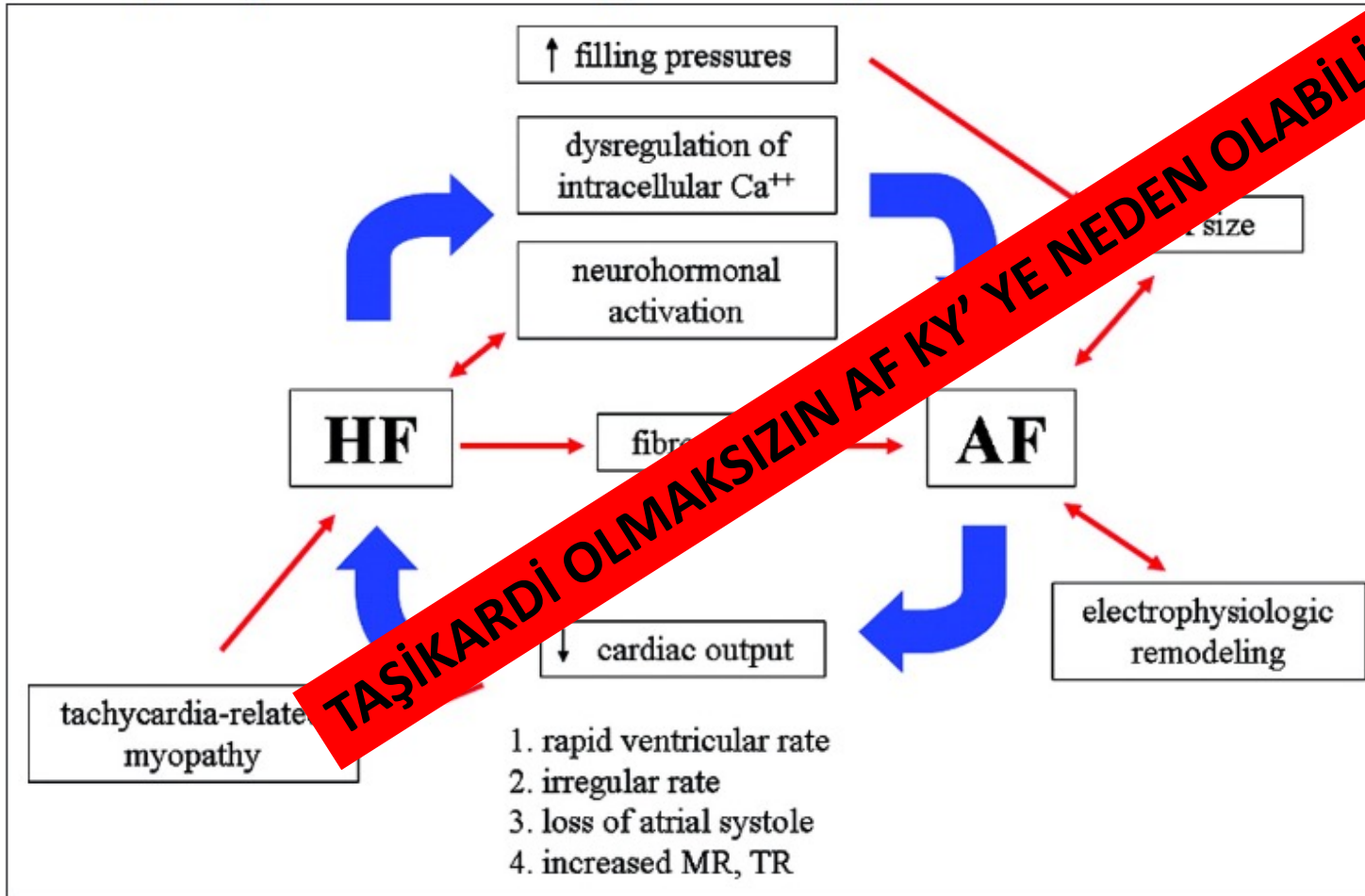
**12. Atrial Fibrilasyon Zirvesi, 8 Aralık 2023, Antalya**



# Epidemiyoloji

- AF ve KY kötü prognozla ilişkili yaygın kardiyak hastalıklardır.
- 2030 yılına kadar ABD' de 12 milyon AF' li ve 8 milyon KY hastası olacağı tahmin edilmektedir.
- KY hastalarında AF, vakaların % 10-60'ında eşlik eder. HFpEF diğerlerine göre daha fazla eşlik eder. Bu birliktelikte;
  - Artmış mortalite
  - KY nedeniyle hastaneye yatış
  - Hayat kalitesinde azalma
- KY hastalarında AF prevalansı hastalık kötüleştikçe artar.
  - NYHA I-II hastalarında prevalans tipik olarak % 5 tir.
  - NYHA III semptomları yaklaşık %26 prevalans göstermektedir
  - NYHA IV %50' ye varan prevalans göstermektedir

# Kalp Yetersizliği – AF İlişkisi



**TAŞIKARDİ OLMAKSIZIN AF KY' YE NEDEN OLABİLİR Mİ??**





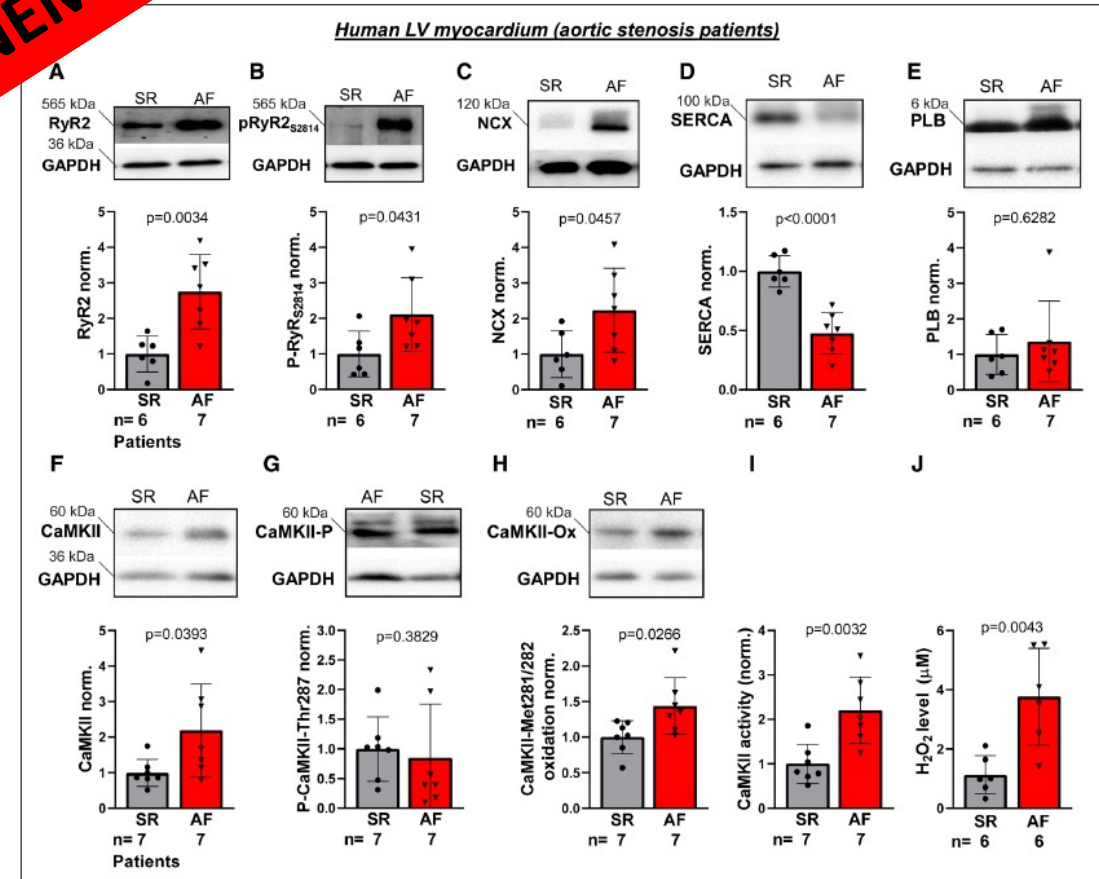
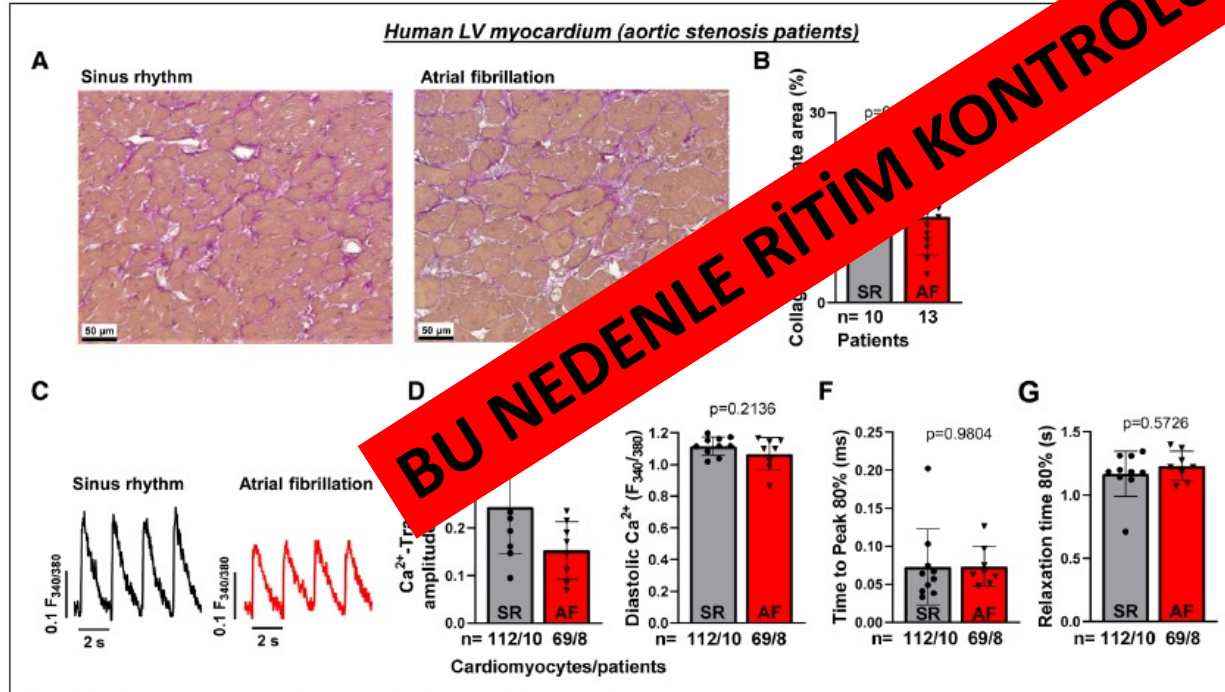
# Effects of Atrial Fibrillation on the Human Ventricle

Steffen Pabel, Maria Knierim, Thea Stehle, Felix Alebrand, Michael Paulus, Marcel Sieme, Melissa Herwig<sup>ID</sup>, Friedrich Barsch<sup>ID</sup>, Thomas Körtrl, Arnold Pöppel<sup>ID</sup>, Brisca Wenner<sup>ID</sup>, Senka Ljubojevic-Holzer, Cristina E. Molina, Nataliya Dybkova, Daniele Camboni, Thomas H. Fischer, Simon Sedej<sup>ID</sup>, Daniel Scherr, Christof Schmid, Christoph Brochhausen, Gerd Hasenfuß<sup>ID</sup>, Lars S. Maier<sup>ID</sup>, Nazha Hamdani<sup>ID</sup>, Katrin Streckfuss-Bömeke<sup>ID</sup>, Sam

EF' si korunmuş aort darlığı hastaları  
Fibroziste de artış yok.

Oksidatif stres → CaMKII eksp ve akt. → sistolik Ca sal. ↓  
→ kontraksiyon couplingte bozulma

**BU NEDENLE RİTİM KONTROLÜ ÖNEMLİDİR !!!**

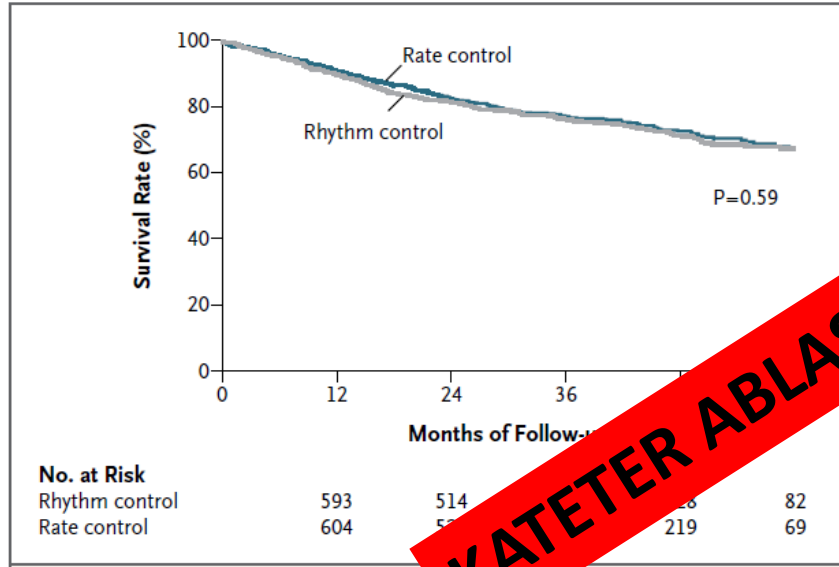


# RİTİM STRATEJİSİ

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## Rhythm Control versus Rate Control for Atrial Fibrillation and Heart Failure

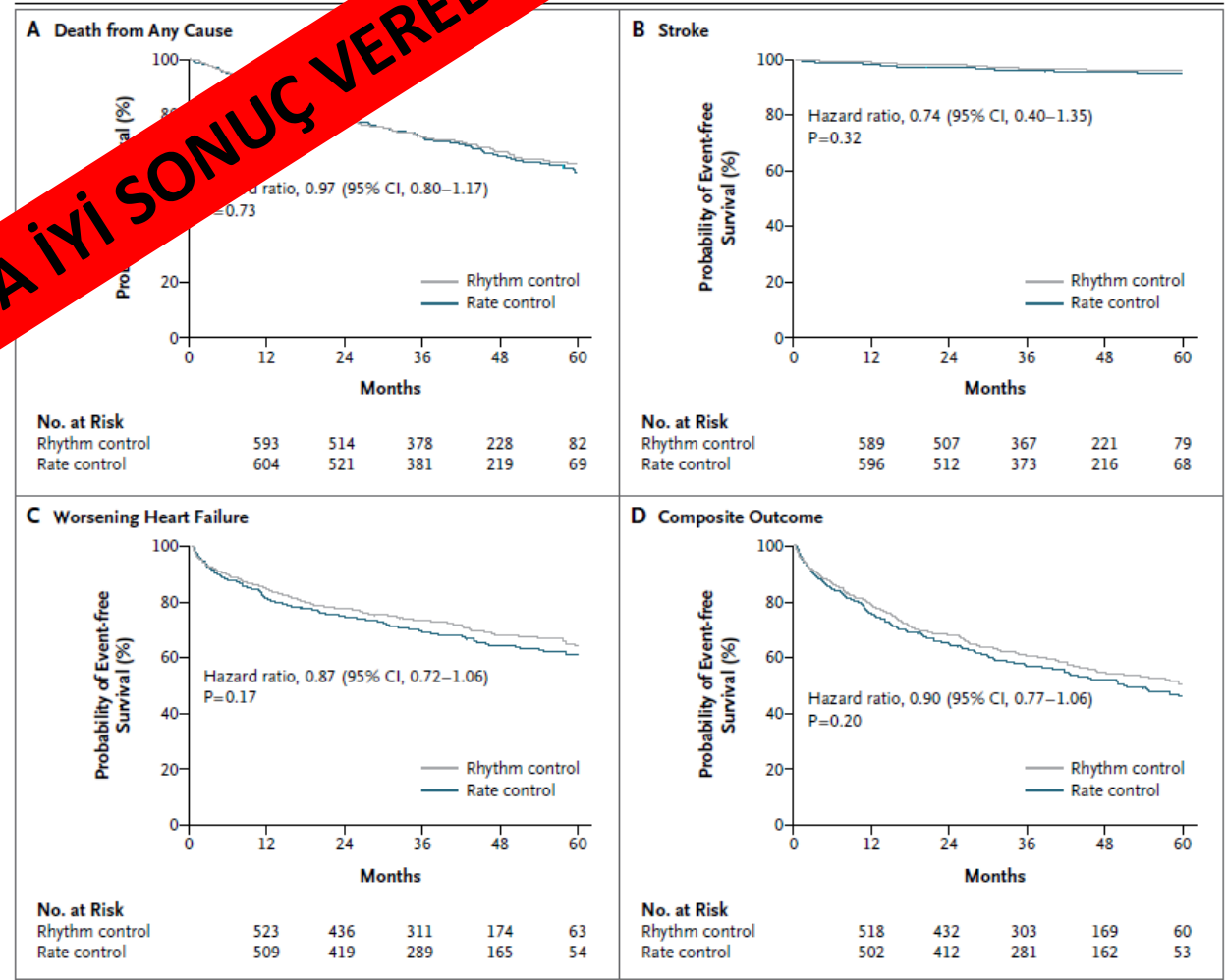
Denis Roy, M.D., Mario Talajic, M.D., Stanley Nattel, M.D., D. George Wyse, M.D., Ph.D., Paul Dorian, M.D.,



**Figure 2.** Kaplan–Meier Estimates of Death from Cardiovascular Causes (Primary Outcome).

Among 1376 patients with atrial fibrillation and congestive heart failure who were followed for a mean of 37 months, 182 patients (27%) in the rhythm-control group died from cardiovascular causes, as compared with 175 patients (25%) in the rate-control group (hazard ratio, 1.06; 95% confidence interval, 0.86 to 1.30).

# Hız kontrolü & Ritim Kontrolü – İLAÇLA AF-CHF İŞMASI



KATETER ABLASYONU

CASTLE AF ÖNCESİ RANDOMİZE ÇALIŞMALAR

# CASTLE-AF ÖNCESİ KALP YETERSİZLİĞİ HASTALARINDA AF KATETER ABLASYON ÇALIŞMALARI

**Table 2. Summary of Randomized Trials of Catheter Ablation of Atrial Fibrillation in Patients With Heart Failure**

	Sample Size	Age, y	NICM, %	Comparator Arm	LVEF, %	Follow-Up, mo	Single-Procedure Success, %	Multiprocedure Success, %	LVEF Improvement, %	Other Comments
Khan 2008 <sup>84</sup> <b>PABA-HF</b>	81 (41)	60	27	AV nodal ablation + BIV pacing	27	6	68	88	+8	Improved 6MHW and Minnesota score
MacDonald 2011 <sup>116</sup>	41 (22)	62	37	Medical rate control	36	12	40		+4	No difference vs rate control, high complication rate
Jones 2013 <sup>117</sup> <b>ARC - HF</b>	52 (26)	63	73	Medical rate control	22		68	88	+11	Minnesota score, BNP, and peak oxygen consumption improved
Hunter 2014 <sup>118</sup> <b>CAMTAF</b>	366 (67)	54	82	Medical rate control	42	20	38	81	+8	Minnesota score and peak oxygen consumption improved
Di Biase 2016 <sup>119</sup> <b>AATAC</b>	203 (102)	62	38	Amiodarone	29	24	—	70	+8	1.4 procedures per patient, 6MHW, Minnesota score, hospitalization and death improved by ablation

**Etiyoloji önemli mi??**

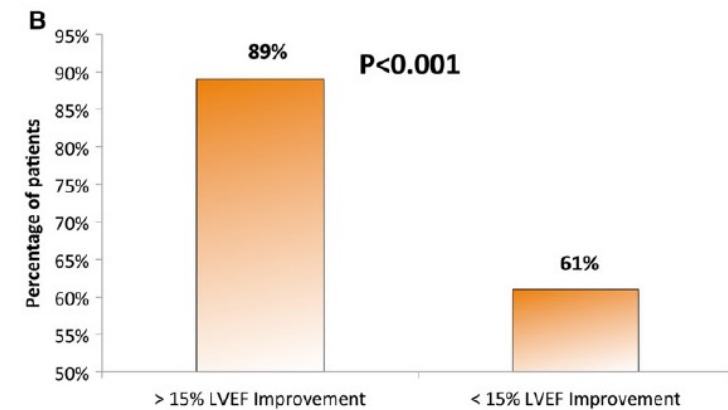
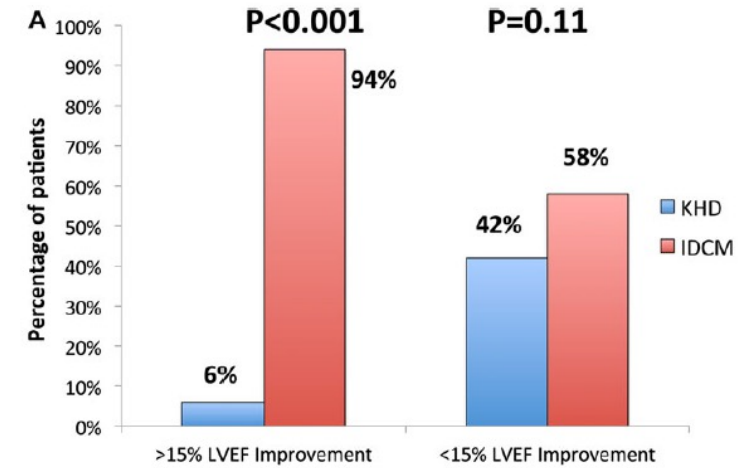
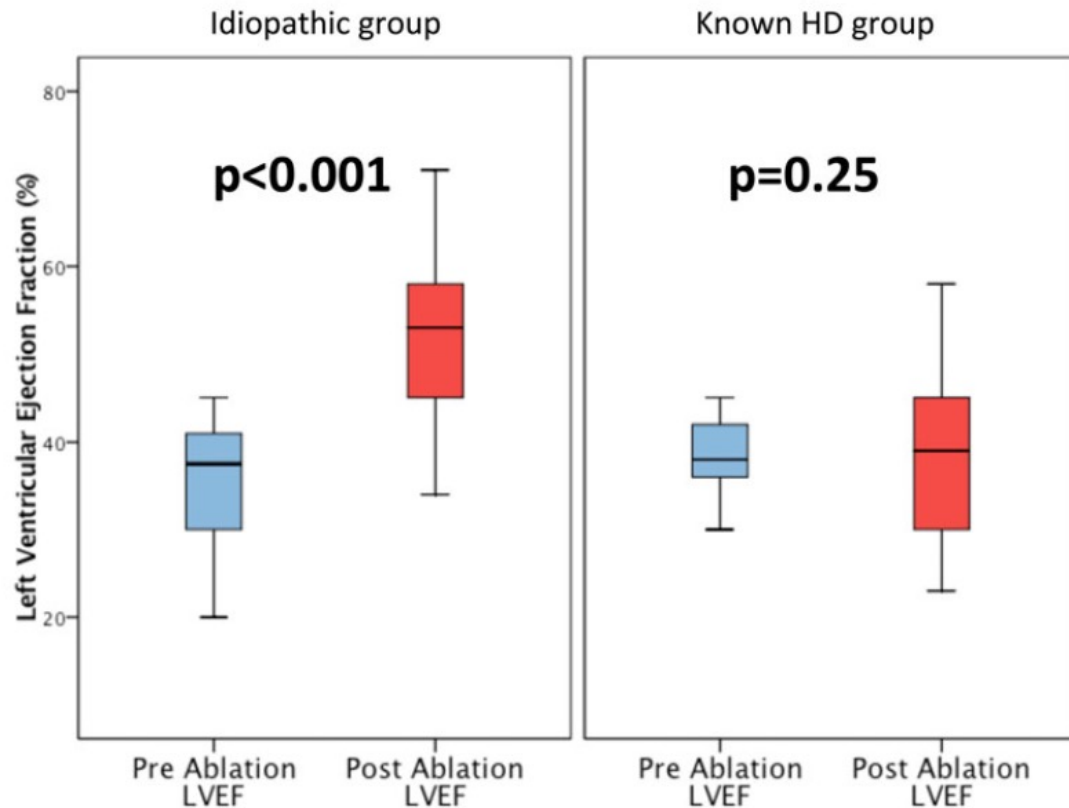
**Daha soft endpointler**



# The Impact of Known Heart Disease on Long-Term Outcomes of Catheter Ablation in Patients with Atrial Fibrillation and Left Ventricular Systolic Dysfunction: A Multicenter International Study

101 hasta LVEF<%45

77 hasta İdiyopatik KMP, 24 hasta KHD, Kateter ablasyon



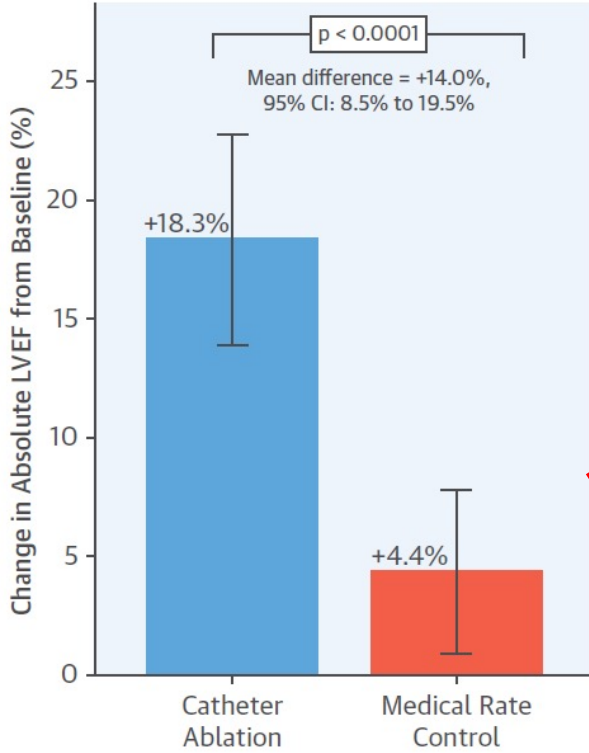
# Catheter Ablation Versus Medical Rate Control in Atrial Fibrillation and Systolic Dysfunction

The CAMERA-MRI Study

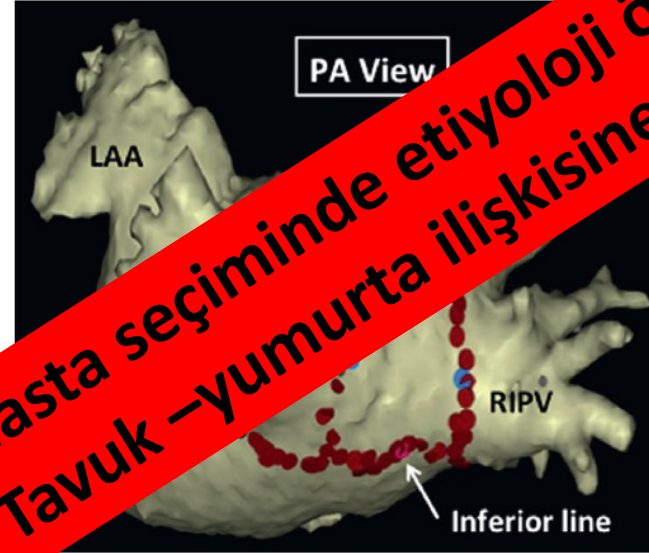


Soru: AF için kateter ablasyonu, **AF varlığı dışında LVSD etiolojisinin açıklanamadığı durumlarda** tıbbi hız kontrolüne kıyasla LVSD' yi iyileştirir mi?

**A** Primary Endpoint: Change in LVEF at Baseline and 6 Months by Treatment Arm



**B** Catheter Ablation Lesion Set in Left Atrium: Pulmonary Vein and Posterior Wall Isolation



**Hasta seçiminde etioloji önemli!!!  
Tavuk –yumurta ilişkisine cevap**

(Kardiyak MR ile)

Persistent AF

Randomizasyon öncesi KMR ile LGE, ILR ile sinüs ritminin kontrolü

Birincil sonlanım: 6. ay kardiyak MR ile LVEF' de değişim

Sonuç: Kateter ablasyon ile sinüs ritminin sağlanması özellikle **KMR 'da ventriküler fibrozis olmadığında,** LVEF' de anlamlı iyileşmeler ile sonuçlanır !!!

# The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

FEBRUARY 1, 2018

VOL. 378 NO. 5

## Catheter Ablation for Atrial Fibrillation with Heart Failure

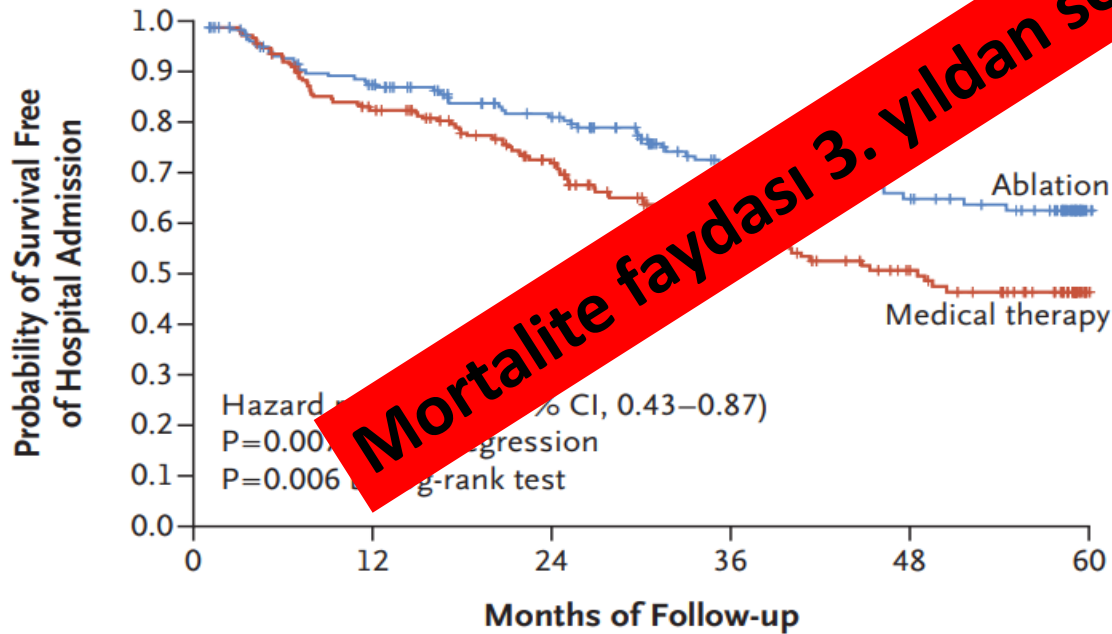
Nassir F. Marrouche, M.D., Johannes Brachmann, M.D., Dietrich Andresen, M.D., Jürgen Siebels, M.D., Lucas Boersma, M.D., Luc Jordaens, M.D., Béla Merkely, M.D., Evgeny Pokushalov, M.D., Prashanthan Sanders, M.D., Jochen Proff, B.S., Heribert Schunkert, M.D., Hildegard Christ, M.D., Jürgen Vogt, M.D., and Dietmar Bänsch, M.D., for the CASTLE-AF Investigators\*

### CASTLE-AF Çalışması:

- Semptomatik Paroksizmal – Persistent AF'li,
  - LVEF  $\leq$  %30 NYHA II-IV olan 363 hasta,
  - Kateter ablasyon & konvansiyonel ilaç tedavisi
- Sonlanım: Herhangi bir nedenle ölüm veya KY kötüleşmesi nedeniyle hastaneye yatış.

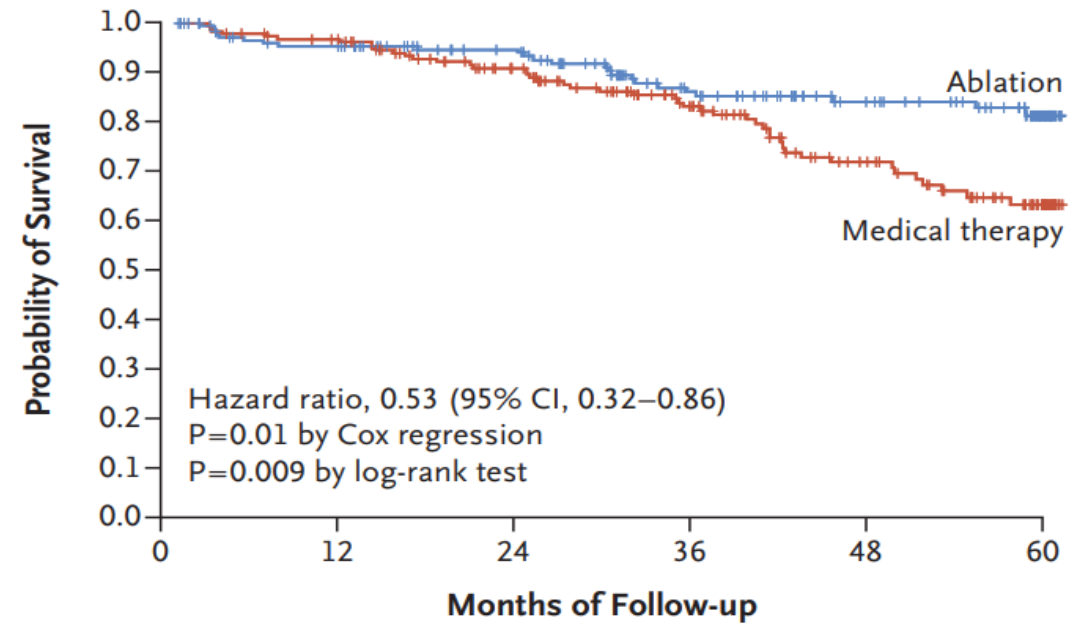
**Mortalite faydası 3. yıldan sonra ortaya çıktı!!!**

### A Death or Hospitalization for Worsening Heart Failure



No. at Risk	0	12	24	36	48	60
Ablation	179	141	114	76	58	22
Medical therapy	184	145	111	70	48	12

### Death from Any Cause



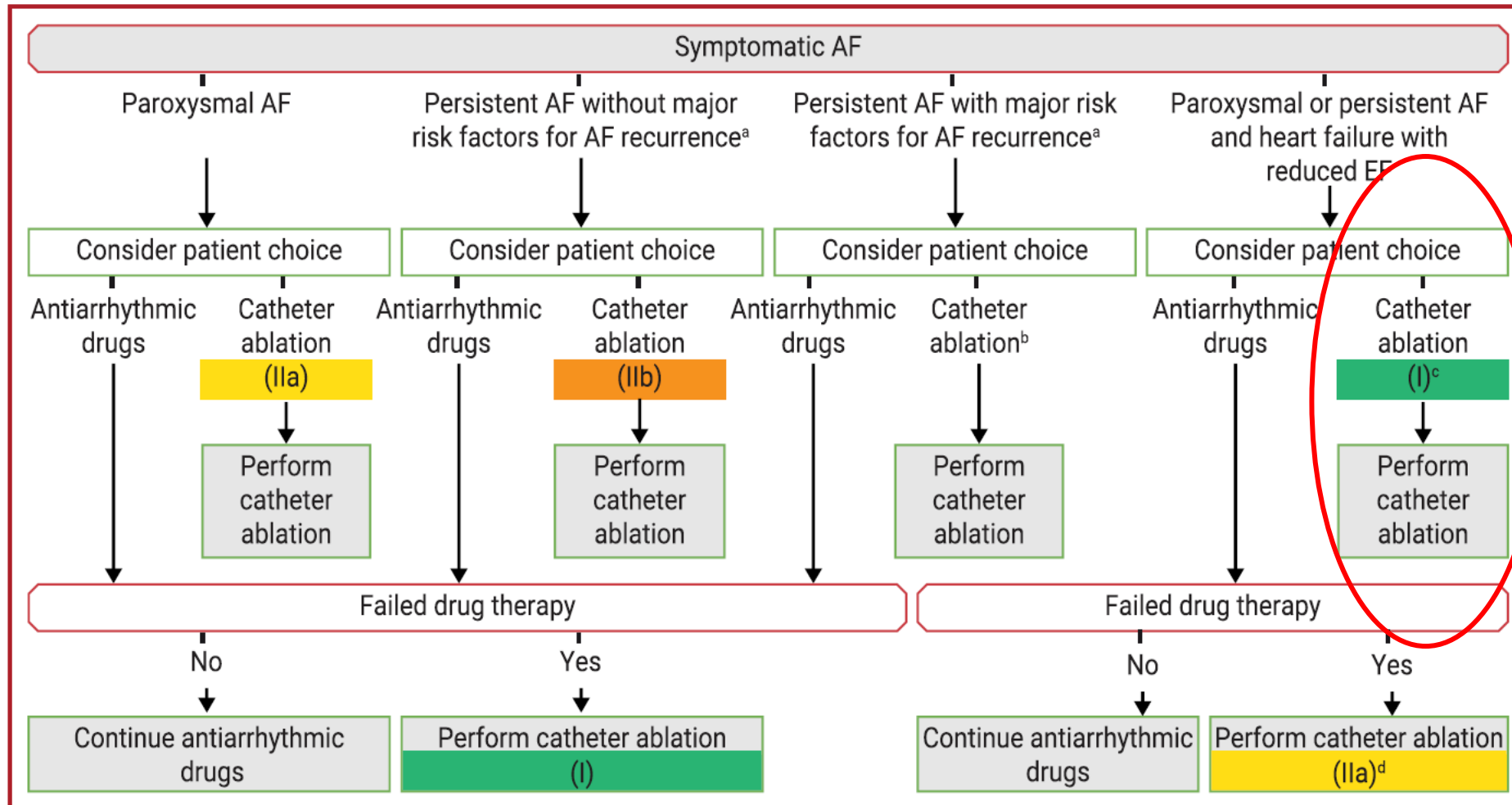
No. at Risk	0	12	24	36	48	60
Ablation	179	154	130	94	71	27
Medical therapy	184	168	138	97	63	19

# CASTLE AF

- Daha belirleyici ve sert end-pointler olan ölüm ve KY nedeniyle hastaneye yatış değerlendirilmiştir.
- İkincil sonlanım noktaları da anlamlı iyiydi
- Diğer çalışmalara oranla daha uzun dönem sonuçlar (ortalama takip 37.8 ay)
- Hem paroksizmal hem persistant grup dahil edildi ve her 2 grup ta ablasyondan fayda gördü.

Table 2. Primary and Secondary Clinical End Points.*					
End Point	Ablation (N=179)	Medical Therapy (N=184)	Hazard Ratio (95% CI)	P Value	
				Cox Regression	Log-Rank Test
	<i>number (percent)</i>				
Primary†	51 (28.5)	82 (44.6)	0.62 (0.43–0.87)	0.007	0.006
Secondary					
Death from any cause	24 (13.4)	46 (25.0)	0.53 (0.32–0.86)	0.01	0.009
Heart-failure hospitalization	37 (20.7)	66 (35.9)	0.56 (0.37–0.83)	0.004	0.004
Cardiovascular death	20 (11.2)	41 (22.3)	0.49 (0.29–0.84)	0.009	0.008
Cardiovascular hospitalization	64 (35.8)	89 (48.4)	0.72 (0.52–0.99)	0.04	0.04
Hospitalization for any cause	114 (63.7)	122 (66.3)	0.99 (0.77–1.28)	0.96	0.96
Cerebrovascular accident	5 (2.8)	11 (6.0)	0.46 (0.16–1.33)	0.15	0.14

# RİTİM STRATEJİSİ -ABLASYON



©ESC 2020

a. Significantly enlarged LA volume, advanced age, long AF duration, renal dysfunction, and other cardiovascular risk factors.

b. In rare individual circumstances, catheter ablation may be carefully considered as first-line therapy.

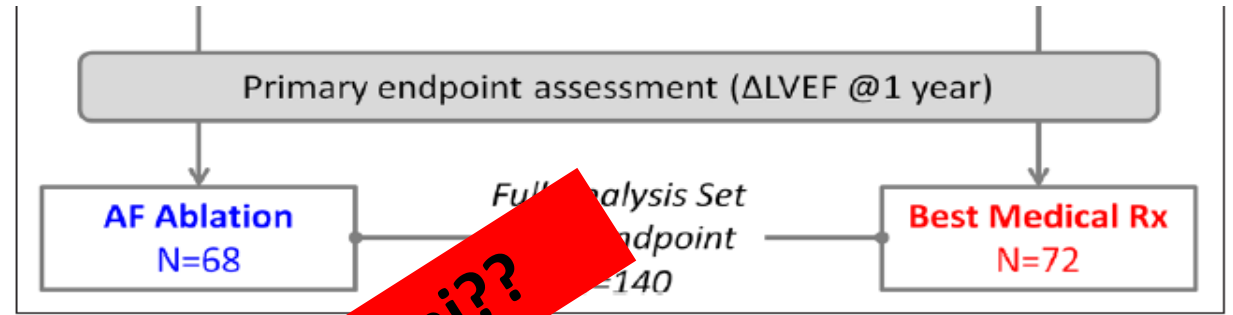
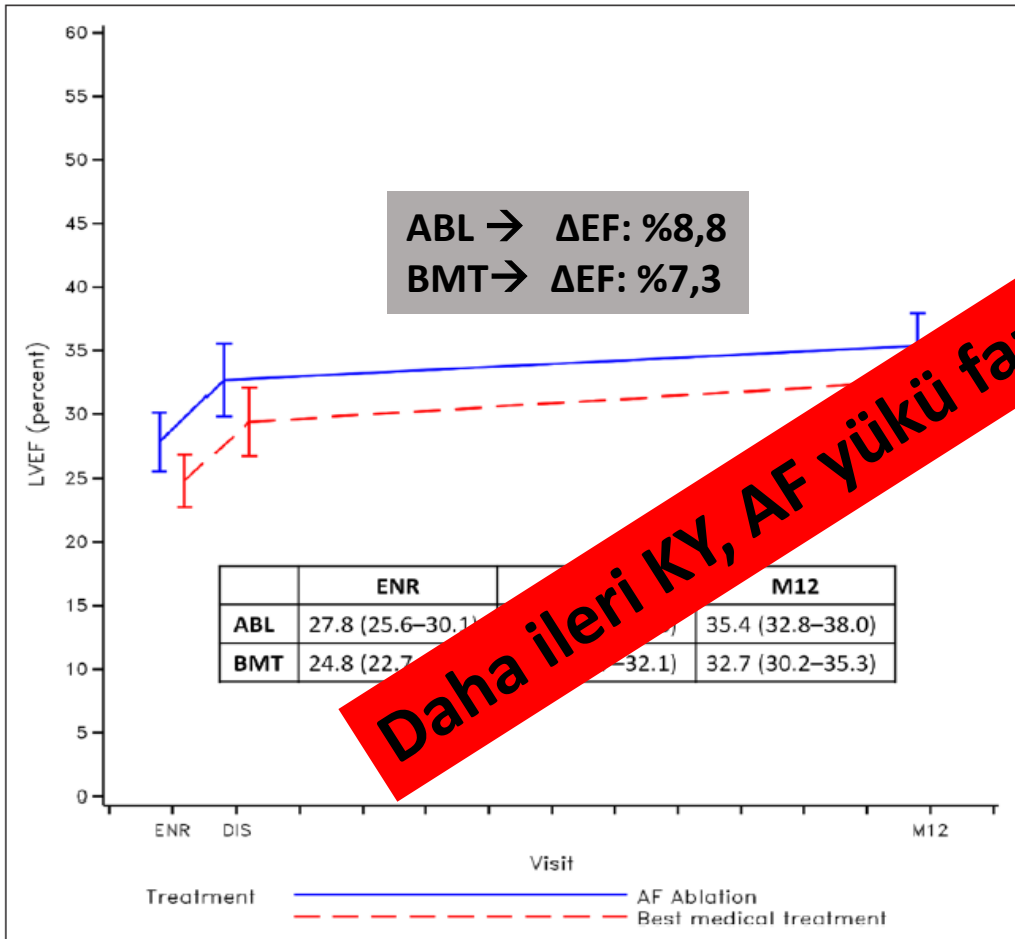
c. Recommended to reverse LV dysfunction when tachycardiomyopathy is highly probably.

d. To improve survival and reduce hospitalization.

ORIGINAL ARTICLE

# Catheter Ablation Versus Best Medical Therapy in Patients With Persistent Atrial Fibrillation and Congestive Heart Failure

The Randomized AMICA Trial



**Daha ileri KY, AF yükü fazla olması nedeniyle mi??**

ICD ve CRT için adayeye yatırılmış LVEF ≤ %35 NYHA ≥ II Persistent AF + NYHA ≥ II KMP

1 yıl sonlanım: 1 yıl içinde LVEF' de mutlak artış

Sonuç: AMICA çalışması AF+ileri KY hastalarında kateter ablasyonun herhangi bir faydasını ortaya koyamamıştır. NEDEN??

CASTLE dan daha düşük ortalama EF → % 27.6 & % 32.5

CASTLE dan daha fazla persistent AF → % 100 & % 70

CASTLE dan daha fazla NYHA III-IV → % 60 & % 31

CASTLE dan daha fazla CRT-D (LBBB) → % 43 & % 27

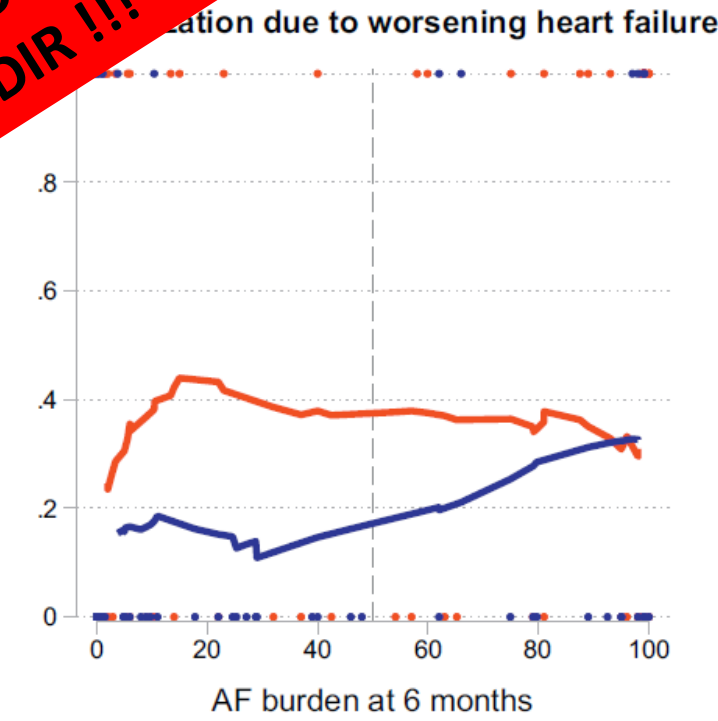
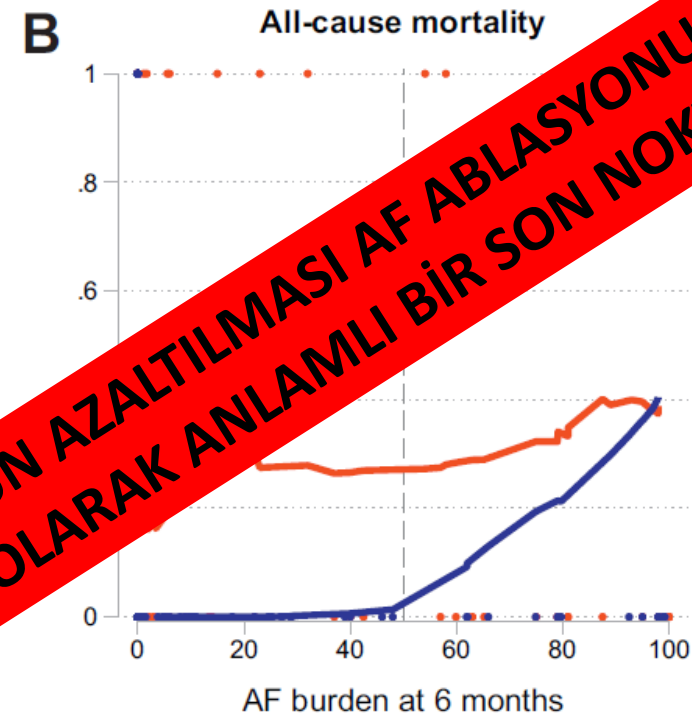
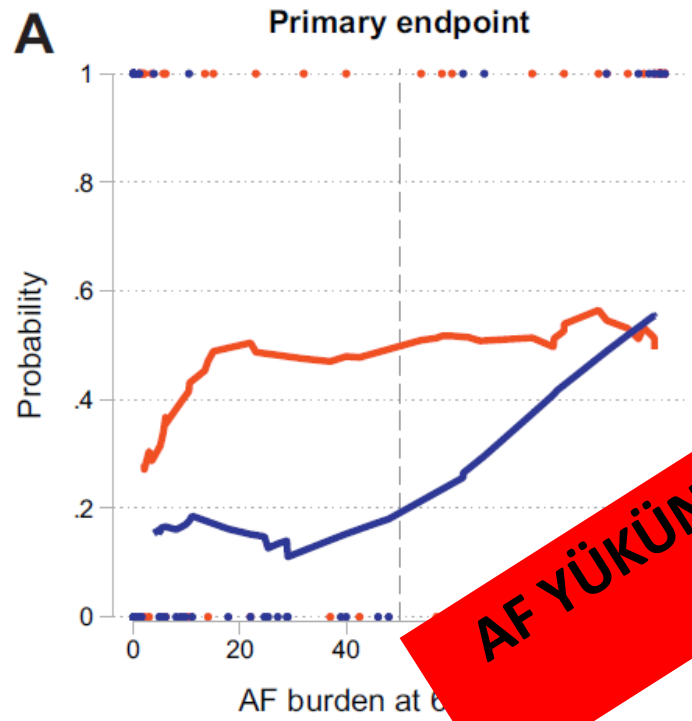
# Atrial Fibrillation Burden and Clinical Outcomes in Heart Failure



## The CASTLE-AF Trial

6 AYLIK AF YÜKÜ !!!

**AF YÜKÜNÜN AZALTILMASI AF ABLASYONU SONRASI KLİNİK OLARAK ANLAMLI BİR SON NOKTADIR !!!**



— Non ablated — Ablated

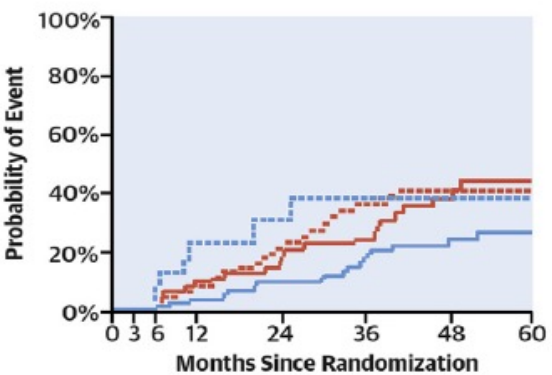
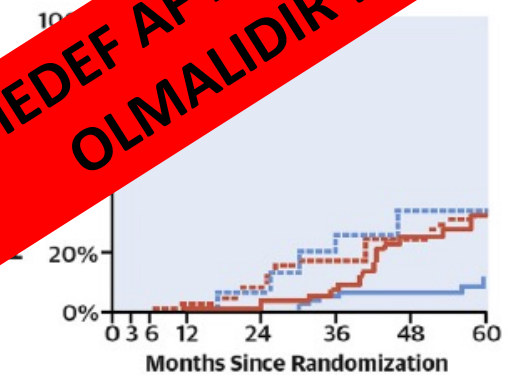
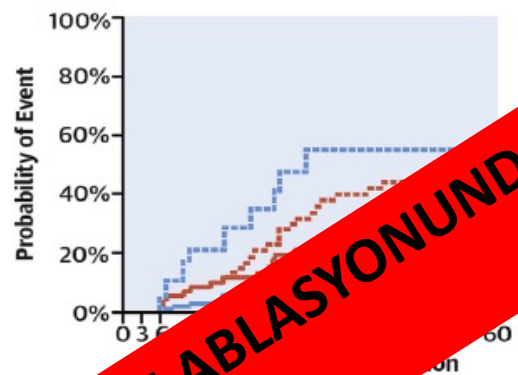
# CENTRAL ILLUSTRATION AF Burden is Predictive of Hard Clinical Outcomes in HF Patients With AF

## HF Patients with AF and EF of 35% or Less

Patients with continuous rhythm monitoring



### A. Primary Endpoint      B. All-Cause Mortality      C. wHF Hospitalization



**AF ABLASYONUNDA HEDEF AF NÜKSÜNDEN ZİYADE AF YÜKÜ OLMALIDIR !!!**

Brachmann et al. J Am Coll Cardiol EP. 2021;7(5):594-603.

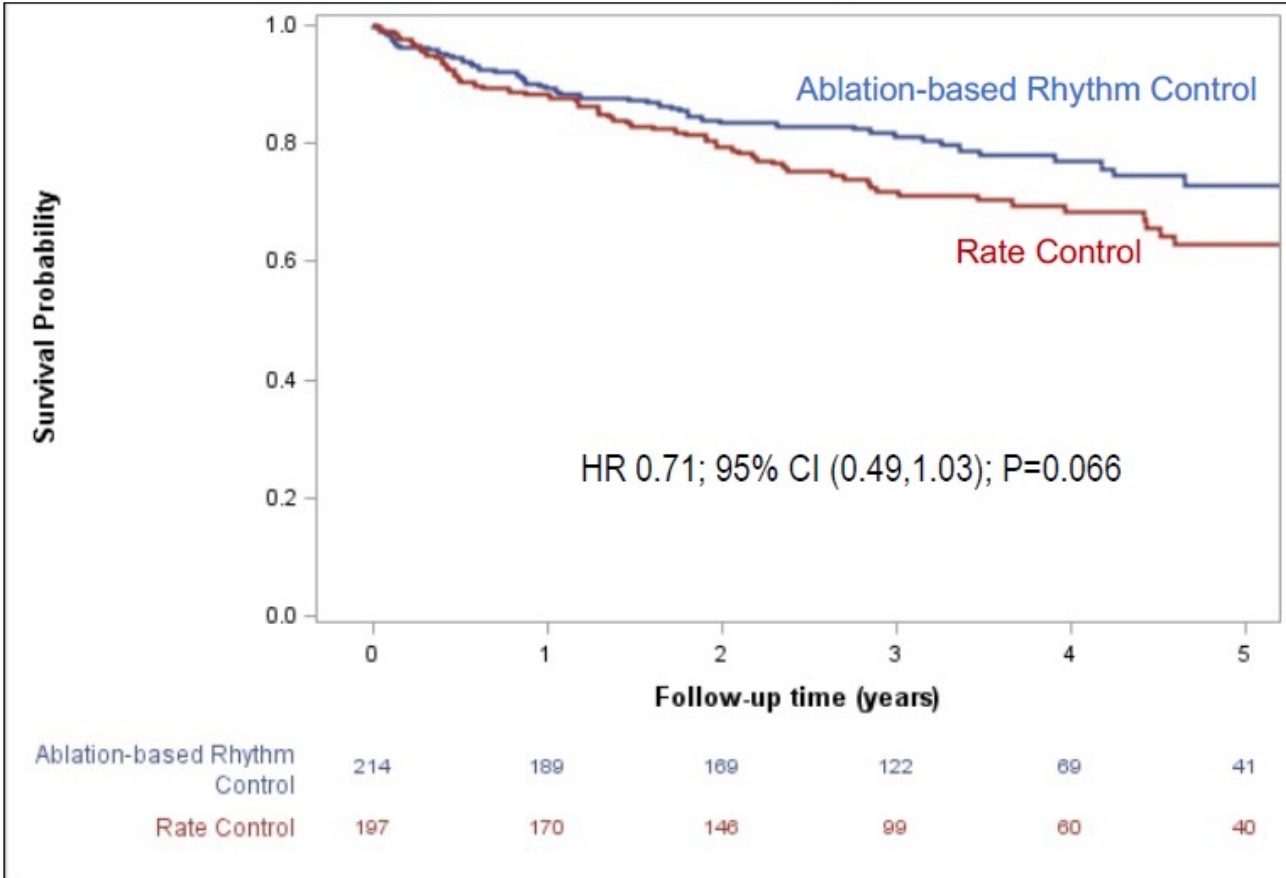
The reduction of AF burden by catheter ablation to <50% was associated with a decrease in (A) primary composite endpoint, (B) all-cause mortality, and (C) wHF hospitalization. AF = atrial fibrillation; FUP = follow-up; HF = heart failure; wHF = worsening heart failure.





# Randomized Ablation-Based Rhythm-Control Versus Rate-Control Trial in Patients With Heart Failure and Atrial Fibrillation: Results from the RAFT-AF trial

Ratika Parkash<sup>1</sup>, MD, MSc; George A. Wells, PhD; Jean Rouleau, MD; Mario Talajic<sup>2</sup>, MD; Vidal Essebag<sup>3</sup>, MD, PhD; Allan Skanes, MD; Stephen B. Wilton<sup>4</sup>, MD, MSc; Atul Verma<sup>5</sup>, MD; Jeffrey S. Healey<sup>6</sup>, MD, MSc; Laurence Sterns, MD; Matthew Bennett, MD; Jean-Francois Roux, MD; Lena Rivard<sup>7</sup>, MD; Peter Leong-Sit, MD; Mats Jensen-Urstad, MD; Umjeet Jolly, MD; Francois Philippon, MD; John L. Sapp<sup>8</sup>, MD; Anthony S.L. Tang, MD



## AF yükü yüksek hastalar

- Paroksizmal AF (6 ayda > 4 atak)
- Persistent ve uzun süreli Persistent AF (< 3 yıl)
- NYHA II-III, HFrEF, HFpEF
- Artmış NT-proBNP
- Birincil sonlanım: Tüm nedenlere bağlı mortalite ve KY olayları

**% 41 EF ortalaması**



## ORIGINAL ARTICLE

# Catheter Ablation in End-Stage Heart Failure with Atrial Fibrillation

- **Transplantasyon değerlendirilmesi için sevk edilen son evre kalp yetersizliği hastaları  $\geq$  %68 NYHA III**
- **Birincil sonlanım: Herhangi bir nedenden ölüm, LVAD imp., açık kalp nakli**
- **İkincil sonlanım: Birincile ek KVS nedeniyle ölüm, LVEF, 6-12. ay AF yükü**

**Table 2. Primary and Secondary End Points.**

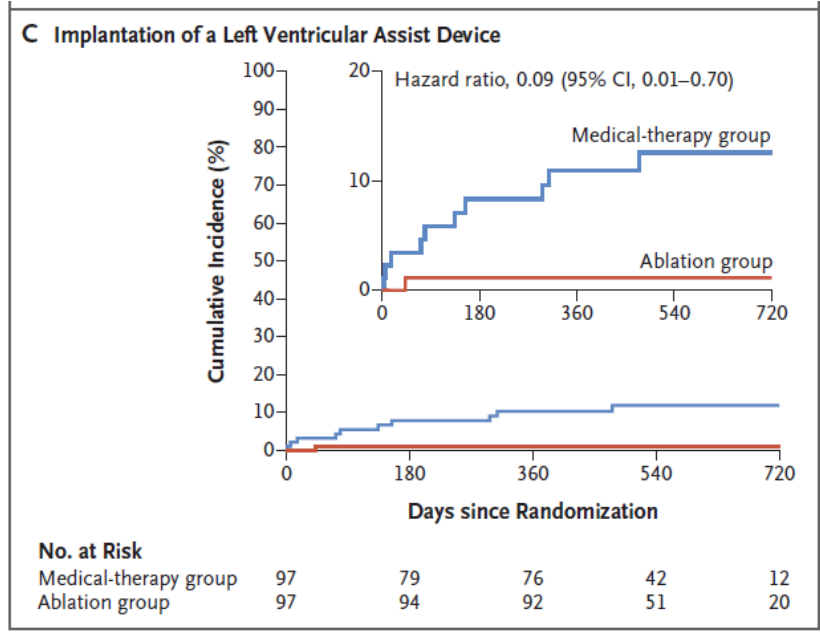
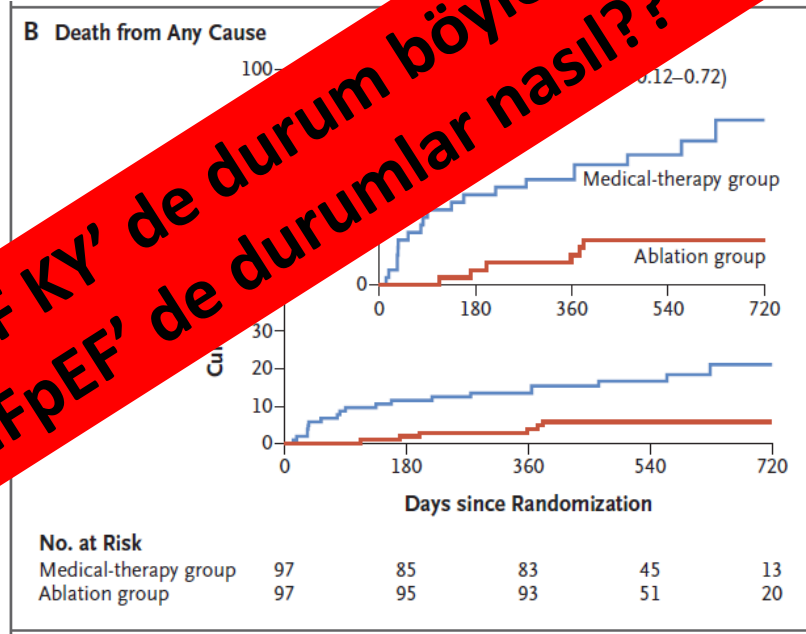
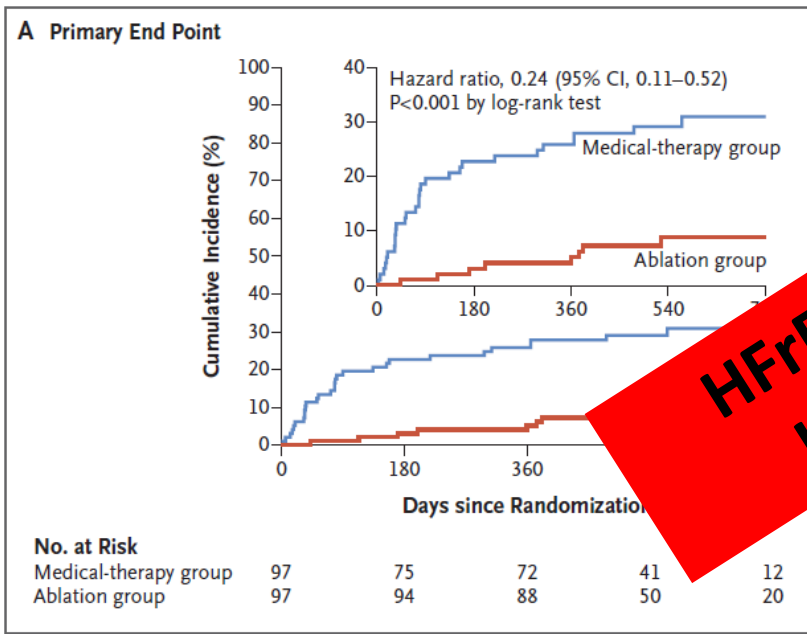
End Point	Ablation Group (N=97)	Medical-Therapy Group (N=97)	Hazard Ratio (95% CI)*	P Value†
	<i>no. (%)</i>			
Primary end point‡	8 (8)	29 (30)	0.24 (0.11 to 0.52)	<0.001
Secondary end points				
Death from any cause	6 (6)	19 (20)	0.29 (0.12 to 0.72)	
Cardiovascular	5 (5)	18 (19)	0.25 (0.09 to 0.68)	
Cerebrovascular	0	1 (1)		
Cancer	1 (1)	0		
Death after nonfatal primary end point	0	5 (5)		
Implantation of left ventricular assist device	1 (1)	10 (10)	0.09 (0.01 to 0.70)	
Urgent heart transplantation	1 (1)	6 (6)	0.15 (0.02 to 1.25)	

**Table 1. Characteristics of the Patients at Baseline.\***

Characteristic	Ablation Group (N=97)	Medical-Therapy Group (N=97)
Age — yr	62±12	65±10
Male sex — no. (%)	85 (88)	72 (74)
Body-mass index†	28±4	28±5
NYHA functional class — no. (%)‡		
II	33 (34)	28 (29)
III	52 (54)	54 (56)
IV	12 (12)	15 (15)
Left ventricular ejection fraction — %	29±6	25±6
Type of atrial fibrillation — no. (%)		
Paroxysmal	28 (29)	31 (32)
Persistent	54 (56)	54 (56)
Long-standing persistent: duration of >1 yr	15 (15)	12 (12)
Duration of atrial fibrillation — yr	4±5	3±4
History of cardioversion — no. (%)	64 (66)	62 (64)
Heart rate — beats/min	80±21	82±20
Cause of heart failure — no. (%)		
Ischemic	37 (38)	39 (40)
Nonischemic	60 (62)	58 (60)
Left atrial diameter — mm	49±6	48±8
Diabetes mellitus — no. (%)	25 (26)	31 (32)
Implantable cardiac device — no. (%)		
ICD	57 (59)	52 (54)
CRT-D	35 (36)	38 (39)
Rhythm monitor	3 (3)	4 (4)
Pacemaker	2 (2)	3 (3)
N-terminal pro-BNP level		
No. of patients evaluated (%)	46 (47)	52 (54)
Value — pg/ml	3852±3261	4461±5191
6-Min walk test		
Test performed — no. (%)	26 (27)	24 (25)
Distance — m	308±69	299±66
Test not feasible — no. (%)	71 (73)	73 (75)
Medications — no. (%)		
Amiodarone	44 (45)	46 (47)
Beta-blocker	93 (96)	91 (94)
Diuretic	71 (73)	76 (78)
ACE inhibitor or ARB	31 (32)	40 (41)
MRA	45 (46)	53 (55)
Sacubitril-valsartan	66 (68)	57 (59)
SGLT2 inhibitor	23 (24)	24 (25)

# CASTLE – HTX SONUÇLARI

**HFrEF KY' de durum böyle iken  
HFpEF' de durumlar nasıl??**



# HFpEF KY ' de AF Ablasyonu faydalı mı??

Circulation

ORIGINAL RESEARCH ARTICLE

## Ablation Versus Drug Therapy for Atrial Fibrillation in Heart Failure

Results From the CABANA Trial

- Toplam 2204 hastalık çalışma
- 778 (%35) hasta > NYHA II, alt analiz
- 378 ablasyon 400 ilaç grubu
- Birincil sonlanım: Ölüm, inme, ciddi kanama ve arrest birleşimi
- %9,3 hastada EF<%40, %11,7 hastada EF: 40-50

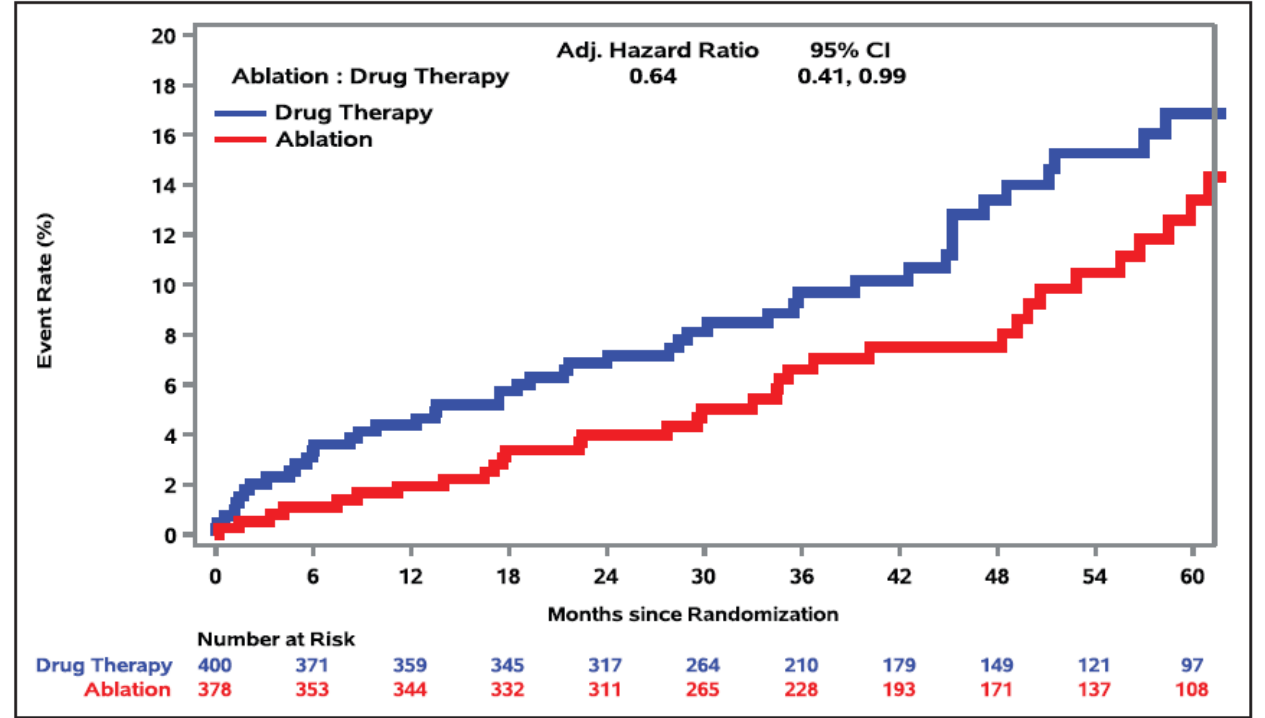





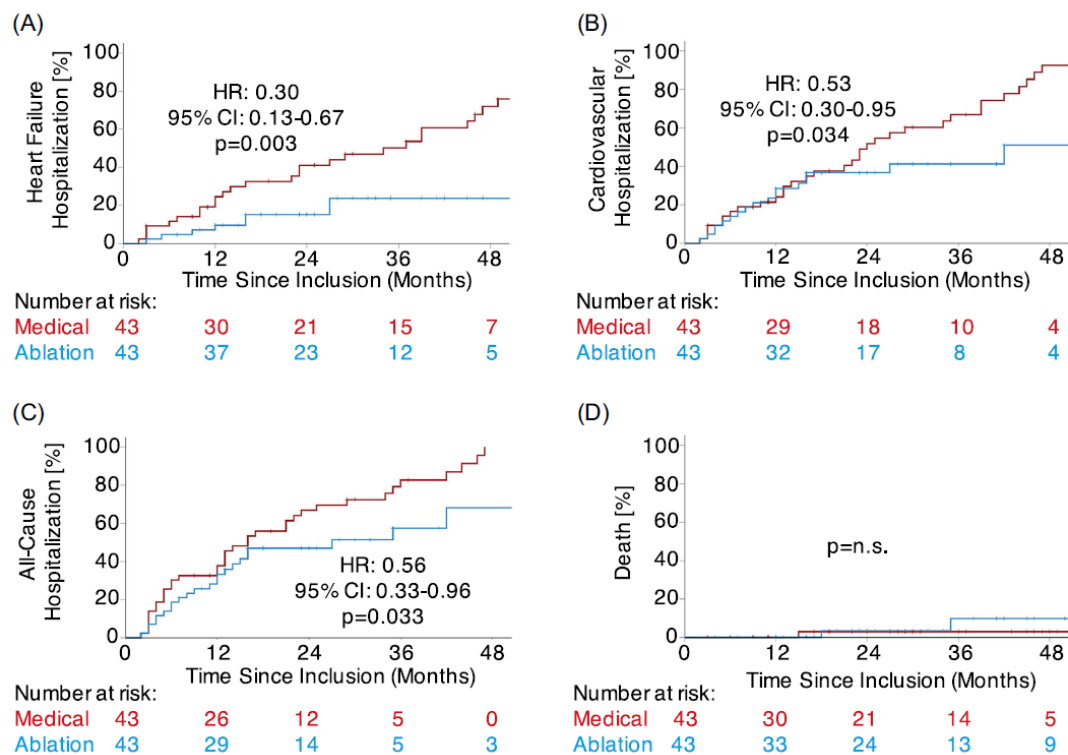
Figure 1. Primary composite end point (death, disabling stroke, serious bleeding, or cardiac arrest) Kaplan-Meier curves by intention-to-treat among CABANA heart failure patients.

CABANA indicates Catheter Ablation Versus Antiarrhythmic Drug Therapy for Atrial Fibrillation.


# HFpEF KY ' de AF Ablasyonu faydalı mı??

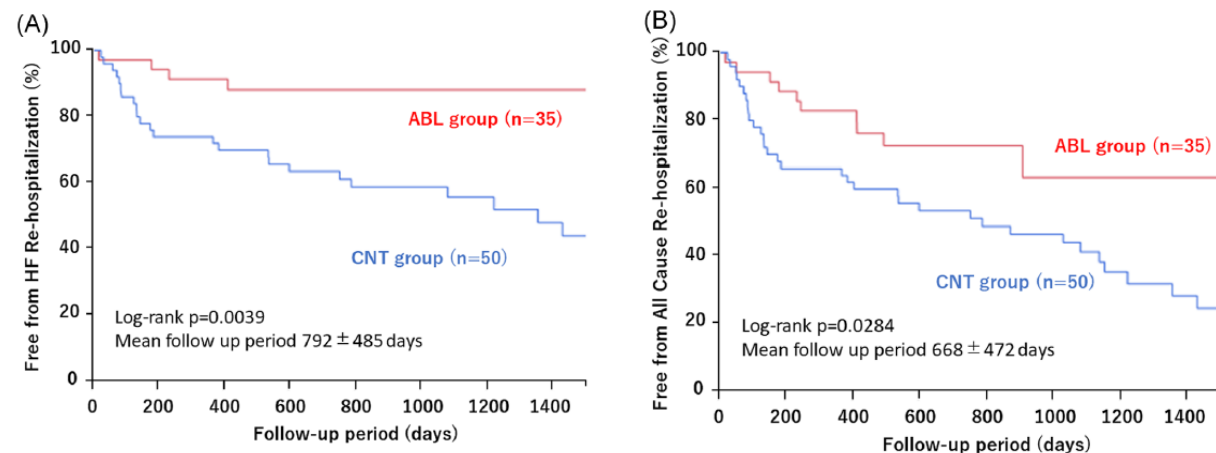
## Catheter ablation for atrial fibrillation in HFpEF patients—A propensity-score-matched analysis

Manuel Rattka MD  | Anna Kühberger | Alexander Pott MD |  
 Tilman Stephan MD | Karolina Weinmann MD  | Michael Baumhardt MD |  
 Deniz Aktolga MD | Yannick Teumer MD | Carlo Bothner MD |  
 Dominik Scharnbeck MD | Wolfgang Rottbauer MD | Tillman Dahme MD 



## Catheter ablation of atrial fibrillation reduces heart failure rehospitalization in patients with heart failure with preserved ejection fraction

Akira Fukui MD, PhD<sup>1</sup>  | Tomomi Tanino MD<sup>1</sup> | Takanori Yamaguchi MD<sup>2</sup> |  
 Kei Hirota MD<sup>1</sup> | Shotaro Saito MD, PhD<sup>1</sup> | Norihiro Okada MD, PhD<sup>1</sup> |  
 Hidefumi Akioka MD, PhD<sup>1</sup> | Tetsuji Shinohara MD, PhD<sup>1</sup> | Kunio Yufu MD, PhD<sup>1</sup> |  
 Naohiko Takahashi MD, PhD<sup>1</sup>



# HFpEF KY ' de AF Ablasyonu faydalı mı??

Studies	Study Design	Sample Size	Primary Outcome	Follow-Up (Years)	Findings
(publication year) Ref					
Fukui et al. (2020) [81]	Single-center retrospective cohort study	85	HF readmission	2.2	Significant association between CA and a lower risk of HF readmission
Arora et al. (2020) [83]	Retrospective cohort study using a national database	56,395	Death + HF readmission	1	No association between CA and better prognosis
Rattka et al. (2021) [82]	Single-center retrospective cohort study	127	Death + HF readmission	1.5	Significant association between CA and a lower risk of the primary outcome

Abbreviations: CA = catheter ablation; HF = heart failure.

AMPERE

CABA HFpEF

TAP-CHF

# KY-AF RİTİM KONTROL ÇALIŞMALARININ ÖZETİ

**TABLE 27** Randomized Trials of Rhythm Control in HF

Study/ Author (y)	No. Pts.	Inclusion	Exclusion	Intervention	Primary Outcome	Death and Hospitalization	Death	Hospitalizations	Reduction in AF	LVEF	QOL	6MWT	Peak VO <sub>2</sub> Max	BNP
Roy (2008) <sup>60</sup>	1376	LVEF <35%, CHF		AAD (primarily amiodarone) vs rate control	Cardiovascular mortality was no different between rhythm vs rate control	No change	No difference	No difference						
MacDonald (2011) <sup>8</sup>	41	Persistent AF; LVEF <35%, CHF II-IV	PAF; QRS >150	RF to medical therapy	Similar increase in CMR LVEF			No difference	Improved with RF	Improved	No change	No change		
ARC-HF: Jones (2013) <sup>5</sup>	52	Persistent AF; LVEF <35%, CHF		RF to medical therapy	Improvement in peak VO <sub>2</sub> with RF	No change	No difference	No difference		No change	Improved with RF	No change	Improved	
CAMTAF (2014) <sup>5</sup>	50	Persistent AF; LVEF <50%; CHF		RF to medical therapy	LVEF significantly improved with RF	No change	No difference			Improved	Improved with RF		Improved	
AATAC (2016) <sup>4</sup>	203	Persistent AF; LVEF <40%, CHF II-III		RF to amiodarone	At 24 mo, RF patients more likely to be in NSR	Improvement with RF	Improved	Improved		Improved	Improved with ablation	Improved		
CAMERA MRI (2017) <sup>12</sup>	66	Persistent AF; LVEF <45%, CHF II-III; idiopathic CM		RF to medical therapy	Improved LVEF with RF					Improved	No change	No change		Improved
CASTLE-AF (2018) <sup>9</sup>	363	PAF or persistent AF; LVEF <36%, CHF II-IV and ICD		RF to medical therapy	Composite of death and hospitalization lower with RF	Improvement with RF	Improved	Improved		Improved				



# KY-AF ABLASYON ÇALIŞMALARININ ÖZETİ-2

**TABLE 27** Continued

Study/ Author (y)	No. Pts.	Inclusion	Exclusion	Intervention	Primary Outcome	Death and Hospitalization	Death	Hospitalizations	Reduction in AF	LVEF	QOL	6MWT	Peak VO <sub>2</sub> Max	BNP
AMICA (2019) <sup>7</sup>	140	Persistent AF; LVEF <36%		RF to medical therapy	No difference in change in LVEF					No change	No change	No change		No change
CABANA substudy (2021) <sup>14</sup>	778	Clinical HF (largely HFpEF)		RF to medical therapy	Decrease in composite of MACE		Improved		Improved with RF		Improved with RF			
RAFT-AF (2022) <sup>11</sup>	411	≥4 PAF/y or persistent AF, NYHA class II or III HF, elevated pro- BNP		RF to medical therapy	No difference in change in mortality/HF	No difference in change in mortality/HF	No change	No change	Improved with RF	Improved with RF	Improved with RF	Improved with RF		Improved with RF
Meta- analysis- Turagam (2019) <sup>13</sup>	775			RF to medical therapy			Improved	Reduced		Improved	Improved	Improved		Improved
Meta- analysis- Chen (2020) <sup>3</sup>	1112			RF to medical therapy			Improved	Reduced	Improved with RF	Improved	Improved			
Meta- analysis- Pan (2021) <sup>10</sup>	775			RF to medical therapy			Improved	Reduced		Improved	Improved	Improved		

AAD indicates antiarrhythmic drug; AATAC, Ablation vs Amiodarone for Treatment of Atrial Fibrillation in Patients With Congestive Heart Failure and an Implanted ICD/CRTD; AF, atrial fibrillation; AMICA, Atrial Fibrillation Management in Congestive Heart Failure With Ablation; ARC-HF, A Randomised Trial to Assess Catheter Ablation Versus Rate Control in the Management of Persistent Atrial Fibrillation in Chronic Heart Failure; BNP, brain natriuretic peptide; CABANA, Catheter Ablation vs Antiarrhythmic Drug Therapy for Atrial Fibrillation; CAMERA MRI, Catheter Ablation versus Medical Rate Control in Atrial Fibrillation and Systolic Dysfunction-an MRI-Guided Multi-centre Randomised Controlled Trial; CAMTAF, Catheter Ablation Versus Medical Treatment of AF in Heart Failure; CASTLE-AF, Catheter Ablation versus Standard Conventional Therapy in Patients with Left Ventricular Dysfunction and Atrial Fibrillation; CHF, congestive heart failure; CM, cardiomyopathy; CMR, cardiac magnetic resonance; HF, heart failure; HFpEF, heart failure with persistent ejection fraction; ICD, implantable cardioverter-defibrillator; LVEF, left ventricular ejection fraction; MACE, major adverse cardiovascular events; NSR, normal sinus rhythm; NYHA, New York Heart Association; PAF, paroxysmal atrial fibrillation; QOL, quality of life; RAFT-AF, Rhythm Control-Catheter Ablation With or Without Anti-arrhythmic Drug Control of Maintaining Sinus Rhythm Versus Rate Control With Medical Therapy and/or Atrio-ventricular Junction Ablation and Pacemaker Treatment for Atrial Fibrillation; RF, radiofrequency; VO<sub>2</sub> max, maximal oxygen consumption; 6MWT, 6-minute walk test.

## 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation

A Report of the American College of Cardiology/American Heart Association  
Joint Committee on Clinical Practice Guidelines

Developed in Collaboration With and Endorsed by the American College of Clinical Pharmacy  
and the Heart Rhythm Society

	COR	LOE	RECOMMENDATIONS
★	1	B-NR	1. In patients who present with a new diagnosis of HFrEF and AF, <u>arrhythmia-induced cardiomyopathy should be suspected, and an early and aggressive approach to AF rhythm control is recommended.</u> <sup>1,2</sup>
★	1	A	2. In appropriate patients with AF and HFrEF who are on GDMT, and <u>with reasonable expectation of procedural benefit (Figure 24), catheter ablation is beneficial to improve symptoms, QOL, ventricular function, and cardiovascular outcomes.</u> <sup>3-13</sup>
★	2a	B-NR	3. In appropriate patients with symptomatic AF and HFpEF with reasonable expectation of benefit, catheter ablation can be useful to improve symptoms and improve QOL. <sup>14-19</sup>
	2a	B-R	6. In patients with AF, HFrEF (LVEF <50%), and refractory heart failure with a nonventricular response who are not candidates for or in whom rhythm control has failed, biventricular pacing therapy can be useful to improve symptoms, QOL, and EF. <sup>20-23</sup>
	2a	B-NR	7. In patients with AF, HF, and impaired ventricular function, biventricular pacing therapy in whom an effective pacing percentage cannot be achieved with single-chamber pacing and medical therapy, AVNA can be beneficial to improve functional class, <sup>24,25</sup> reduce the risk of hospitalization, <sup>24,25</sup> and improve survival. <sup>24,25</sup>
	2a	B-NR	8. In patients with AF and HFpEF and arrhythmia-induced cardiomyopathy who have recovered LV function, long-term surveillance can be beneficial to detect recurrent AF in view of the high risk of recurrence of arrhythmia-induced cardiomyopathy. <sup>26-28</sup>
	2b	C-LD	10. In patients with AF and HFrEF who undergo AVNA, conduction system pacing of the His bundle or left bundle branch area may be reasonable as an alternative to biventricular pacing to improve symptoms, QOL, and LV function. <sup>32-35</sup>

**Makul prosedürel fayda beklentisi??**

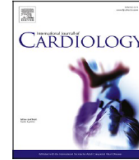
# HANGİ KY HASTASINA AF ABLASYONU YAPALIM??



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- Gözlemsel Retrospektif, tek merkezli bir çalışma
- Amaç: LVEF iyileştiricilerini öngörmek için tahmin modeli oluşturmak

A new prediction model for left ventricular systolic function recovery after catheter ablation of atrial fibrillation in patients with heart failure

*The ANTWOORD Study*

Marco Bergonti<sup>a,b,c,d,\*</sup>, Francesco Spera<sup>a</sup>, Maxime Tijssens<sup>a,d</sup>, Alice Bonomi<sup>b</sup>, Johan Saenen<sup>a,d</sup>, Wim Huybrechts<sup>a</sup>, Hielko Miljoen<sup>a</sup>, Anouk Wittcock<sup>e</sup>, Michela Casella<sup>f,g</sup>, Claudio Tondo<sup>b,c</sup>, Hein Heidbuchel<sup>a,d</sup>, Andrea Sarkozy<sup>a,d</sup>

**Table 1**

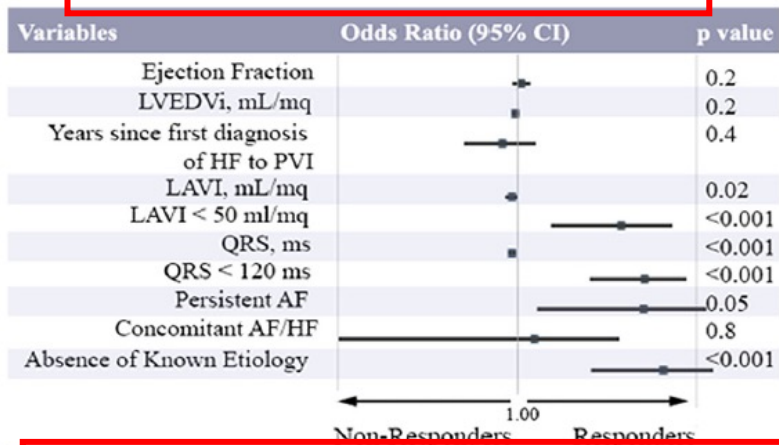
Baseline characteristics.

	Total			Responders			Non Responders			p value
	n = 111			n = 60	54%	n = 51	46%			
Age, years	60.7	±	9.7	59.8	±	10.5	61.7	±	8.4	0.3
Male Sex, n	68		61%	40		67%	28		55%	0.2
Hypertension, n	46		41%	26		43%	20		39%	0.7
Diabetes, n	15		14%	7		12%	8		16%	0.6
Previous TIA or Stroke, n	15		14%	5		8%	10		20%	0.1
CHADS-VASC	2.3	±	1.40	1.9	±	1.40	2.7	±	1.30	0.002
BMI	28.1	±	4.8	28.6	±	4.9	27.6	±	4.7	0.3
QRS Duration, msec	115	±	32	96	±	18	136	±	32	<0.001
QRS duration <120 msec, n	68		61%	52		87%	16		31%	<0.001
HFrEF	81		73%	41		68%	40		78%	0.5
HFmrEF	30		27%	19		32%	11		22%	0.4
Previous Hospitalization for HF, n	102		92%	51		85%	51		100%	0.004
Absence of known Etiology, n	67		60%	54		90%	13		25%	<0.001
ICD or CRT, n	34		31%	6		10%	28		55%	<0.001
CRT-D, n	16		14%	1		1%	15		30%	<0.001
Years of HF, n	1.1		0.4–3.9	0.8		0.2–1.5	2.4		0.6–4.6	<0.001
Persistent AF, n	91		82%	57		95%	34		67%	0.01
Years of AF	2.3		0.8–6.8	2.2		0.7–6.9	2.4		0.9–5.3	0.9
AF after HF, n	33		30%	0		0%	33		65%	<0.001
AF concomitant HF, n	48		43%	37		62%	11		22%	<0.001
EF, %	32.3	±	9.4	33.9	±	8.6	30.5	±	10.0	0.06
LVEDVi, mL/m <sup>2</sup>	74.1	±	27.6	66.0	±	26.7	83.4	±	25.7	0.001
LAVI, mL/m <sup>2</sup>	43.3	±	15.3	37.7	±	12.0	50.0	±	16.3	<0.001
LAVI >50 mL/m <sup>2</sup> , n	80		72%	52		87%	28		55%	<0.001

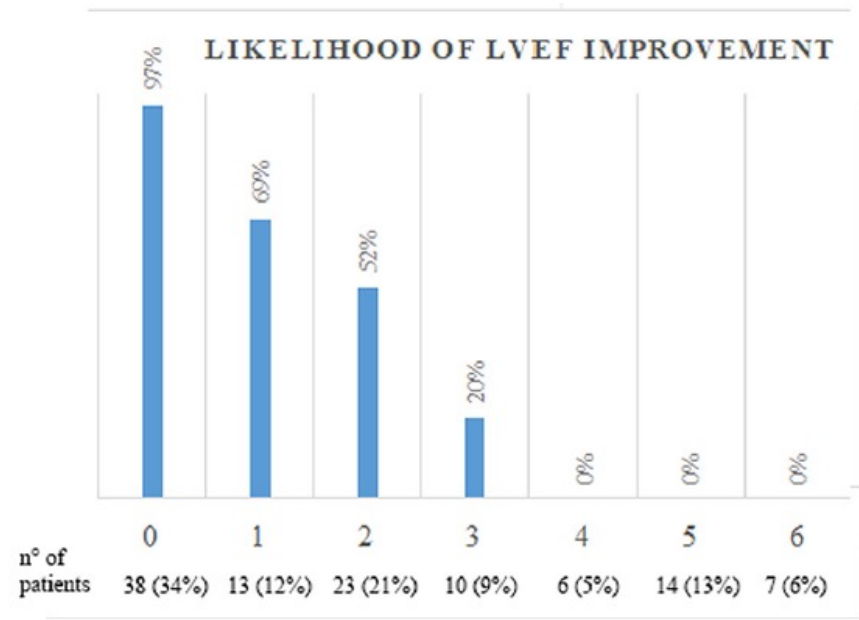
# ANTWOORD ÇALIŞMASI – ANTWERP SKORLAMASI

**Table 2**  
Predictors of LV function improvement.

	OR	Univariate Analysis			Multivariate Analysis			Sig.
		95% C.I.		Sig.	OR	95% C.I.		
		Lower	Upper			Lower	Upper	
Age	0.98	0.94	1.04	0.3				
EF, %	1.04	1.00	1.01	0.05	1.06	0.96	1.18	0.2
LVEDVi, mL/m <sup>2</sup>	0.97	0.95	0.99	0.002	0.98	0.96	1.01	0.2
LAVI, mL/m <sup>2</sup>	0.94	0.91	0.97	<0.001	0.92	0.87	0.98	0.002
QRS, ms	0.94	0.91	0.96	<0.001	0.93	0.89	0.96	<0.001
Years AF	1.03	0.94	1.13	0.5				
Years HF	0.66	0.53	0.84	0.001	0.81	0.53	1.30	0.4
Persistent AF	9.5	2.5	34.8	0.01	17.8	1.40	217.9	0.03
Concomitant AF and HF	5.8	2.5	13.6	<0.001	1.3	0.21	8.2	0.8
Absence of Known Etiology	26.3	9.1	75.4	<0.001	36.8	4.2	325.3	0.001
<b>Predictors of LV function improvement – DISCRETE variables</b>								
LAVI < 50 mL/m <sup>2</sup>	5.3	2.1	13.5	<0.001	9.1	1.8	47.9	<0.001
Persistent AF	9.5	2.5	34.8	0.01	7.4	1.0	55.8	0.05
QRS < 120 ms	14.2	5.5	36.8	<0.001	19.0	4.1	88.4	<0.001
Concomitant AF and HF	5.8	2.5	13.6	<0.001	0.9	0.2	3.4	0.8
Absence of Known Etiology	26.3	9.1	75.4	<0.001	33.5	6.0	187.4	<0.001

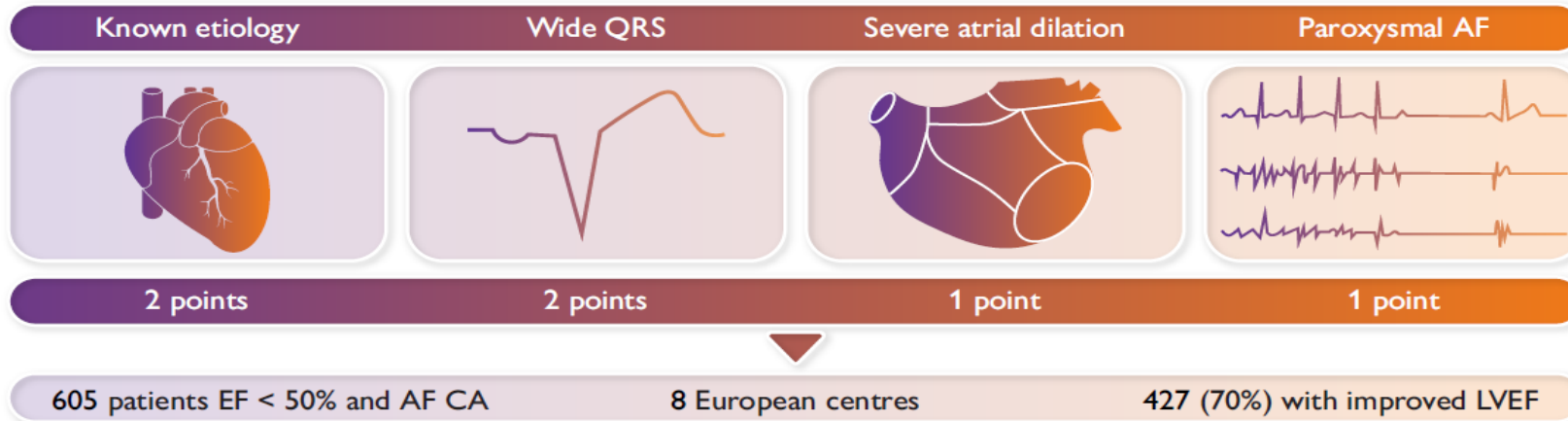


ANTWERP Score		
Known Etiology	2 Points	AUC = 0.931 (0.886-0.976) p < 0.001
QRS > 120 ms	2 Points	
Paroxysmal AF	1 Point	
LAVI > 50 mL/m <sup>2</sup>	1 Point	

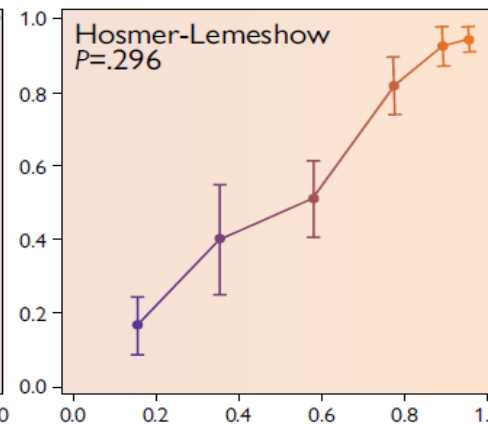
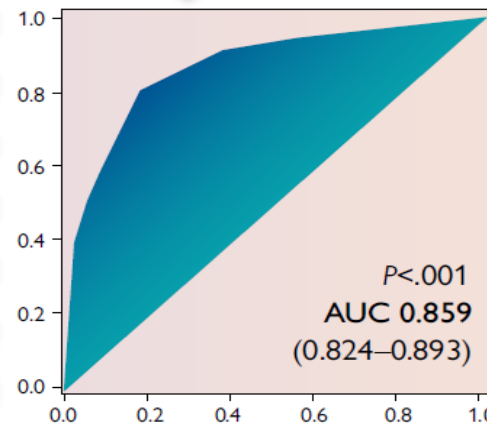


# Left ventricular functional recovery after atrial fibrillation catheter ablation in heart failure: a prediction model

A new prediction model for LVEF recovery after AF ablation in patients with HF



Score	n° Patients	Responders
0	191	94%
1	95	92%
2	98	82%
3	92	51%
4	45	40%
5-6	84	17%



**ANTWERP SKORU  
DOĞRULAMA**

**Primer sonlanım: İndeks prosedürden  
1 yıl sonra LVEF' de iyileşme**

**Table 2 Endpoints**

	<b>Responders</b>	<b>Non-Responders</b>	<b>HR</b>	<b>Lower 95%CI</b>	<b>Upper 95% CI</b>	<b>P-value</b>
Arrhythmia recurrence						
AF or AT recurrences	118/385 (30.6%)	86/167 (51.5%)	0.53	0.40	0.71	<.001
Paroxysmal AF recurrence >30 s	81/385 (21.0%)	29/167 (17.4%)	1.18	0.76	1.82	.47
Persistent AF recurrence	37/385 (9.6%)	57/110 (34.1%)	0.23	0.15	0.36	<.001
	<b>Responders</b>	<b>Non-Responders</b>	<b>OR</b>	<b>Lower 95%CI</b>	<b>Upper 95% CI</b>	<b>P-value</b>
Permanent AF	12/340 (3.5%)	19/152 (12.5%)	0.26	0.12	0.54	<.001
Death or heart transplantation	5/342 (1.5%)	18/156 (11.5%)	0.11	0.04	0.31	<.001
Heart failure hospitalization	13/342 (3.8%)	47/156 (30.1%)	0.09	0.05	0.18	<.001
Positive left ventricular remodelling	79/162 (48.8%)	11/114 (9.6%)	8.91	4.45	17.84	<.001

Univariate COX regression (upper part) and logistic regression (lower part) analyses for predictors of AF recurrence after catheter ablation, comparing anterior mitral line (AML) and non-AML group.

AF, atrial fibrillation; AT, atrial tachycardia; CI, confidence interval; HR, hazard ratio; OR, odds ratio.

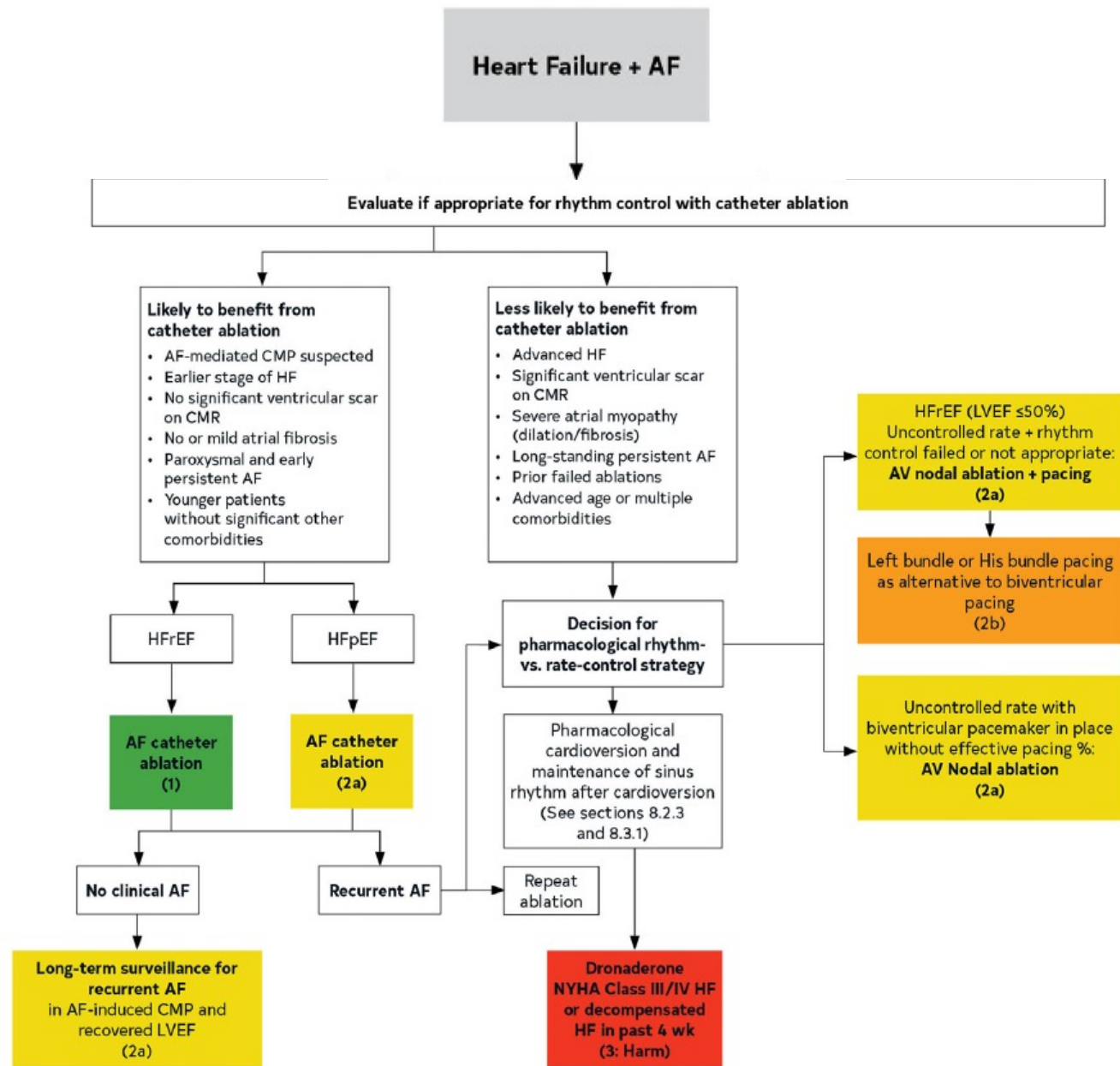
Positive remodelling was defined as > or = 15% reduction in left ventricular end-systolic volume (LVEDV).

- **Bu bulgular, gelecekteki klinik çalışmalarda AF ablasyonuna yönlendirmeye ilişkin ortak karar verme sürecini standardize etmek için ANTWERP skorunun kullanılmasını desteklemektedir.**

# 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

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# Sadece PVI mi??

**Recommendations for Techniques and Technologies for AF Catheter Ablation**  
Referenced studies that support the recommendations are summarized in the [Online Data Supplement](#).

COR	LOE	RECOMMENDATIONS
1	A	1. In patients undergoing ablation for AF, PVI is recommended as the primary lesion set for all patients unless a different specific trigger is identified. <sup>1-7</sup>
2b	B-R	2. In patients undergoing ablation for AF, the value of other endpoints beyond PVI such as noninducibility and ablation of additional anatomic ablation targets (eg, posterior wall sites, low voltage areas, complex fractionated electrograms, rotors) is uncertain. <sup>8-18</sup>



# Gelecekte Beklentiler

- ANTWERP skoru  $\leq 2$  ve  $\geq 5$  olan hastalarda strateji belirliken, skor 3-4 olan hastalarda (beklenen iyileşme oranı %47), tanısal değerlendirmeleri iyileştirmek için kardiyak MR gibi daha ileri tanısal testlerden faydalanılabilir.
- İşlem öncesi etiyojolojiye ve AF yüküne yönelik kardiyak MR ile atriyal ve ventriküler fibrozisin değerlendirilmesinin yaygınlaşması
- AF yükünün öneminin doğrulanmasına yönelik yeni çalışmalar
- Ablasyon uygulanan hastaların takibinde tanısal hafıza ve uzaktan izlemeye sahip ILC'lerin geliştirilmesi
- Sadece PVI mi, ek lezyonlar mutlaka koyalım mı?? Buna yönelik çalışmalar??

# VAKA 1

22 yaş erkek hasta. DM, HT, KAH yok. Sigara, alkol yok.

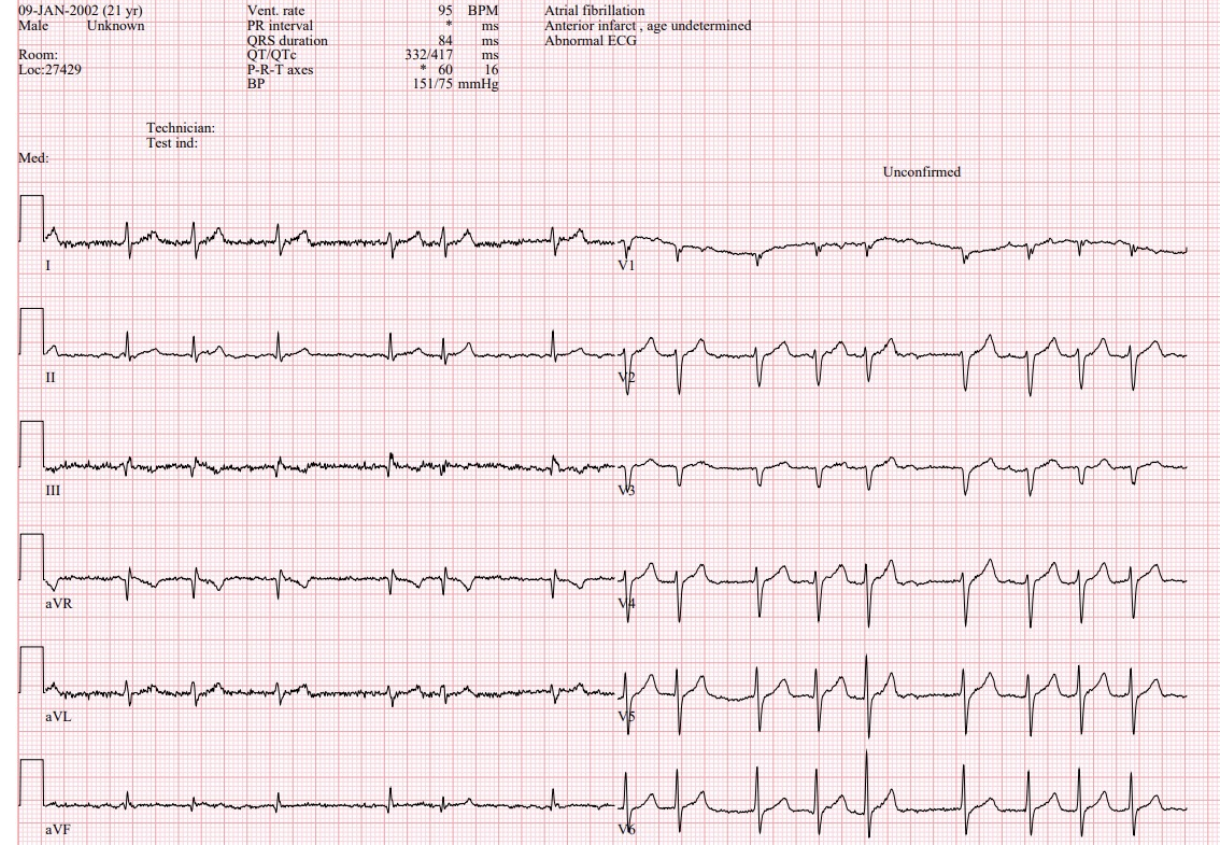
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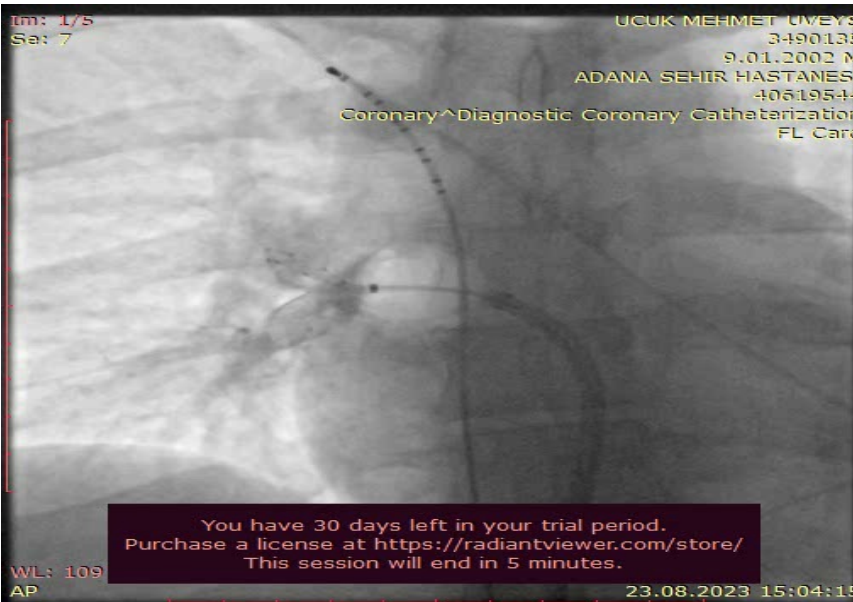
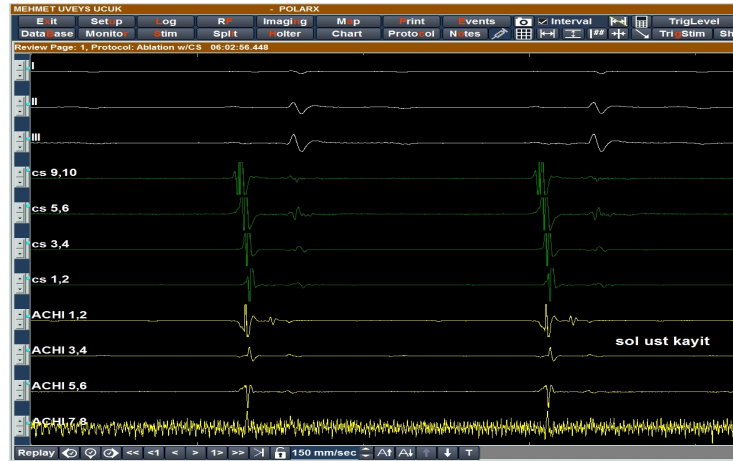
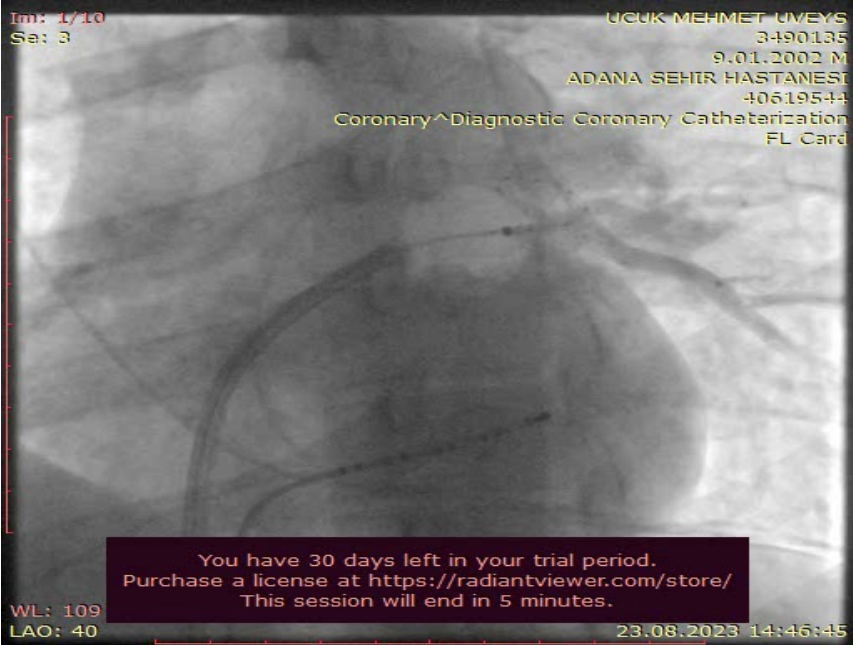
2 yıl önce akut AF nedeniyle CV. 2 yıl önce EKO normal

Çarpıntı, dispne (2 yıldır progresif)

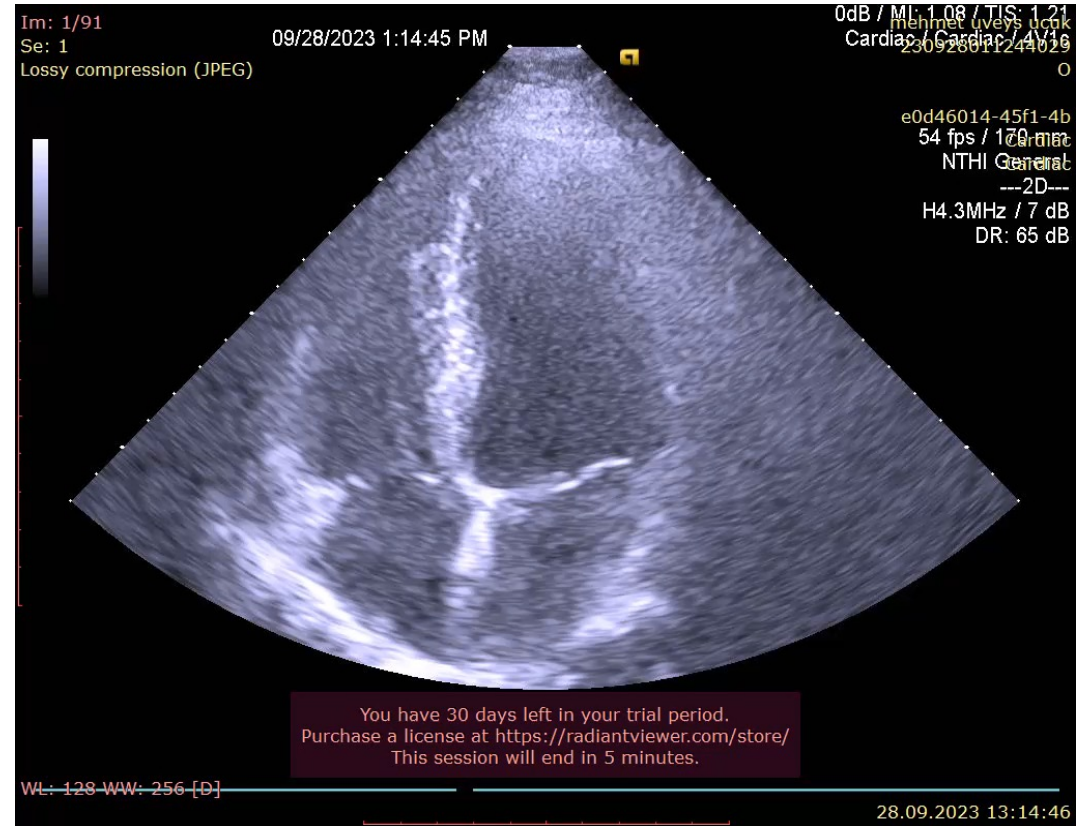
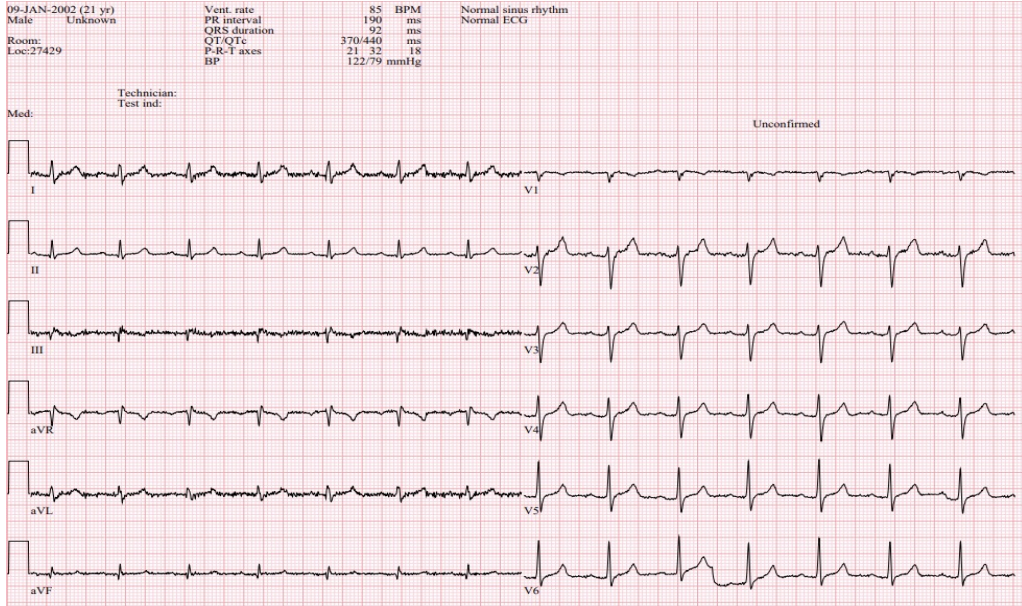
Dış merkezden AF ablasyonu amacıyla yönlendirildi

- EF %30
- LA 42 mm
- 1-2 MY





# 2. AY KONTROL EKO



# VAKA 2

50 yaşında erkek,

Bilinen HT, AF, KKY tanılı hastanın rutin kontrollerinde ritmi AF olarak görülmüş.

DCCV planıyla KYBÜ'ye kabul edildi.

Kardiyak öykü:

KAG: 2 kez (medikal, sonuncusu 3 ay önce)

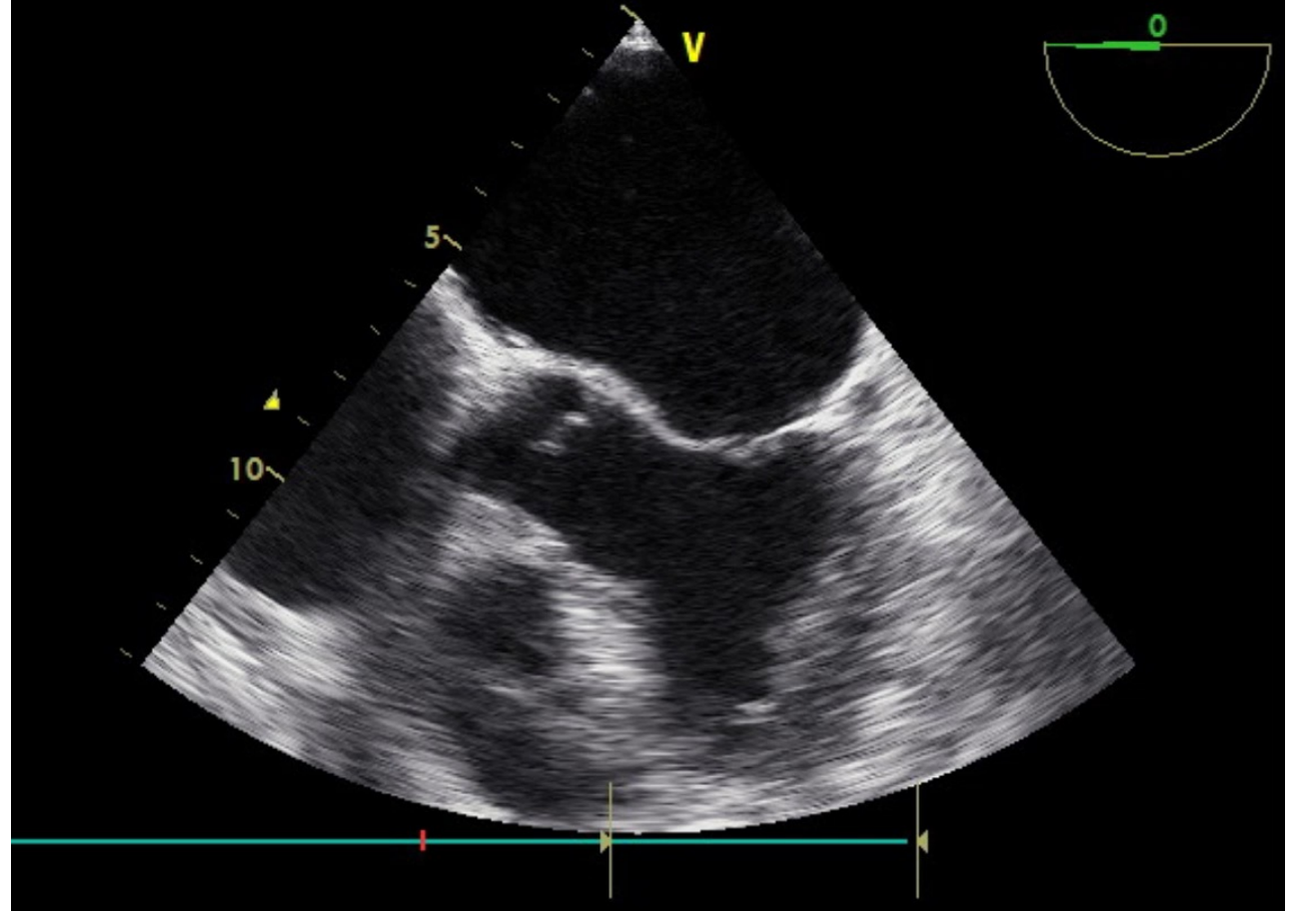
ICD: Yok (önerilmiş)

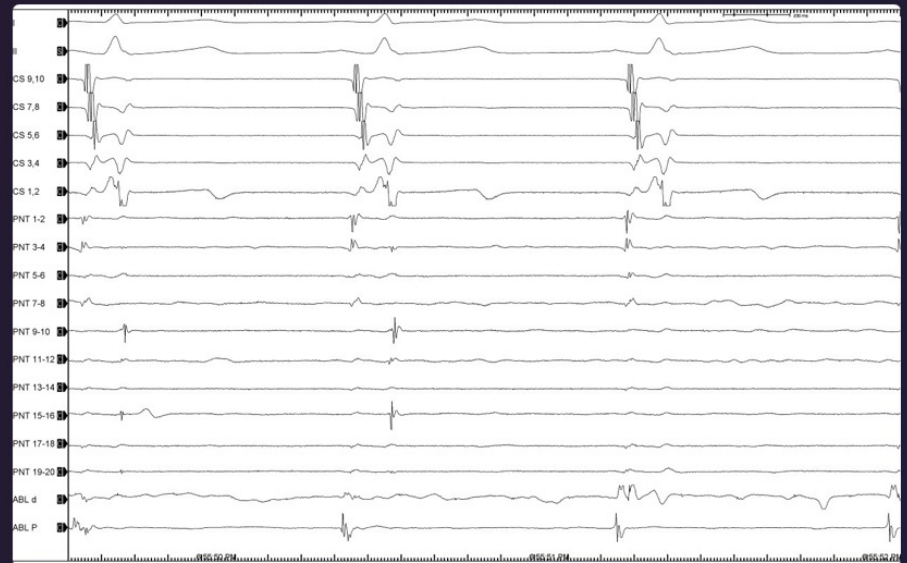
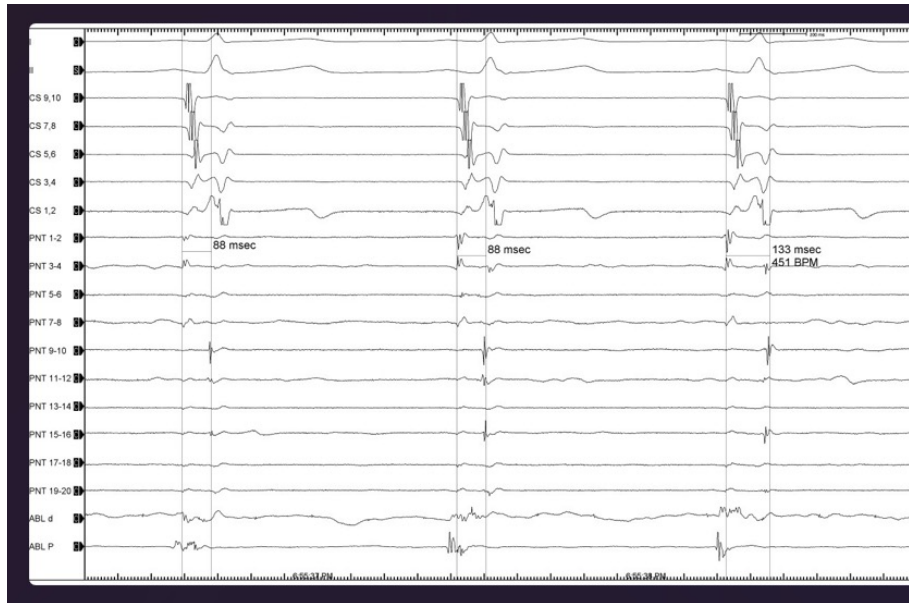
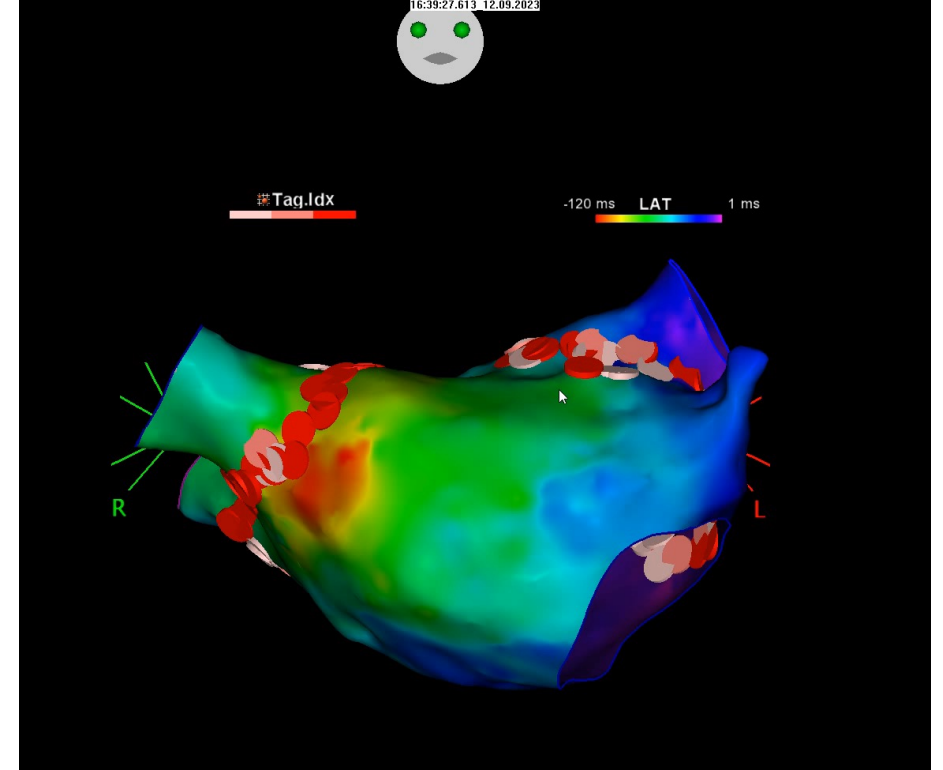
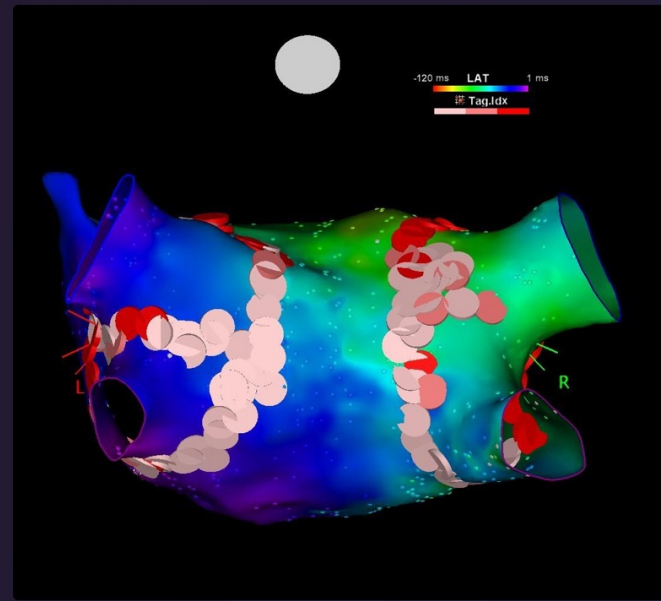
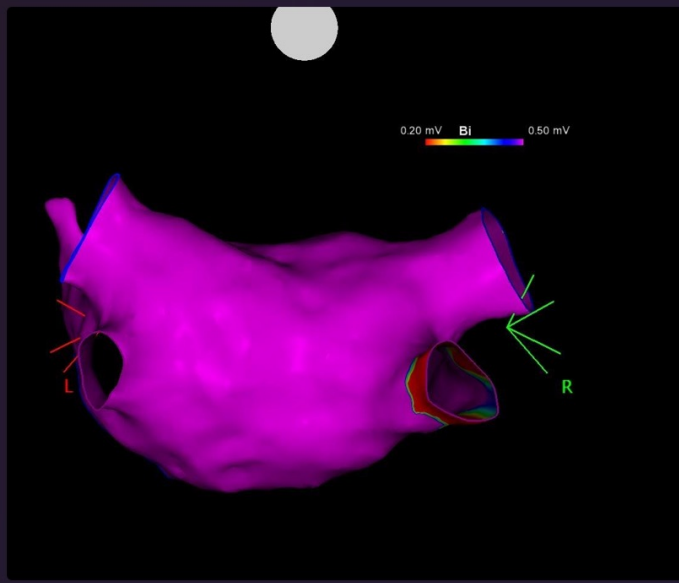
Ablasyon : Yok (önerilmiş)

Efor dispnesi: Var

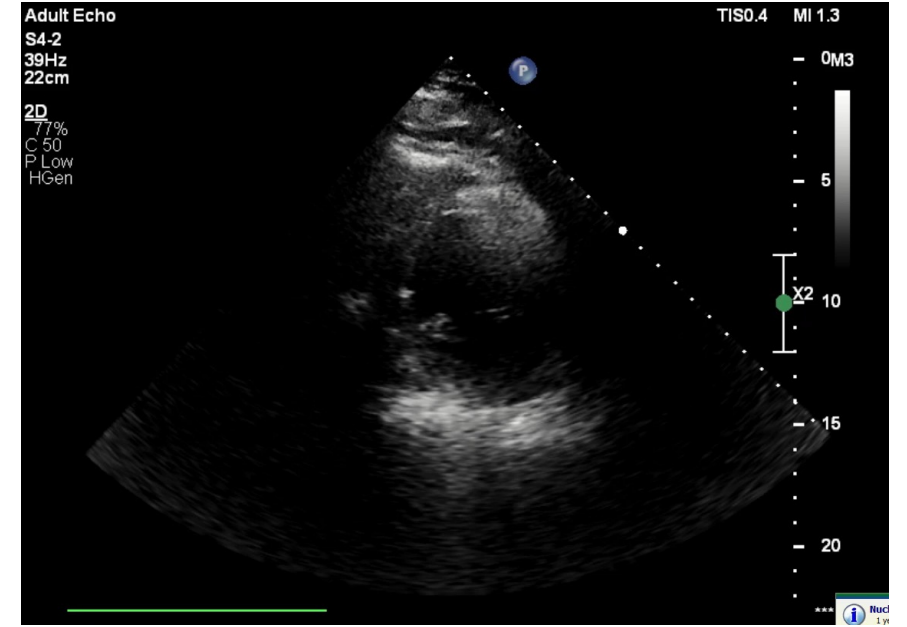
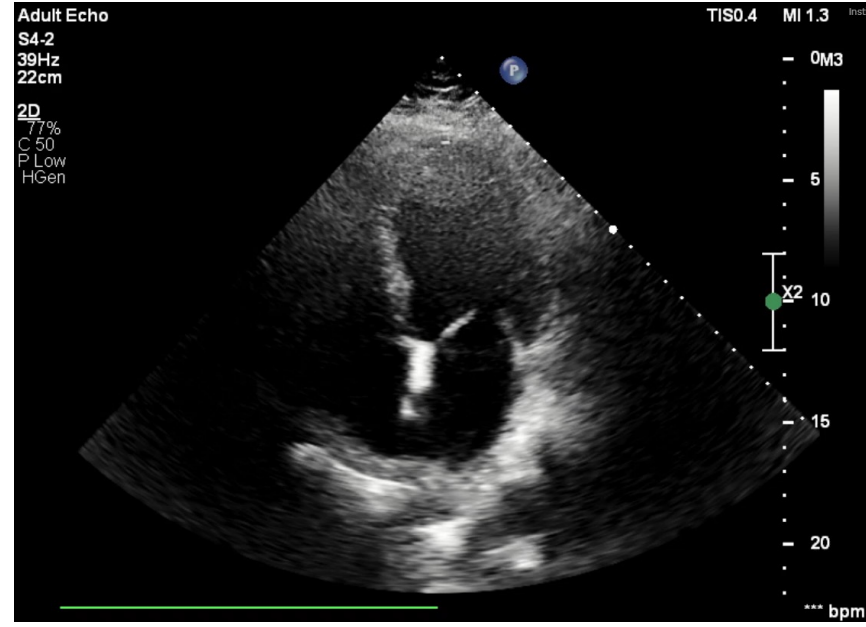
Ayaklarda şişme: Var

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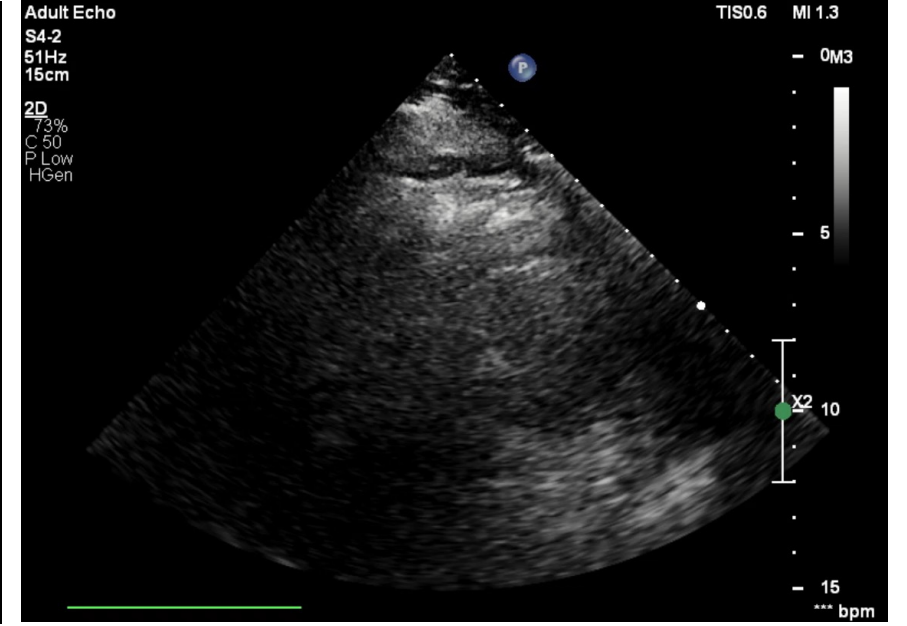
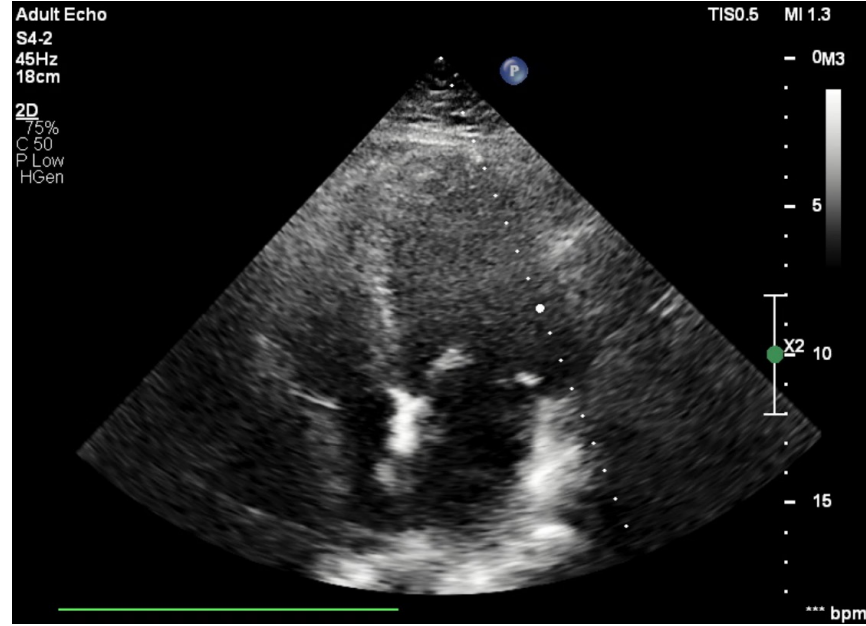




Ritim sinüs Ablasyon sonrası  
1. ayda



Ritim sinüs Ablasyon sonrası  
8. ayda





# ADANA ŐEHİR EĐİTİM VE ARAŐTIRMA HASTANESİ



TEŐEKKŐRLER