

Invasive treatment of Atrial Fibrillation

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Disclosures

- ▶ None



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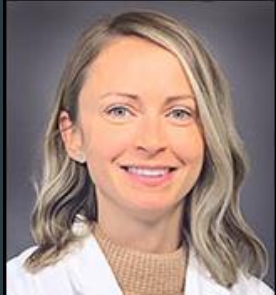
Tracy Hagerty, MD



**Margaret
MacDonald**



Nancy Strong



**Elysha
Wiest**



Tyler Hauf



**Susan A.
Hamlyn-Prescott**



Nicole Habel



**Deb
Moyer**

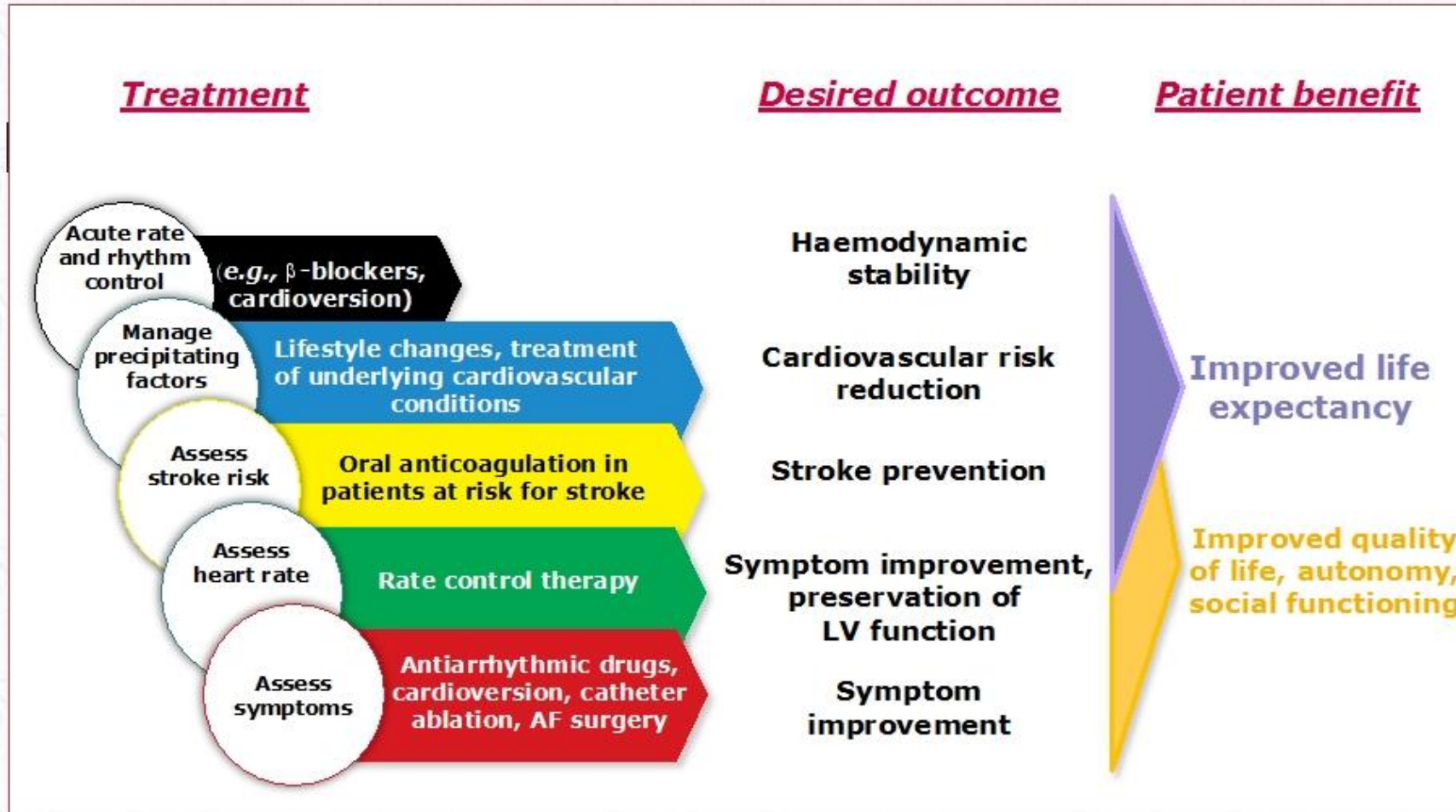


Maggie Infeld

Sue Calame - Manager - 2007
Gregory Johnson - 2001
Darlene Maxwell - 2003
Patrick Weber - 2003
Julie Eastman - 2004
Heather Kinsey - 2016
Maureen Frede - 2018
Maureen Sullivan - 2019
Danny Williams - 2019
Adam Gray - 2019
Patra Vail "Happy" - 2020
Erin Blake - 2020
Liza Martin - 2021
Amanda Taylor - 2022



The Five Domains of Integrated AF Management



Outline

A- AF ablation:

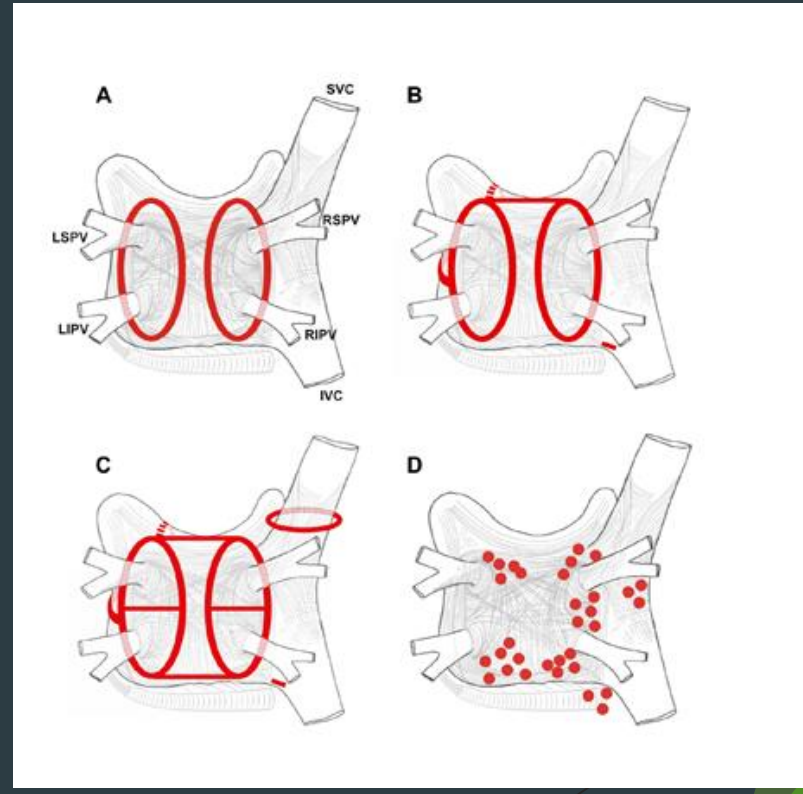
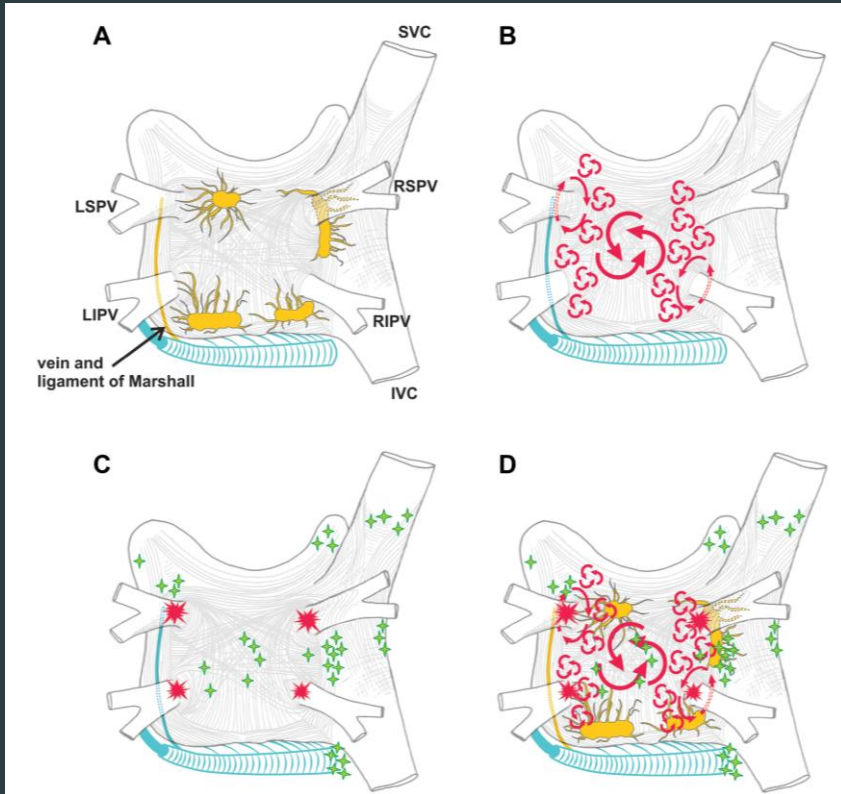
- Introduce AF concepts relevant to the invasive treatment of AF
- Understand how ablation for atrial fibrillation is performed
- Review patient's experience with ablation

B- When can a pacemaker help?

C- Left atrial appendage occlude device implant

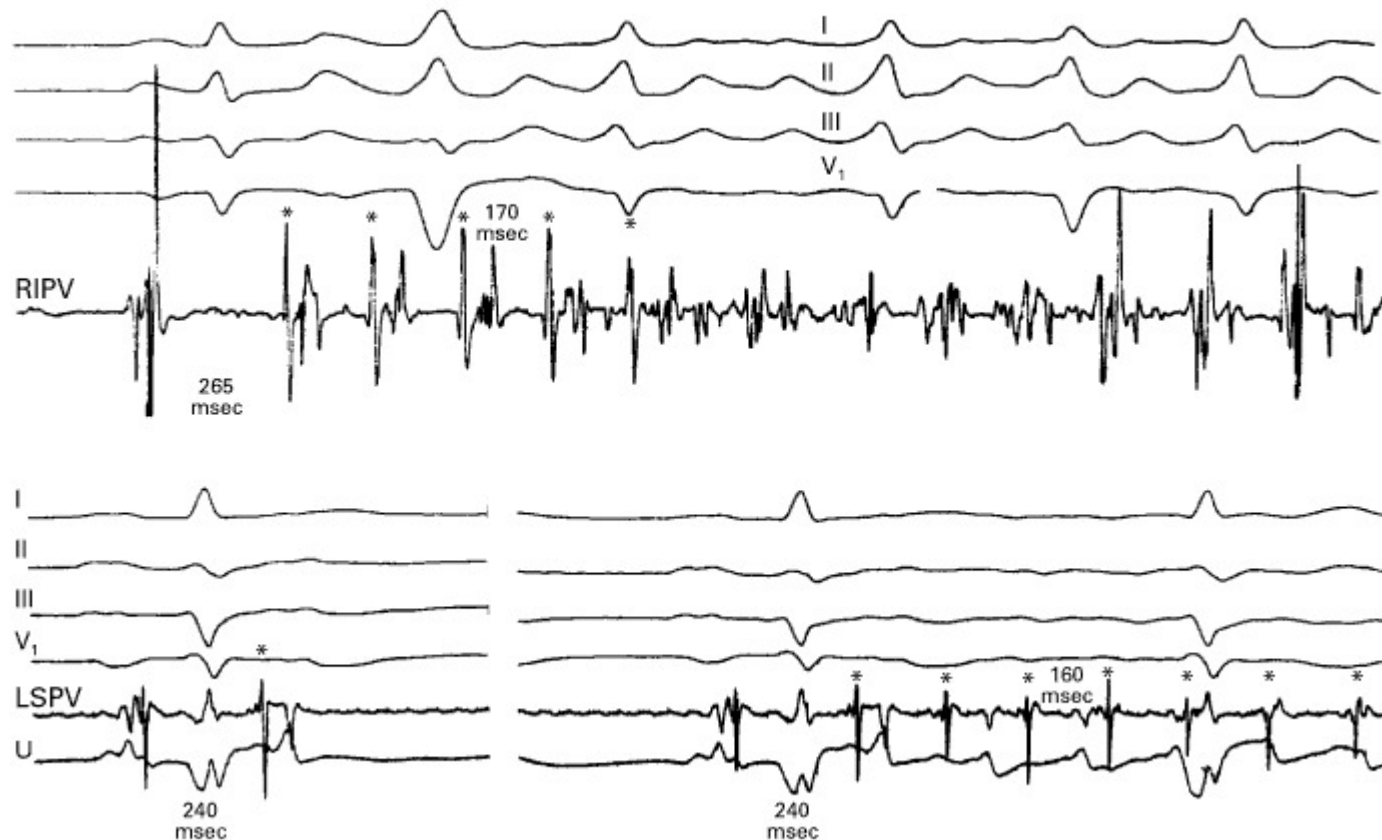
- Patient selection

AF Mechanisms and Ablation Concepts



Spontaneous Initiation of Atrial Fibrillation by Ectopic Beats Originating in the Pulmonary Veins

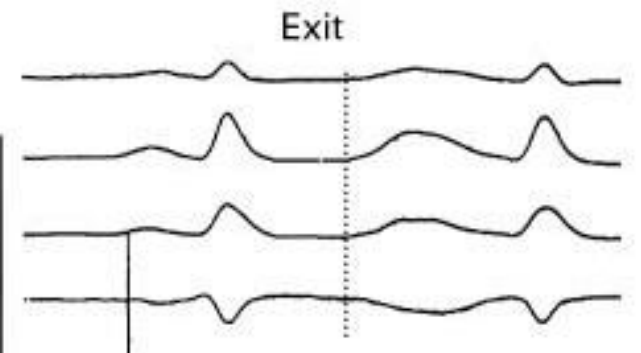
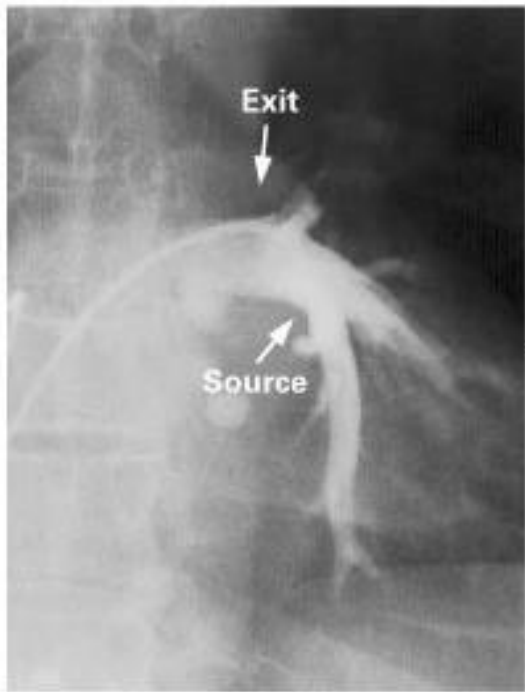
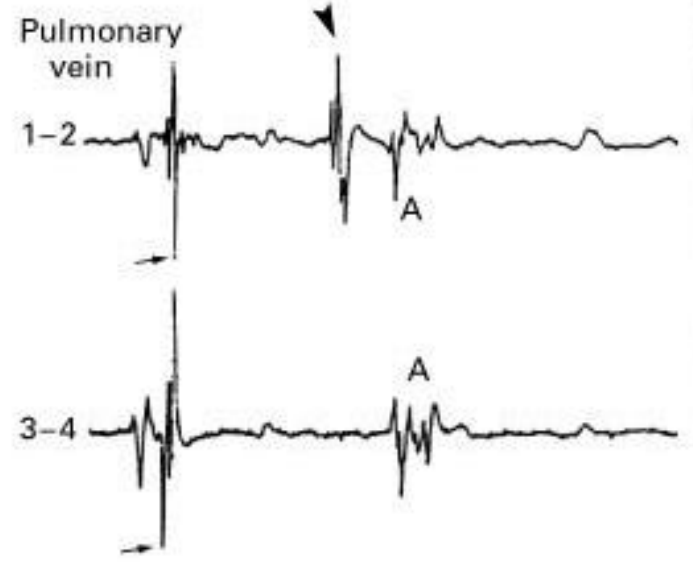
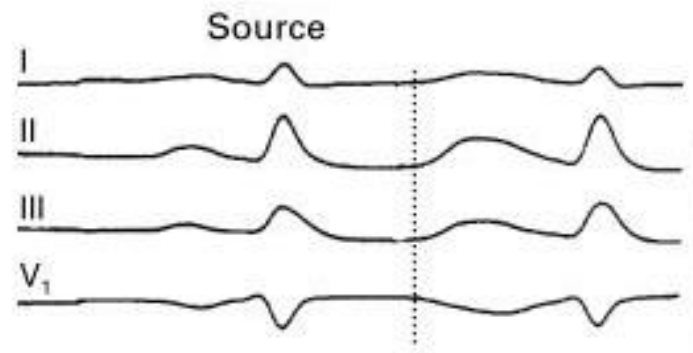
Michel Haïssaguerre, M.D., Pierre Jaïs, M.D., Dipen C. Shah, M.D., Atsushi Takahashi, M.D., Mélèze Hocini, M.D., Gilles Quiniou, M.D., Stéphane Garrigue, M.D., Alain Le Mouroux, M.D., Philippe Le Métayer, M.D., and Jacques Clémenty, M.D.



September 3, 1998

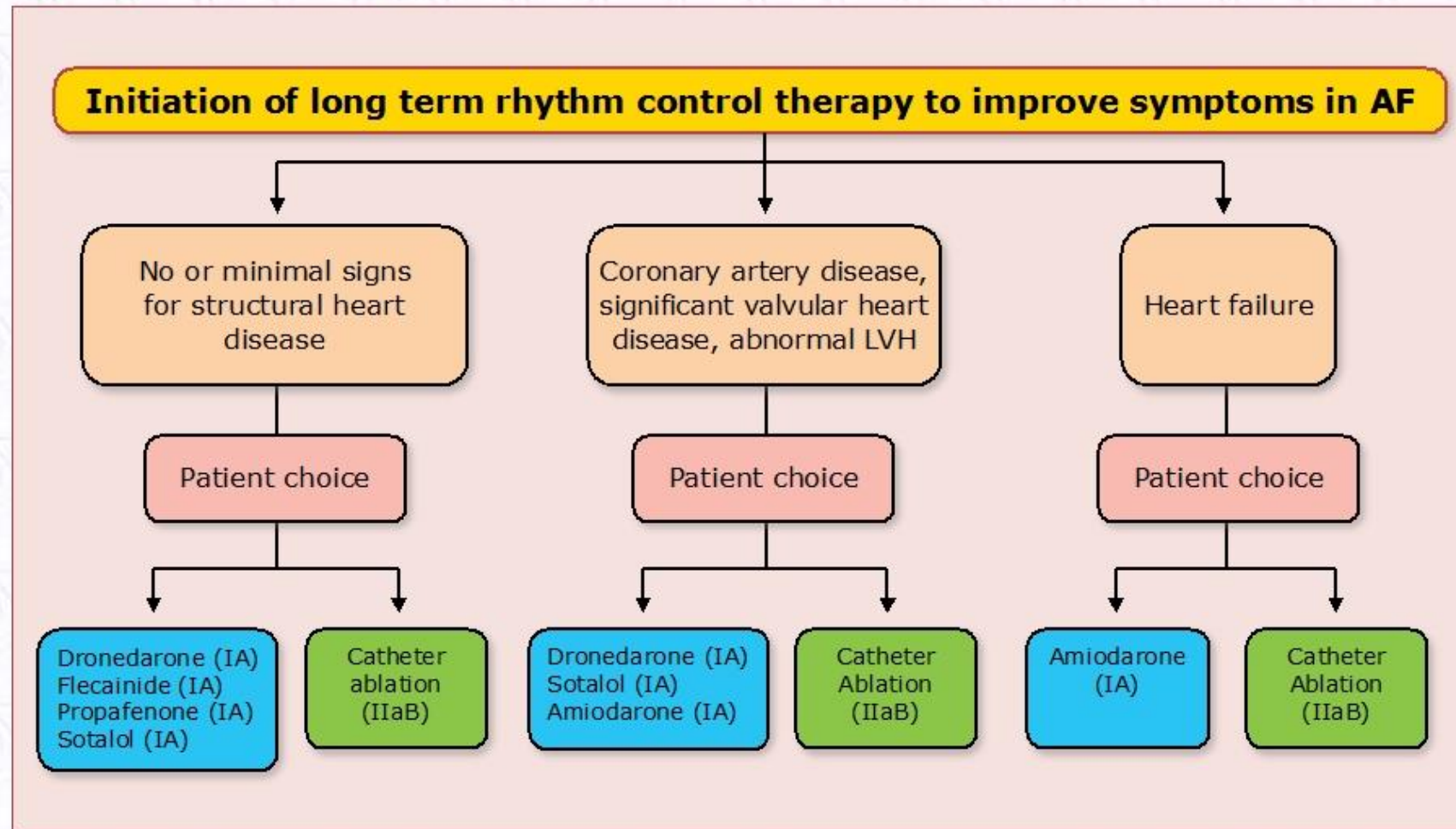
N Engl J Med 1998; 339:659-666

DOI: 10.1056/NEJM199809033391003

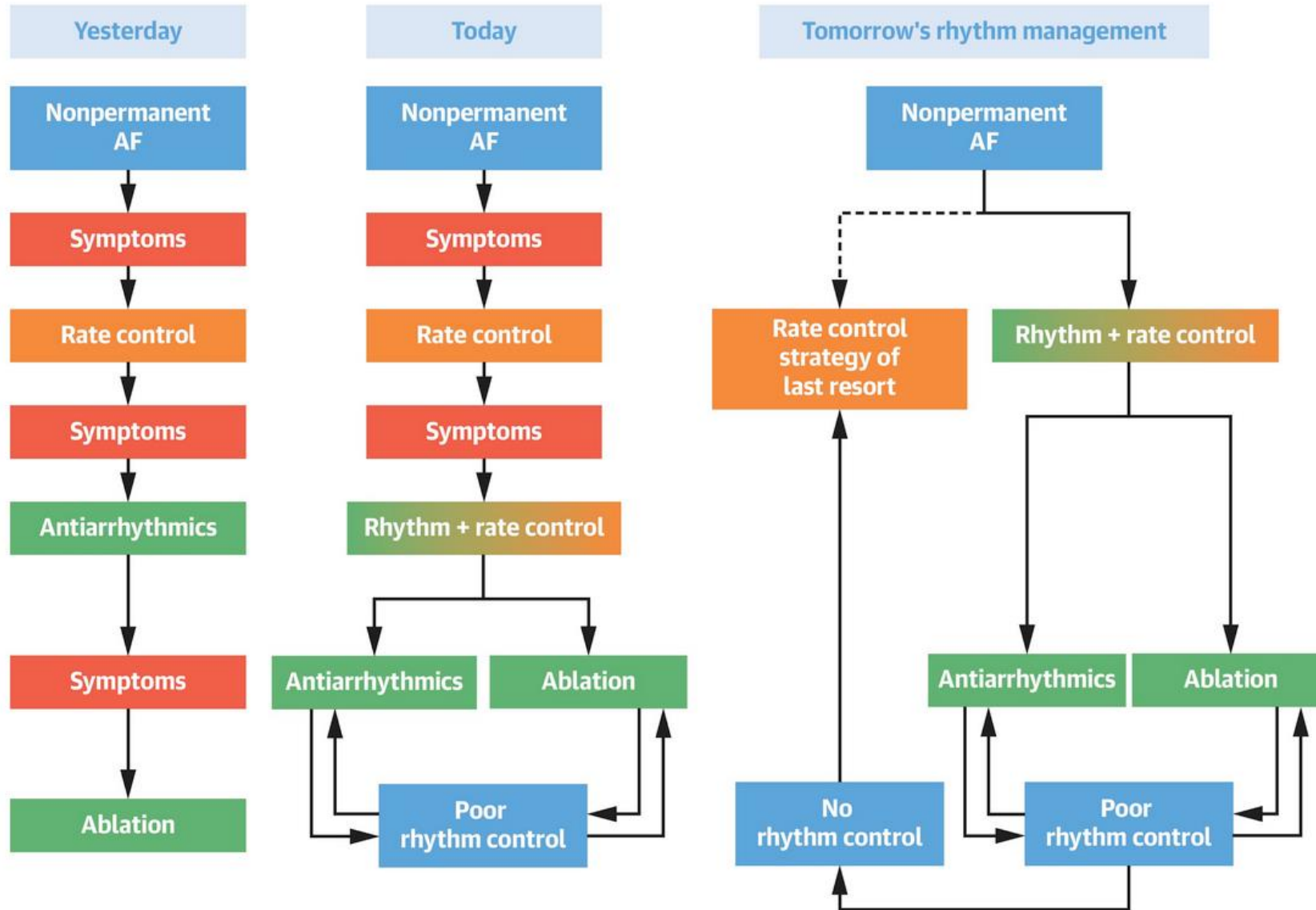


100 msec

Initiation of long term rhythm control therapy in symptomatic patients with atrial fibrillation



CENTRAL ILLUSTRATION: Summary of the Evolution of Atrial Fibrillation Rhythm Management



As of 2022....

Ablation can be offered as first line therapy if a rhythm control strategy is selected

- To improve quality of life and minimize symptoms
- May improve mortality in HFrEF for selected pts

Factors Favoring Rhythm-Control Strategies	
 Age <65 years	 Pregnancy
 Tachycardia-induced myopathy	 No or minor structural heart disease
 Disabling AF symptoms ^a	 No/few comorbidities
 Increased stroke risk	 Normal or only moderately enlarged LA
 AF recurring with transient events	 Heart failure
 Rate control difficult to achieve	 Patient choice

Patient preparation

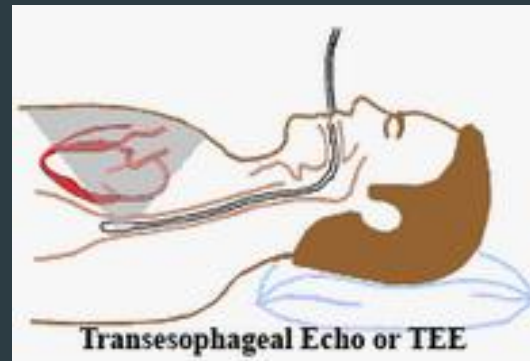
- Procedure performed on uninterrupted anticoagulation
- CT scan to define LA anatomy

Procedure day

- ▶ General anesthesia



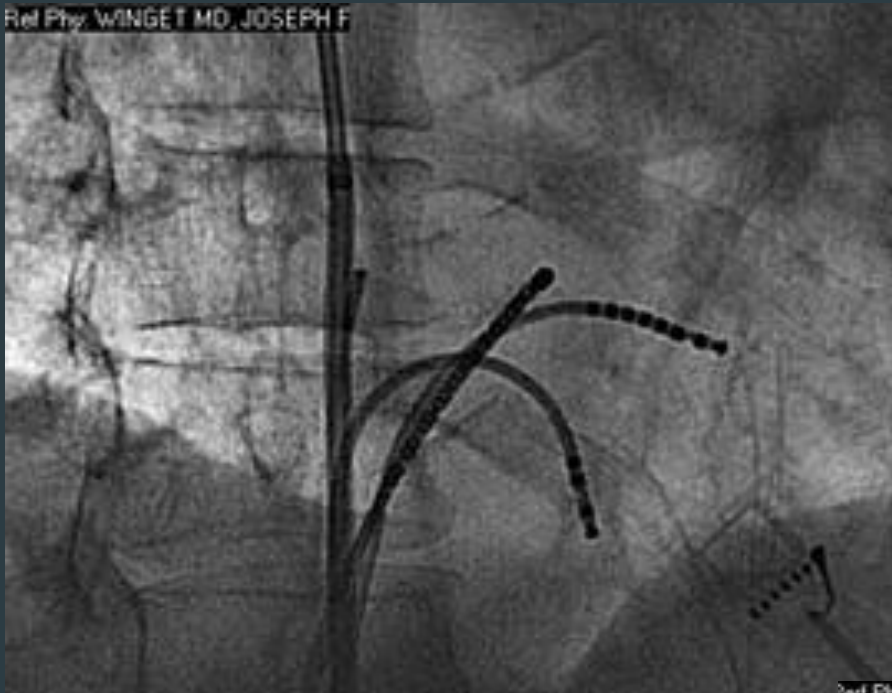
- ▶ Transesophageal echocardiogram



- ▶ Femoral vein access (B/L)

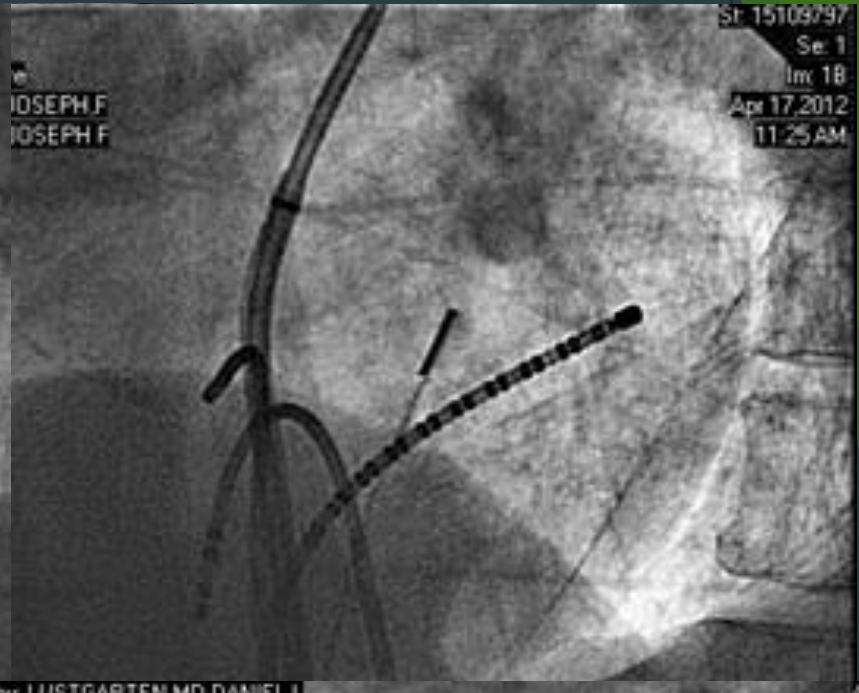


Ref Phy: WINGET MD, JOSEPH F



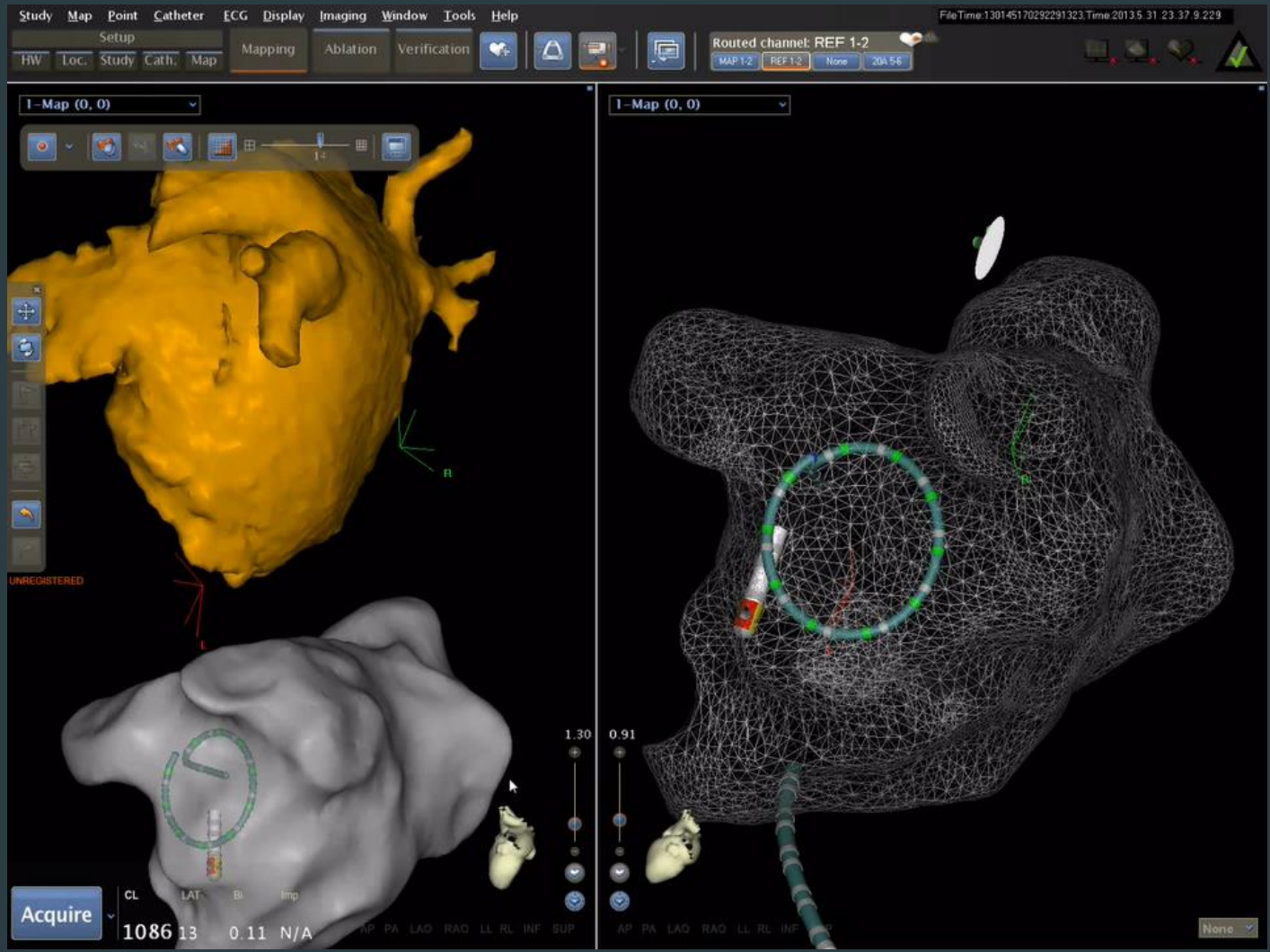
JOSEPH F
JOSEPH F

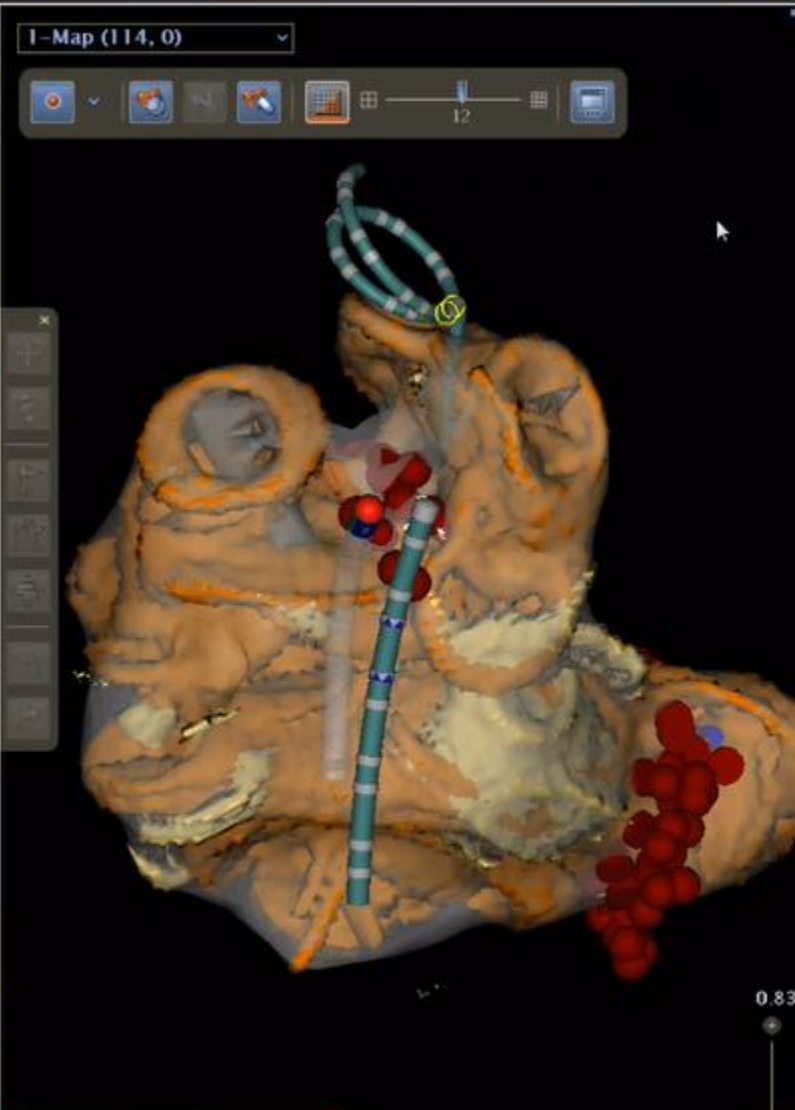
Sr: 15109797
Se: 1
Im: 18
Apr 17, 2012
11:25 AM



Perf Phy: LUSTGARTEN MD, DANIEL L
LUSTGARTEN MD, DANIEL L





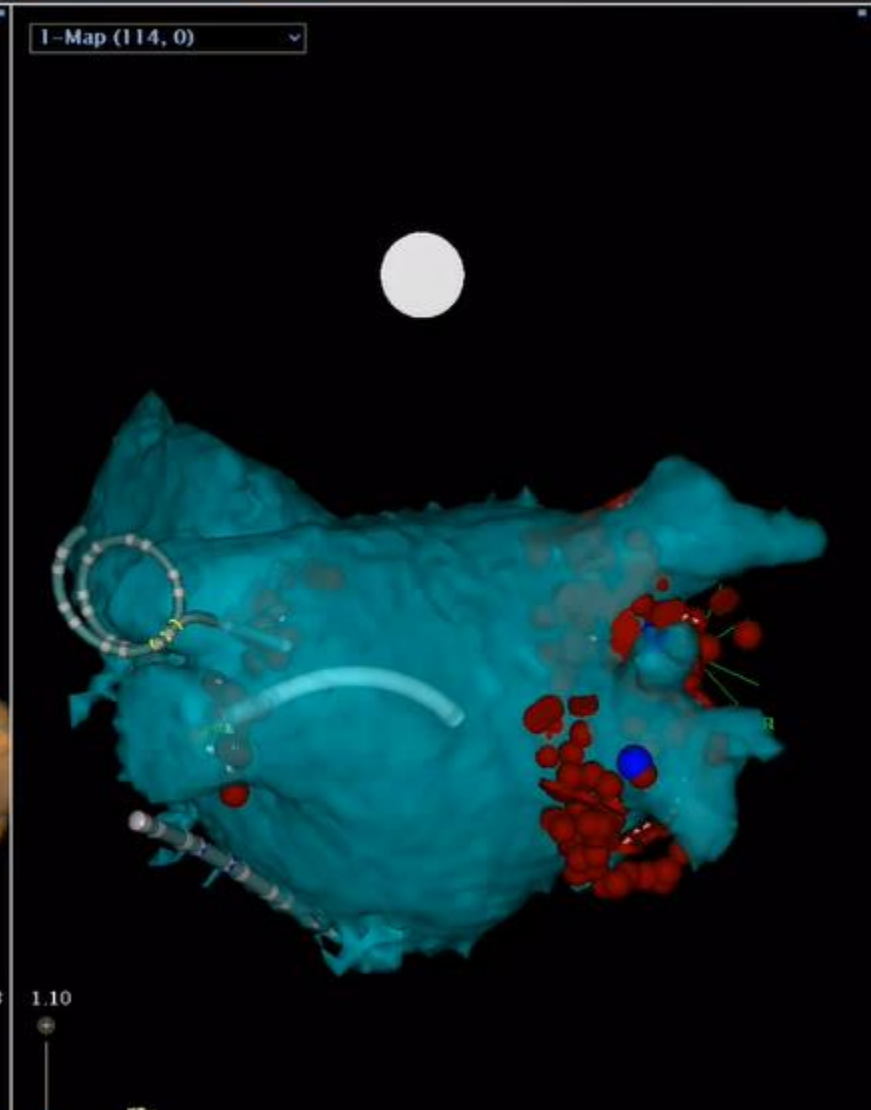


Sec	°C	W	Imp
742	33.0	30	132

CL LAT (ms) 440 2

Acquire

CL	LAT	Bi	Imp	PA	LAO	RAO	LL	RL	INF	SUP
734	2	2.72	131							



CL	LAT	Bi	Imp	PA	LAO	RAO	LL	RL	INF	SUP

AP PA LAO RAO LL RL INF SUP

None

Study Map Point Catheter ECG Display Imaging Window Tools Help

Setup

HW Loc. Study Cath. Map Mapping Ablation Verification

Routed channel: 20B 19:20

MAP 1:2 REF 1:2 None 20A 5:6

File Time: 130145216275971439, Time: 2013.6.1.0.53.47.597

1-Map (108, 0) Resp

1-Map (108, 0) Resp

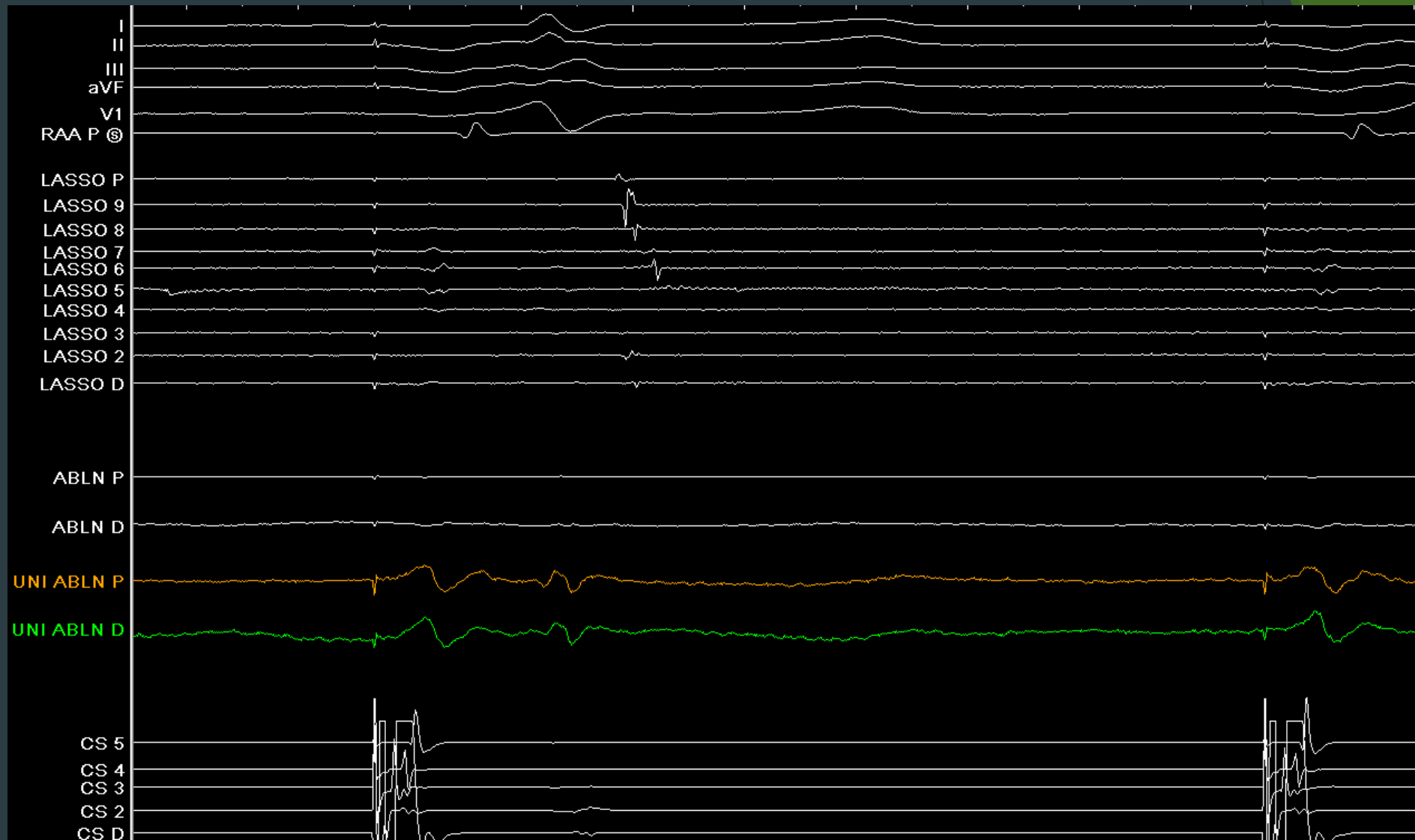
Acquire

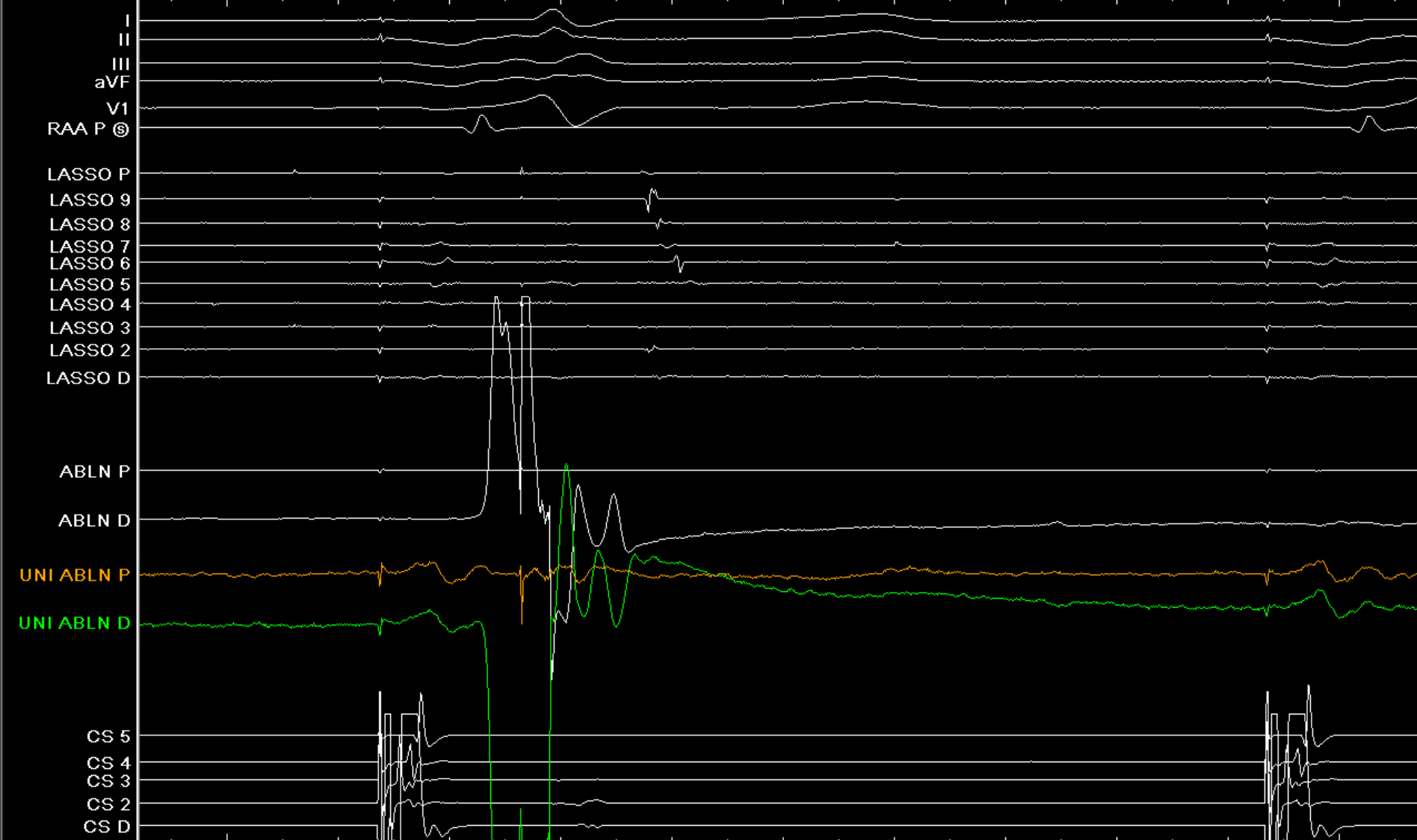
CL	LAT	Bi	Imp
1150	157	0.07	N/A

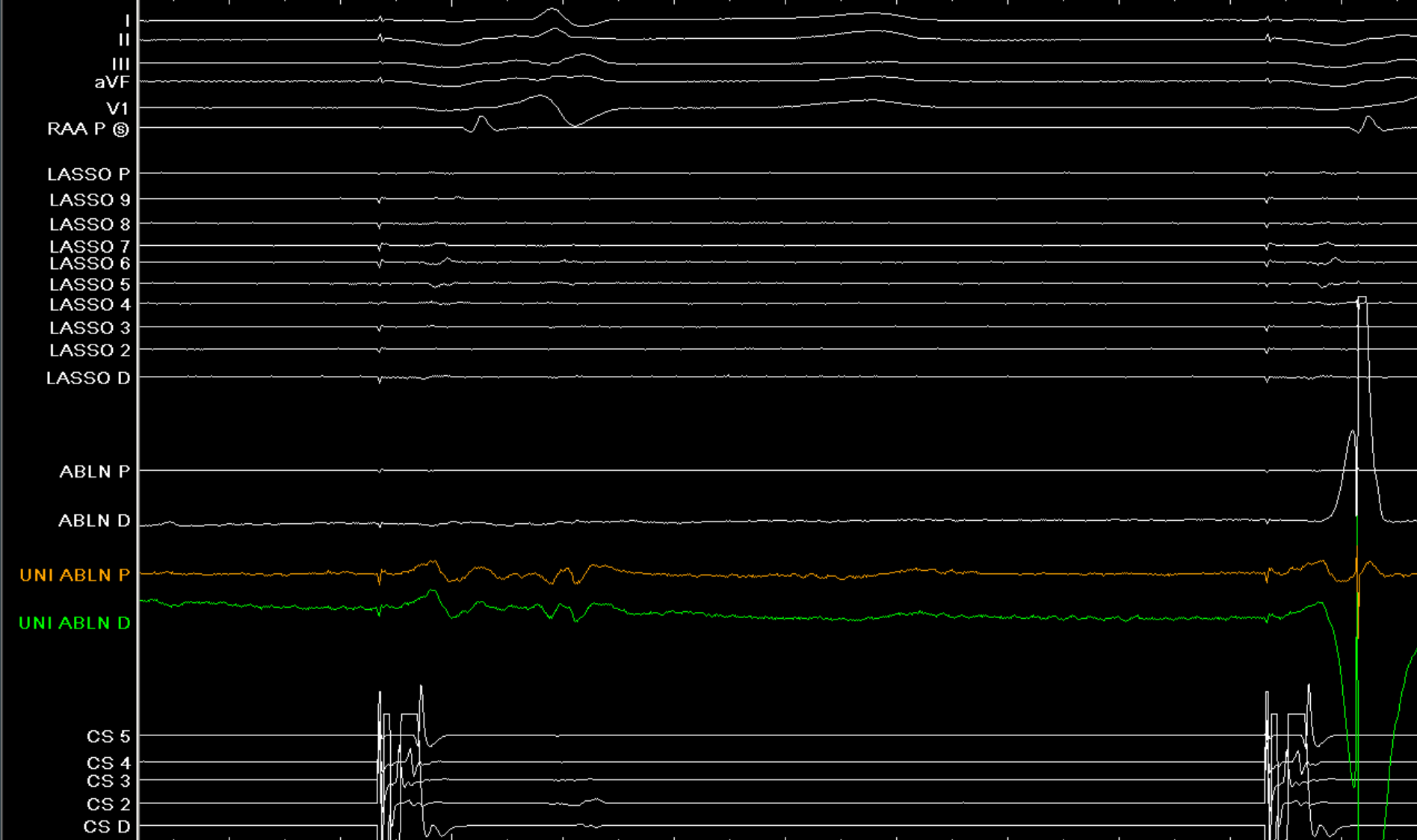
AP PA LAO RAO LL RL INF SUP

AP PA LAO RAO LL RL INF SUP

Sync



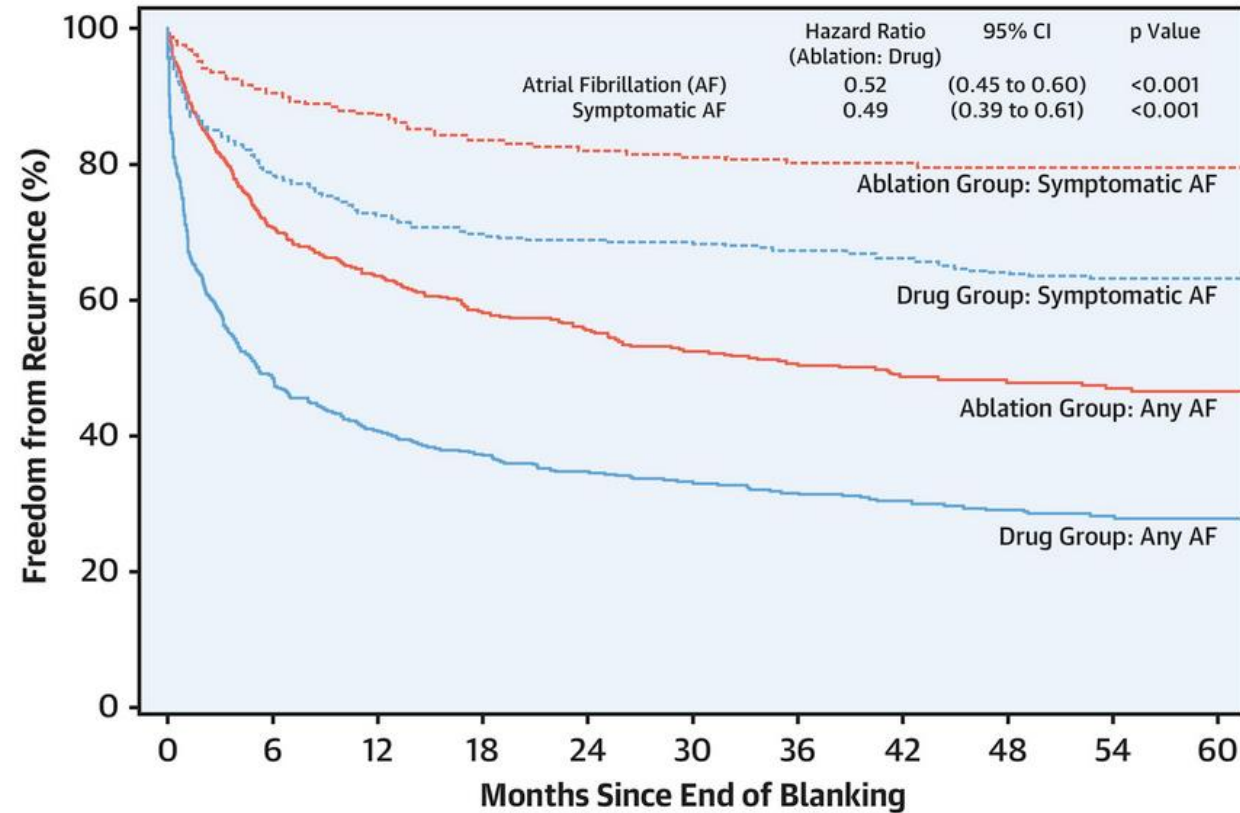




Post procedure

- Overnight stay
- Discharge on anticoagulation (at least 90 days)
- Discharge on proton pump inhibitors x 30 days
- Activity restriction for 2 weeks

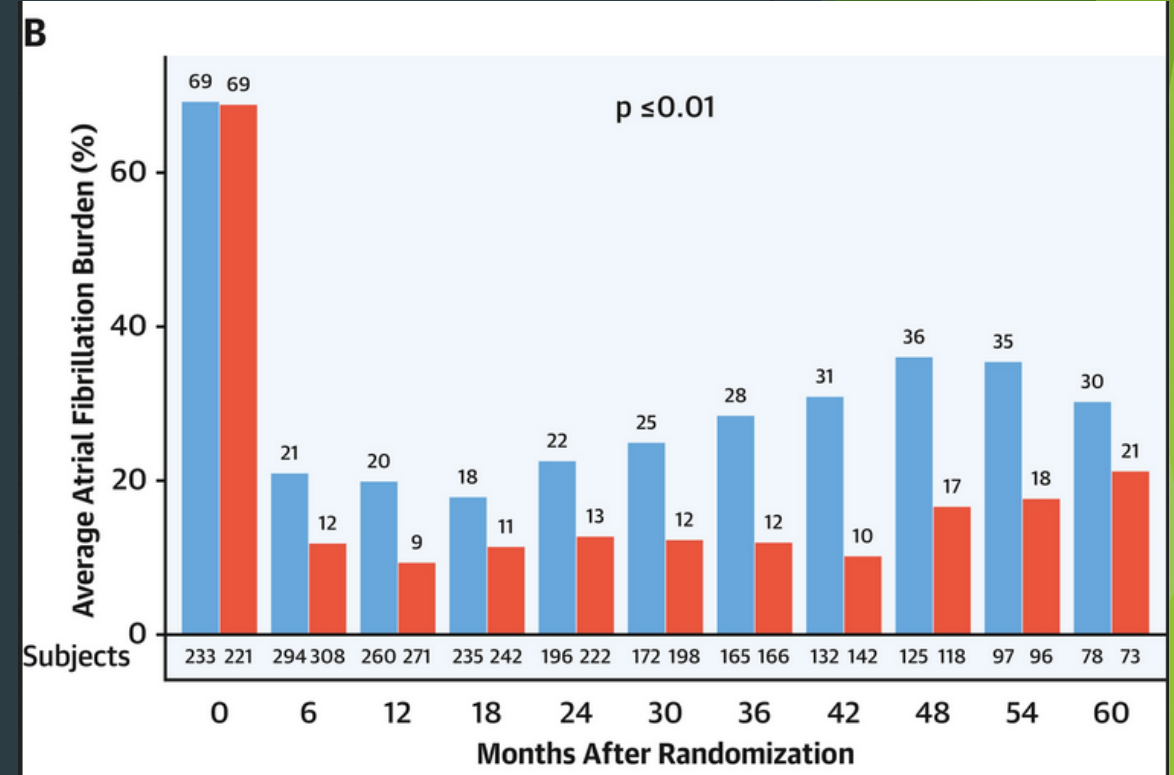
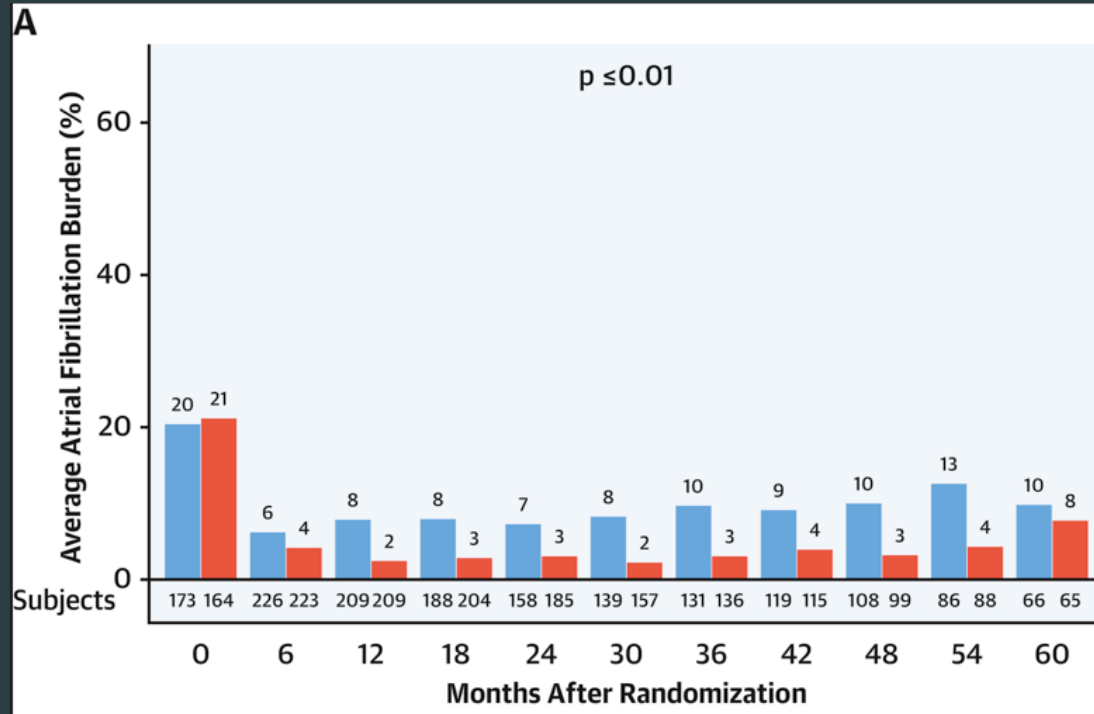
CENTRAL ILLUSTRATION: Freedom From Recurrent Atrial Fibrillation by Randomized Therapy and Symptoms in 1,240 Patients Using the CABANA Electrocardiogram Recording Monitors Post-90-Day Blanking



	No. at risk										
	0	6	12	18	24	30	36	42	48	54	60
Ablation Group: Symptomatic AF	611	547	521	468	432	380	335	295	247	203	110
Drug Group: Symptomatic AF	629	484	441	399	365	330	294	259	212	168	101
Ablation Group: Any AF	611	430	380	327	290	239	199	162	133	103	57
Drug Group: Any AF	629	303	251	211	180	156	130	114	93	73	40

Poole, J.E. et al. J Am Coll Cardiol. 2020;75(25):3105-18.

Paroxysmal vs Persistent



Jeanne E. Poole et al. *J Am Coll Cardiol* 2020; 75:3105-3118.



Success rate

Reported rate will depend on:

- How do you measure (burden of AF vs all or nothing)
- Paroxysmal vs Persistent
- Age and comorbidities

What do I tell pts:

- Paroxysmal (60-70 % success rate with 1/3-1/4 pts requiring a second procedure to achieve success rate to about 80%)
- Persistent (50% success rate with at least 1/2 pts requiring a second procedure to achieve success rate to 60-70%)

Table 1. Adverse Effects of Ablation for Atrial Fibrillation.*

Adverse Effect	Incidence %	Recommended Monitoring	Management
Death	0.15		
Cardiac tamponade	1.2–6.0	Blood-pressure monitoring, examination of cardiac silhouette on chest radiographic study, echocardiography	Reversal of anticoagulation, immediate pericardiocentesis, surgery if accumulation is ongoing
Stroke	0–2	Neurologic examination	Depends on center; consider thrombolysis or intervention
Pulmonary-vein stenosis	0.5–2.0	CT or MRI 3–4 mo after ablation	If stenosis is severe, with symptoms, then dilation and possible stenting of the pulmonary vein or veins
Phrenic-nerve injury	0–11	Fluoroscopy	Most patients recover without treatment
Regular atrial arrhythmia†	5–25	Transtelephonic monitoring, Holter monitoring, use of implantable loop recorder	Antiarrhythmic drugs, perform ablation again
Vascular complications (arteriovenous fistula, pseudoaneurysm)	0.5–5.0	Vascular ultrasonography	Percutaneous or open vascular surgery
Esophageal injury with ulceration	10	Esophageal temperature probe	Most patients heal without treatment
Atrioesophageal fistula	0.04	Maintain high index of suspicion for this complication (symptoms such as fever, chills, recurrent neurologic events, or sepsis occur 2–4 wk after ablation); CT or MRI	Surgery

Pt journey 1

- 55 years old lady with history of treated obstructive sleep apnea, obesity and hypertension has had paroxysmal episodes of palpitation for the past 6 months
- Event monitor demonstrated episodes of paroxysmal atrial fibrillation associated with symptoms
- She is started on diltiazem and anticoagulation
- Symptoms improve slightly, but she continues to experience episodes that interfere with her quality of life

Options

A- Continue current management

B- Antiarrhythmic drugs

C- Ablation

Pt opted for AF ablation

- Discharged home 1 day after procedure
- Visit to the ER for chest pain 3 days after the procedure
- Diagnosed with pericarditis, treated with Colchicine
- Free of symptomatic AF one year post procedure

Particularly challenge groups

- ▶ Untreated OSA
- ▶ Uncontrolled HTN/DM
- ▶ Severe Lung disease
- ▶ Severe Obesity

Pt journey 2

- 60 years old presented with HFrEF (EF 20%), AF w RVR and LBBB in 2015
- CV failed
- HF continued despite medical therapy, underwent implant of a BIV ICD
- Atrial fibrillation was interfering with BIV pacing, so he was started on dofetilide therapy
- Stayed in sinus rhythm for 2 years
- Recurrence of persistent AF despite dofetilide
- EF now 40 %. Some fatigue. No HF hospitalizations.
- IN AF, BIV pacing <90% despite digoxin and maximum tolerated BB

Options

A - leave good enough alone

B- Amiodarone

C- AV node ablation

D- AF ablation

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., *et al.*, for the CASTLE-AF Investigators*

[Article](#) [Figures/Media](#)

[Metrics](#)

February 1, 2018

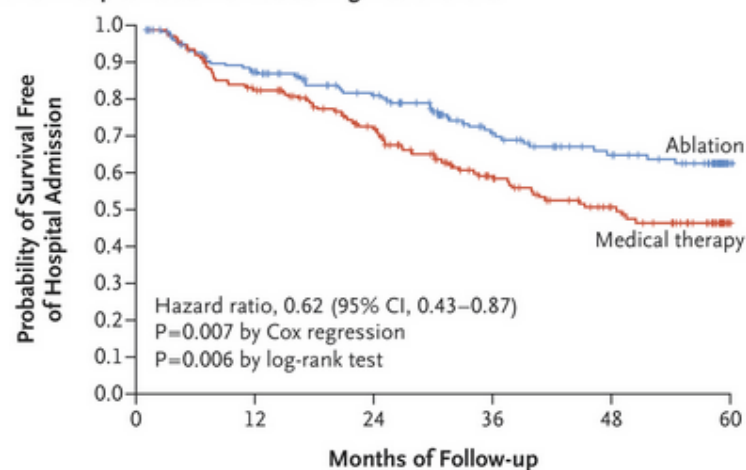
N Engl J Med 2018; 378:417-427

DOI: 10.1056/NEJMoa1707855

Chinese Translation [中文翻译](#)

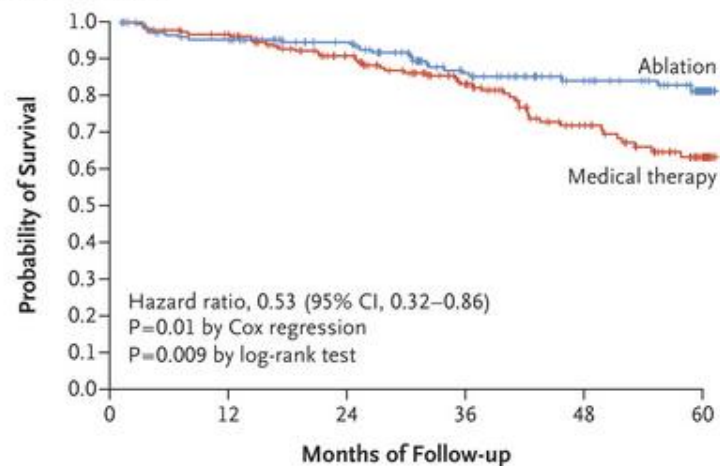
[31 References](#) [1162 Citing Articles](#) [Letters](#) [4 Comments](#)

A Death or Hospitalization for Worsening Heart Failure



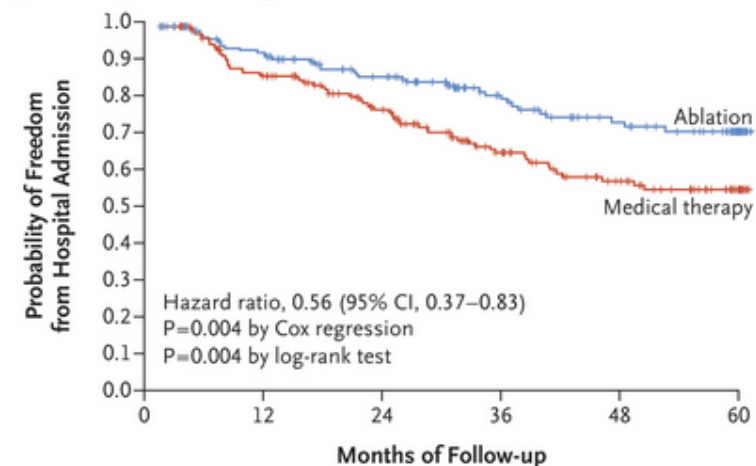
No. at Risk						
	0	12	24	36	48	60
Ablation	179	141	114	76	58	22
Medical therapy	184	145	111	70	48	12

B 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

C Hospitalization for Worsening Heart Failure



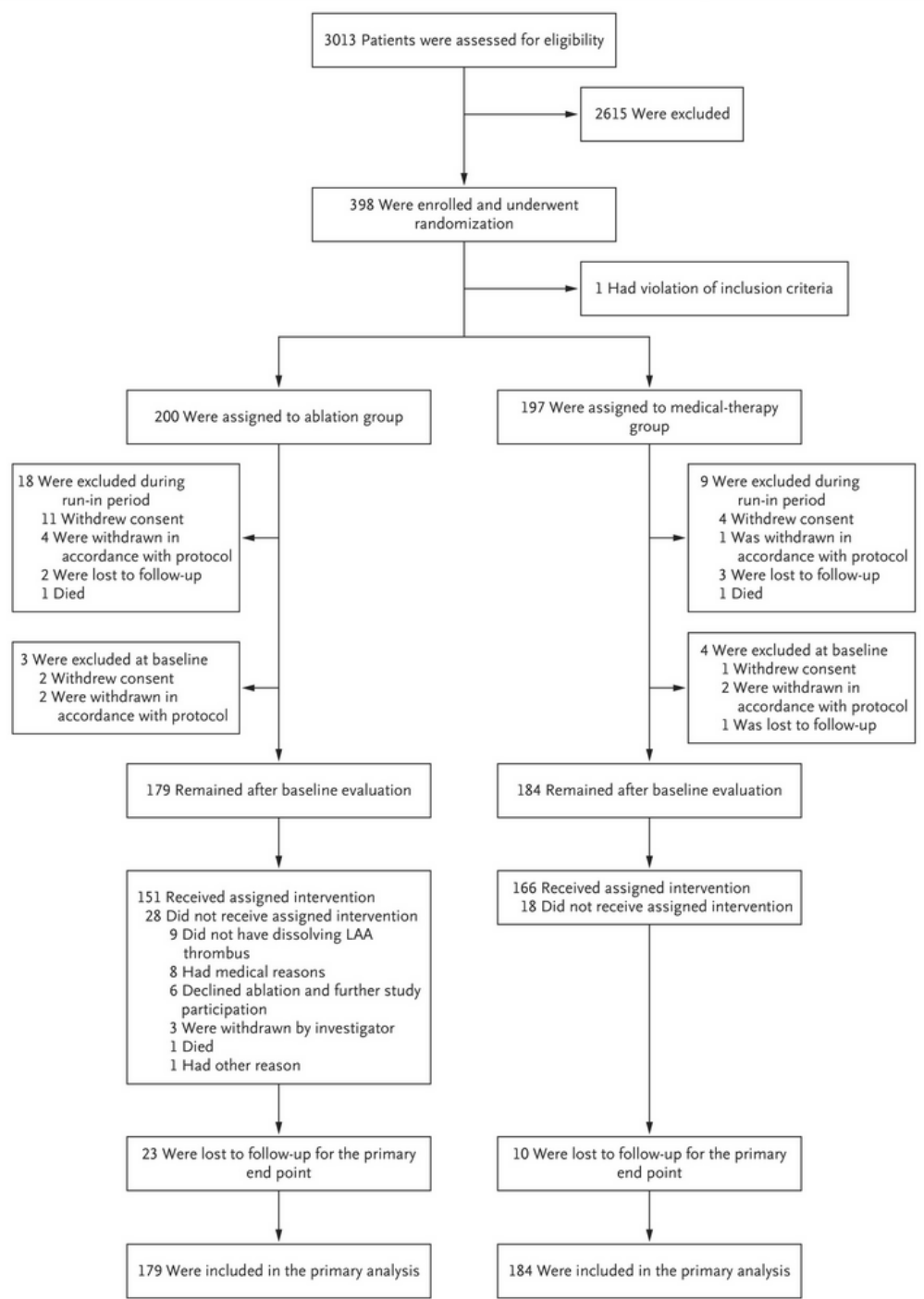
No. at Risk						
	0	12	24	36	48	60
Ablation	179	141	114	76	58	22
Medical therapy	184	145	111	70	48	12

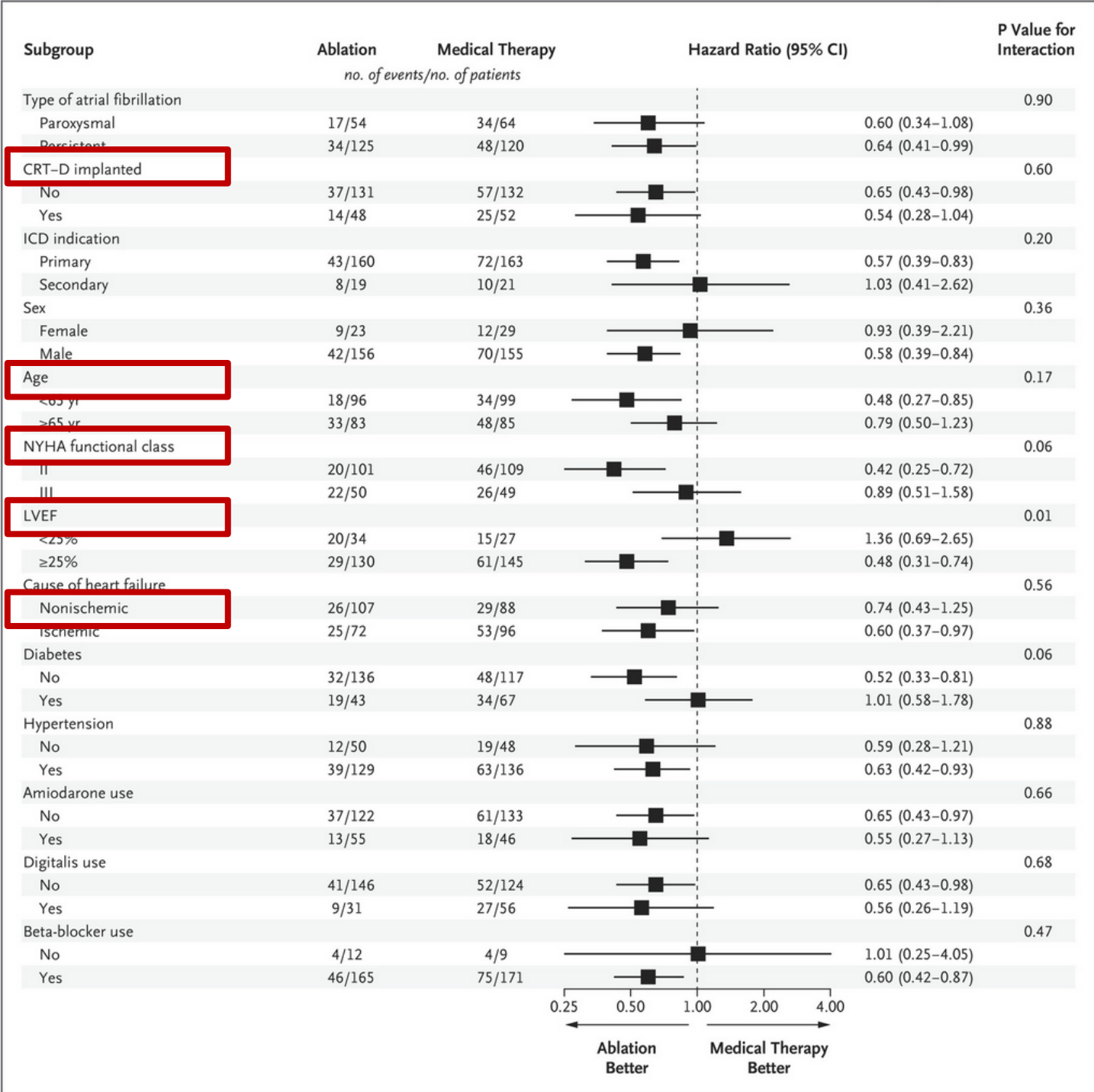
Table 2. Primary and Secondary Clinical End Points.*

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

* All numbers and percentages represent the total numbers of events and raw event rates after a median follow-up of 37.8 months. Deaths and cerebrovascular accidents were evaluated at baseline and 12 weeks after baseline for hospitalizations in the two groups (the “blinking period”). For Kaplan–Meier estimates at 12, 36, and 60 months, see Table S6 in the Supplementary Appendix.

† The primary end point is a composite of death from any cause or hospitalization for worsening heart failure.





2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society in Collaboration With the Society of Thoracic Surgeons

Craig T. January, L. Samuel Wann, Hugh Calkins, Lin Y. Chen, Joaquin E. Cigarroa, Joseph C. Cleveland Jr, Patrick T. Ellinor, Michael D. Ezekowitz, Michael E. Field, Karen L. Furie, Paul A. Heidenreich, Katherine T. Murray, Julie B. Shea, Cynthia M. Tracy and Clyde W. Yancy

Originally published 28 Jan 2019 | <https://doi.org/10.1161/CIR.0000000000000665> | Circulation. 2019;140:e125–e151

6.3.4. Catheter Ablation in HF

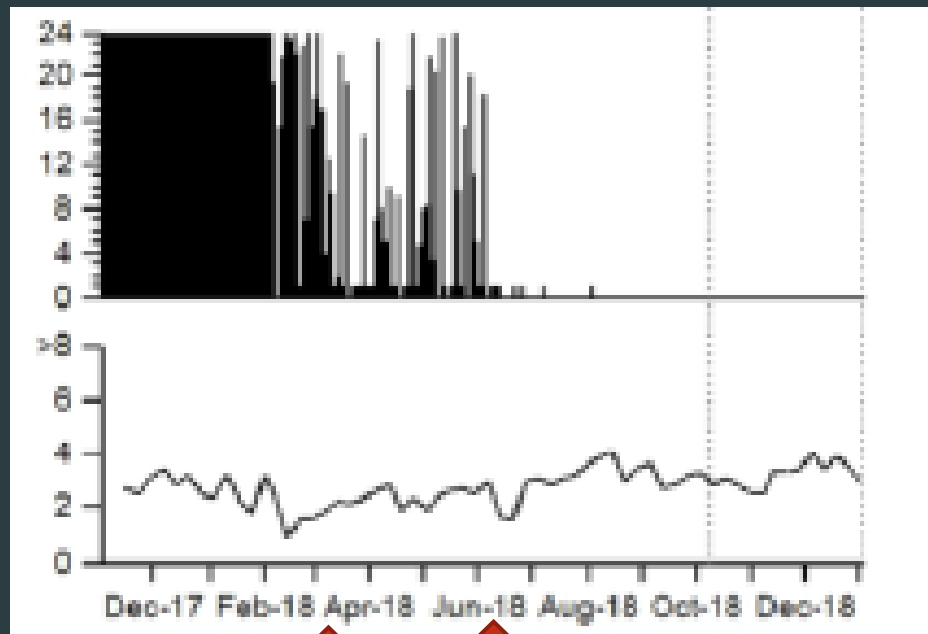
Recommendation for Catheter Ablation in HF

Referenced studies that support the new recommendation are summarized in [Online Data Supplement 7](#).

COR	LOE	Recommendation
IIb	B-R	<p>1. AF catheter ablation may be reasonable in selected patients with symptomatic AF and HF with reduced left ventricular (LV) ejection fraction (HFrEF) to potentially lower mortality rate and reduce hospitalization for HF.^{56.3.4-1,56.3.4-2}</p> <p>NEW: New evidence, including data on improved mortality rate, has been published for AF catheter ablation compared with medical therapy in patients with HF.</p>

Our pt decides for AF ablation

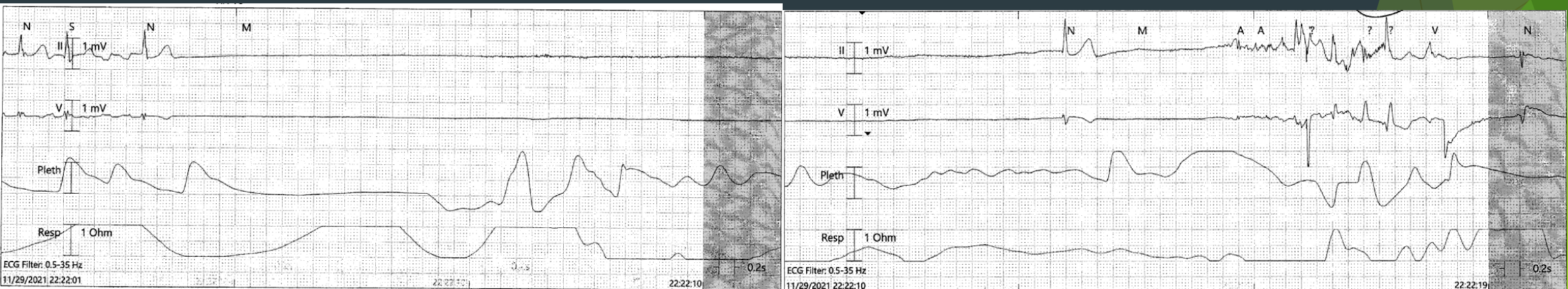
- Early AF recurrence after 3 weeks treated with CV
- Recurrent atrial tachycardia, required second ablation



Currently feels significantly better
in sinus rhythm
EF is 45-50%. Off AAD

Pt journey 3

- 72 years old man has episodes of paroxysmal atrial fibrillation
- Symptoms have been generally controlled with diltiazem
- He had an episode of pre-syncope while splitting wood
- Wife brought him to the ER where he had another event



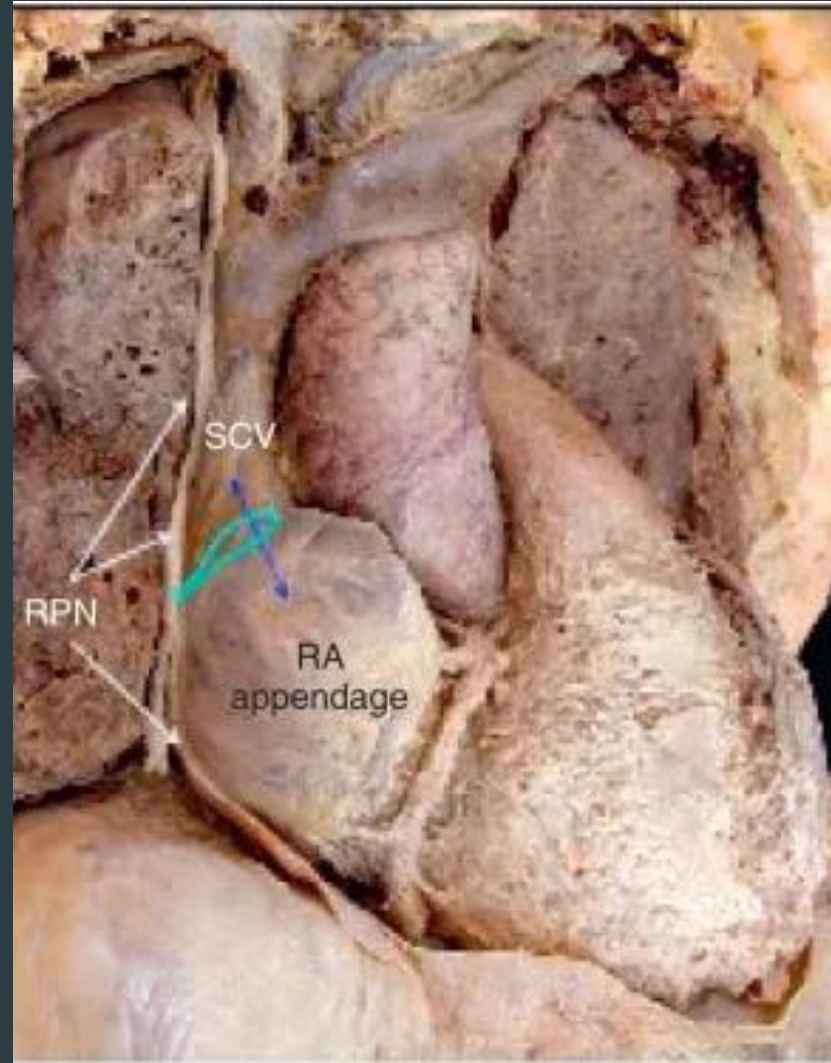
Options:

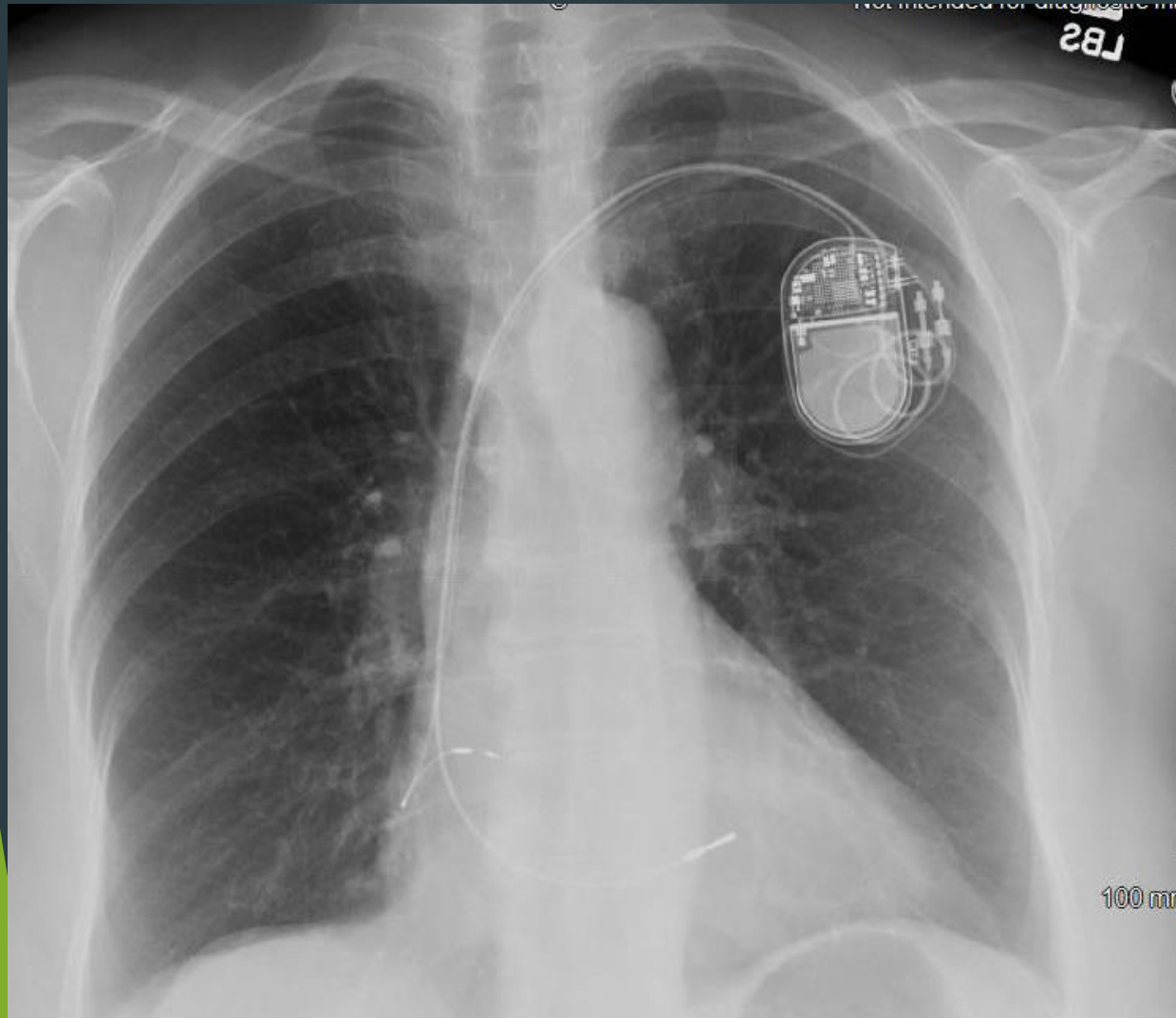
A- Restrict activities

B- Stop diltiazem

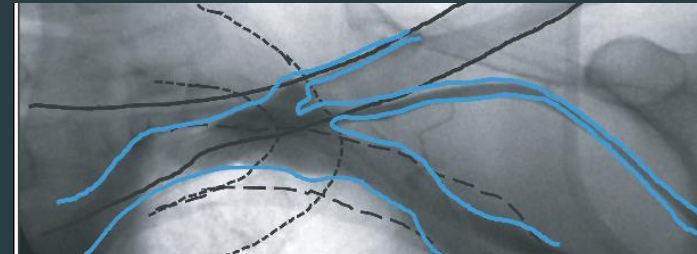
C- Pacemaker implant

Sinus node dysfunction often coexists with AF





Pacemaker performed
under conscious sedation



Discharge home next day

Pt journey 4

- Frail 82 years old with permanent atrial fibrillation
- Reports fatigue and dizziness
- AVG HR 100 bpm despite maximum tolerated BB and CCB

Options

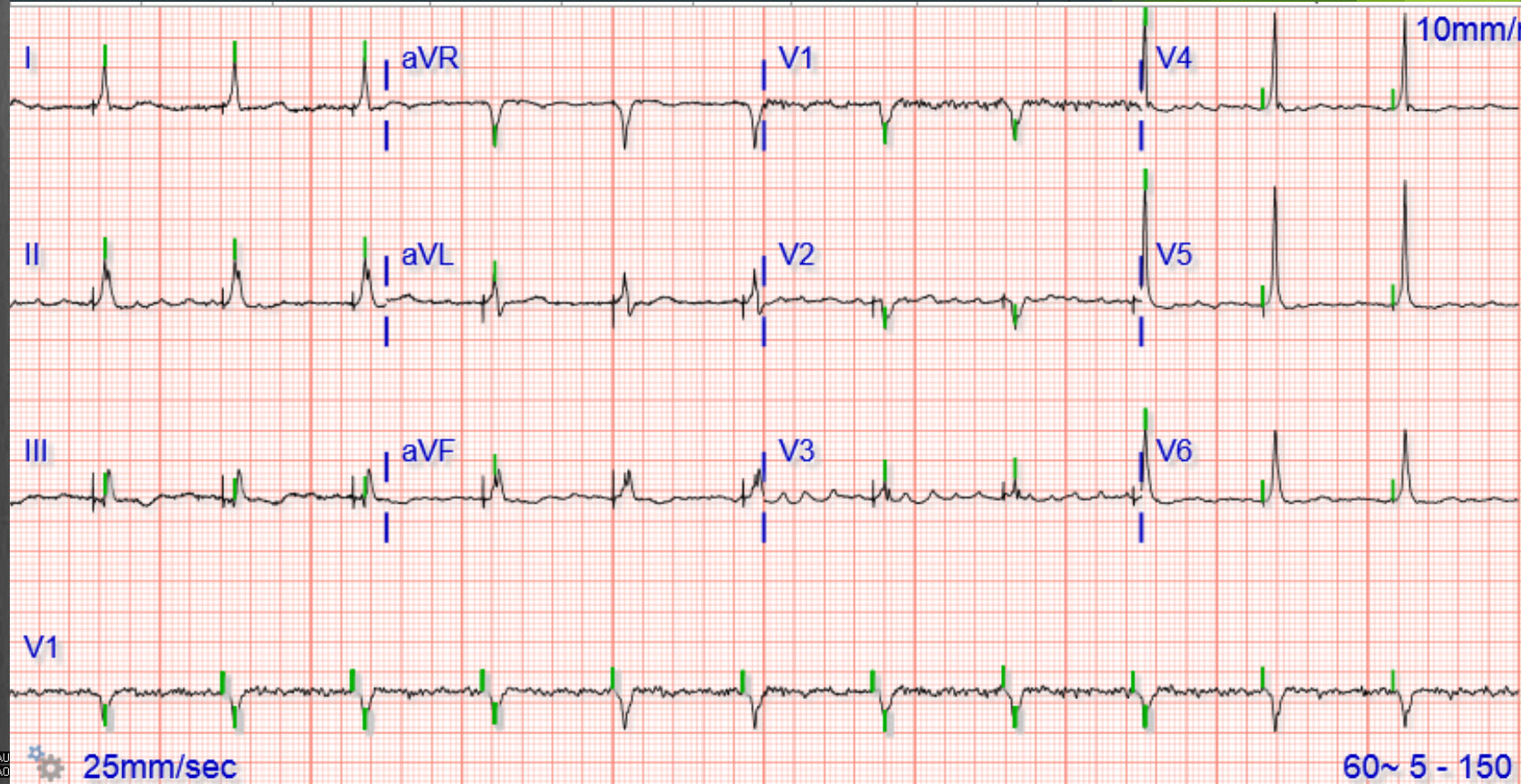
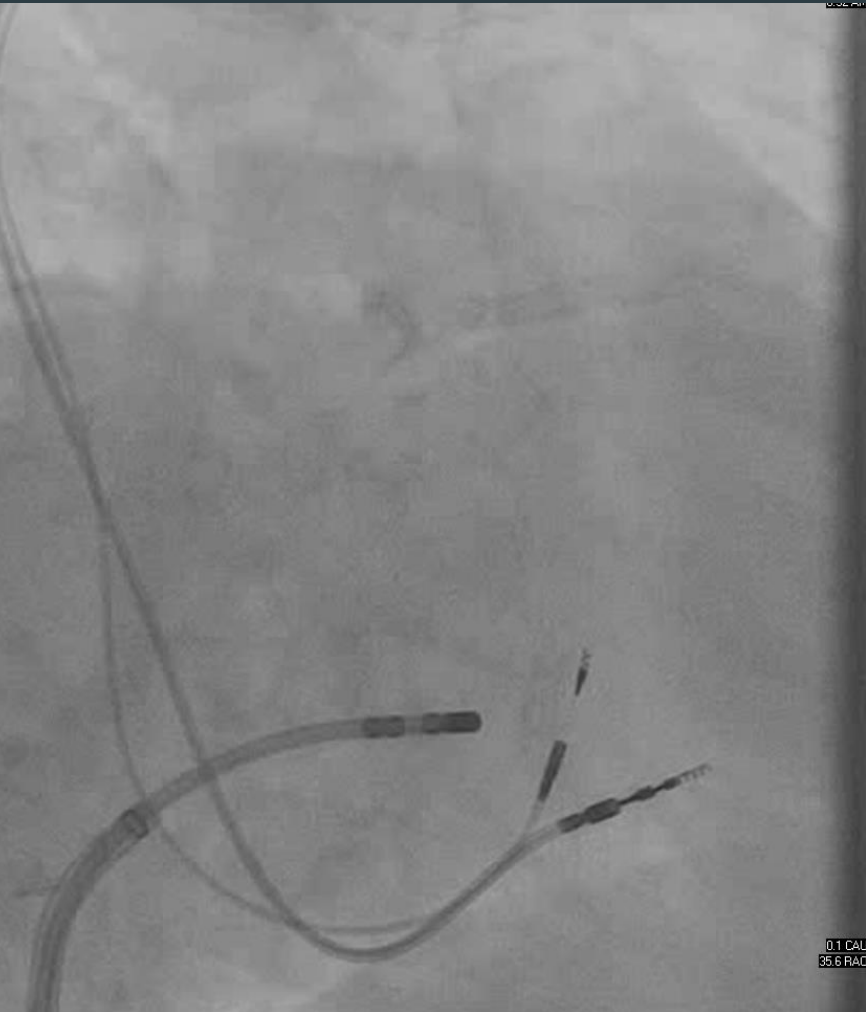
A- Amiodarone

B- Digoxin

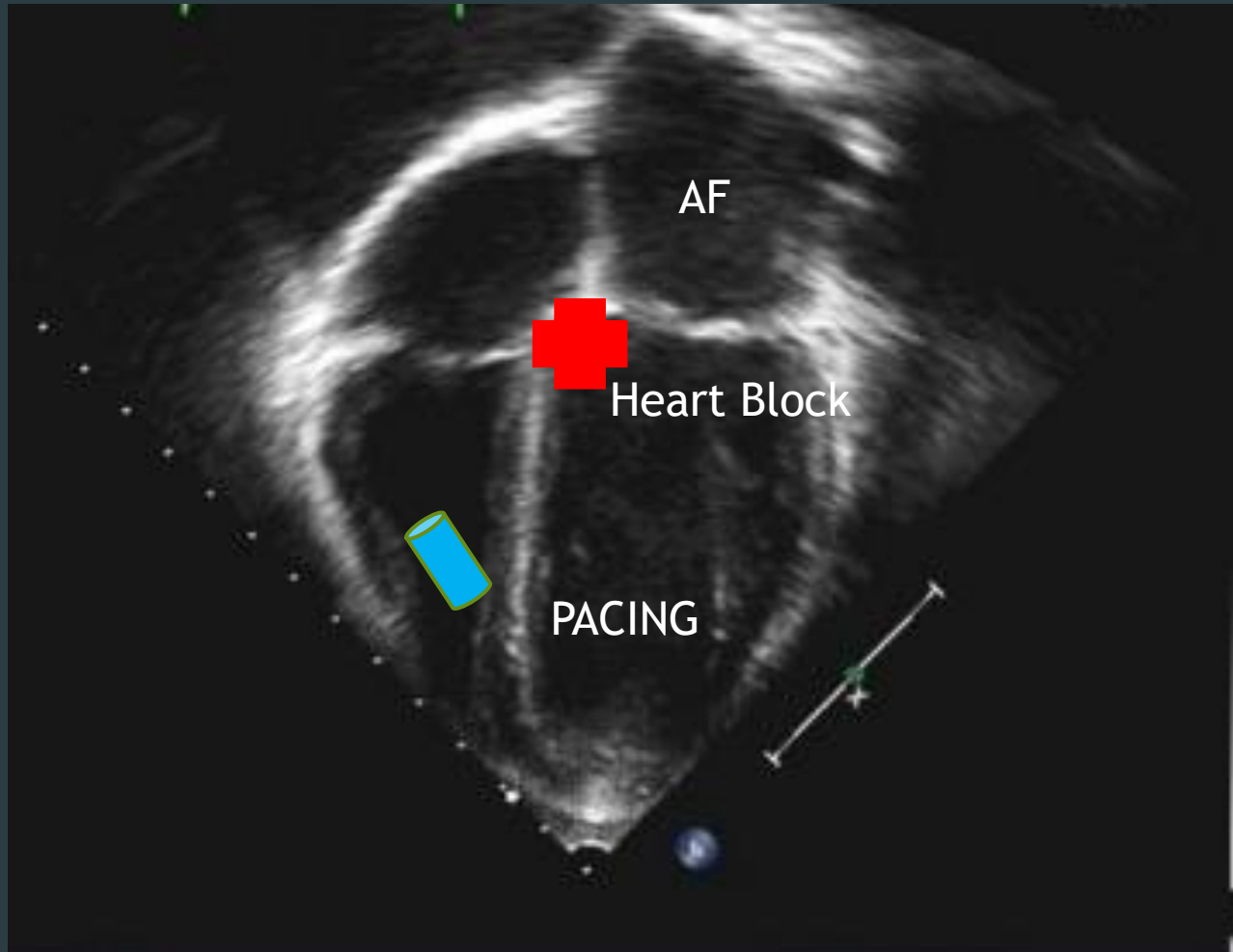
C- AF ablation

D- PPM and AV node ablation

Pt opted for pacemaker and AV node ablation



What have we achieved



No need for rate
controlling drugs

PPM + AV NODE ABL
Improves quality of
life and decreases
hospitalization

Pt journey 5

- 79 years old lady with permanent AF
- Reports no symptoms from AF
- She had tolerated DOAC for many years
- Until recently she had a major GI bleeding

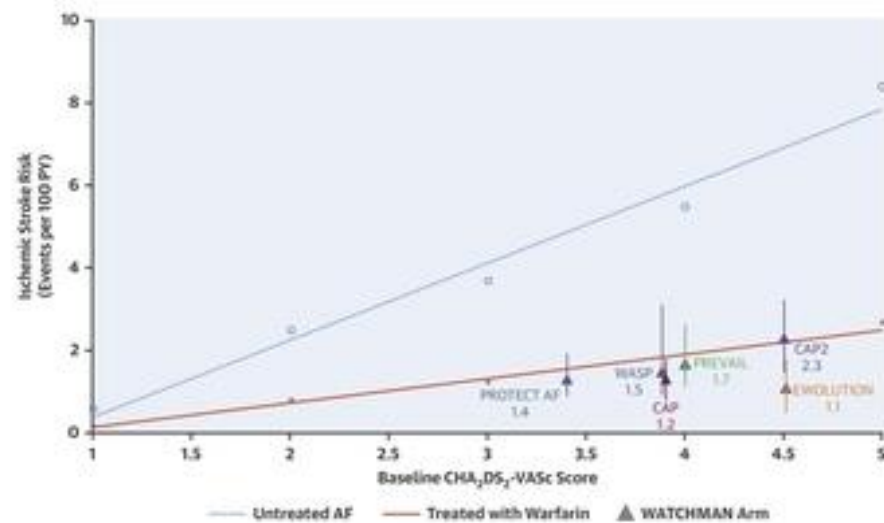
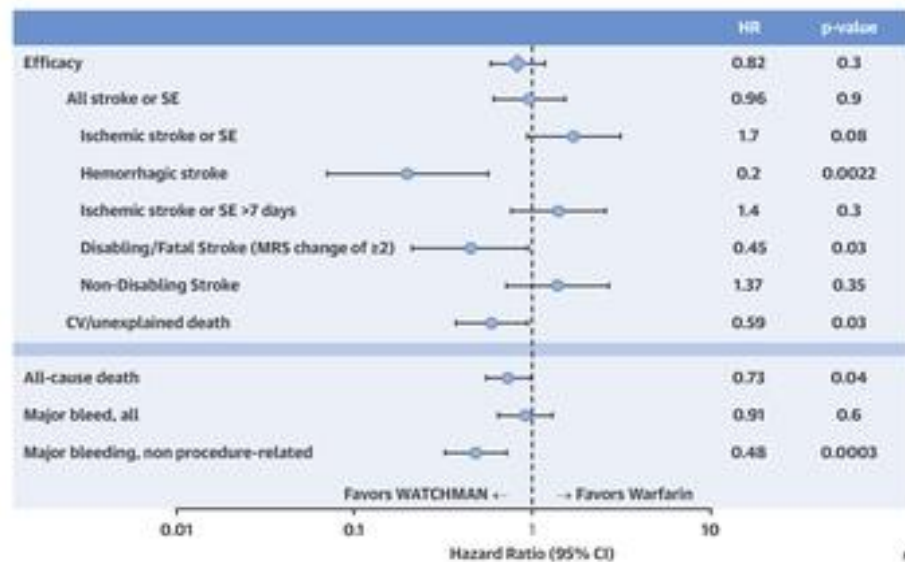
Options

- A- Stop anticoagulation indefinitely
- B- Resume oral anticoagulation
- C- Left atrial appendage occlude device implant

Appendage occlusion as an alternative to prevent stroke in AF



CENTRAL ILLUSTRATION: Stroke Prevention in Nonvalvular Atrial Fibrillation With LAA Closure



Reddy, V.Y. et al. *J Am Coll Cardiol.* 2017;70(24):2964-75.

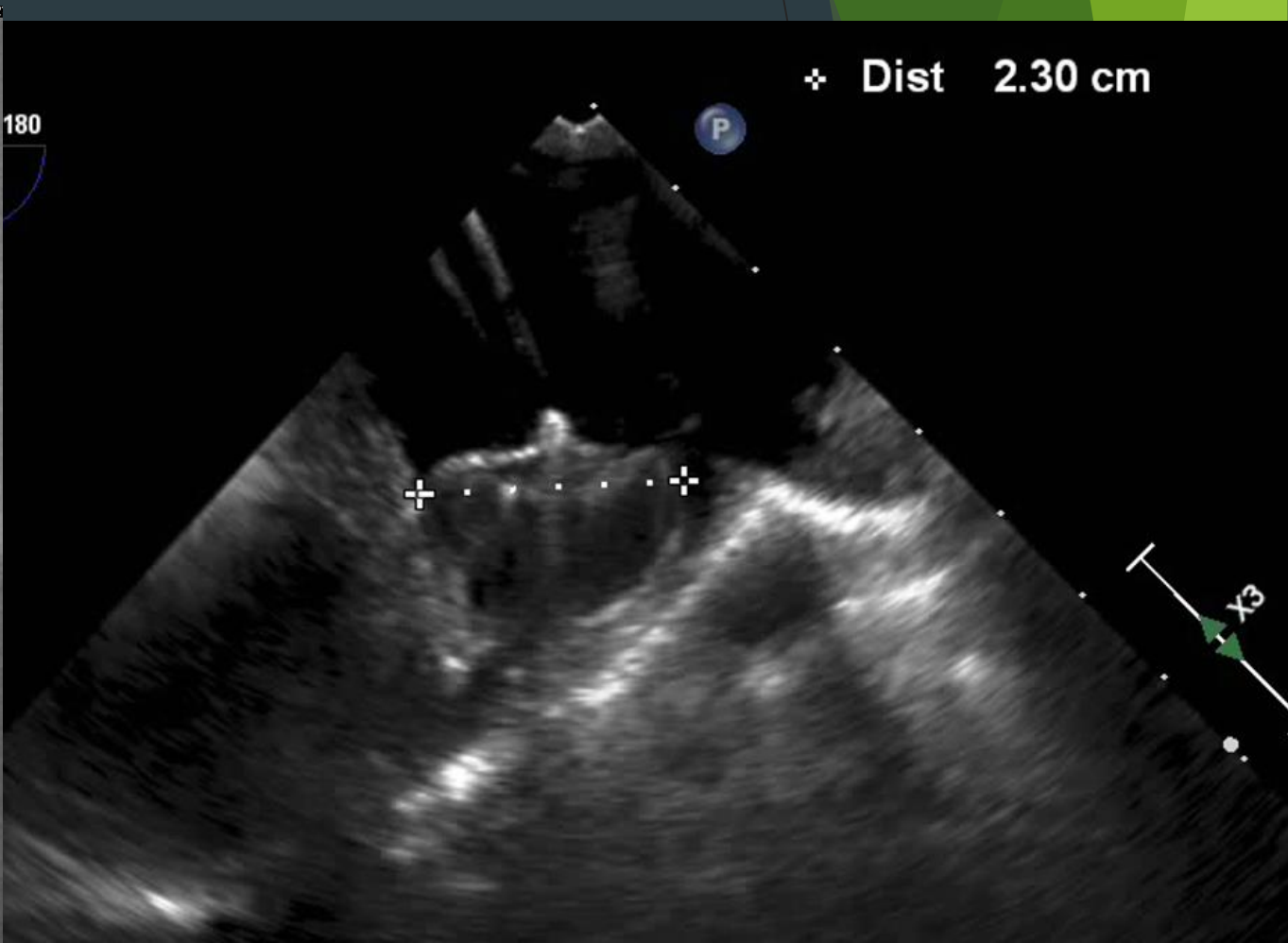
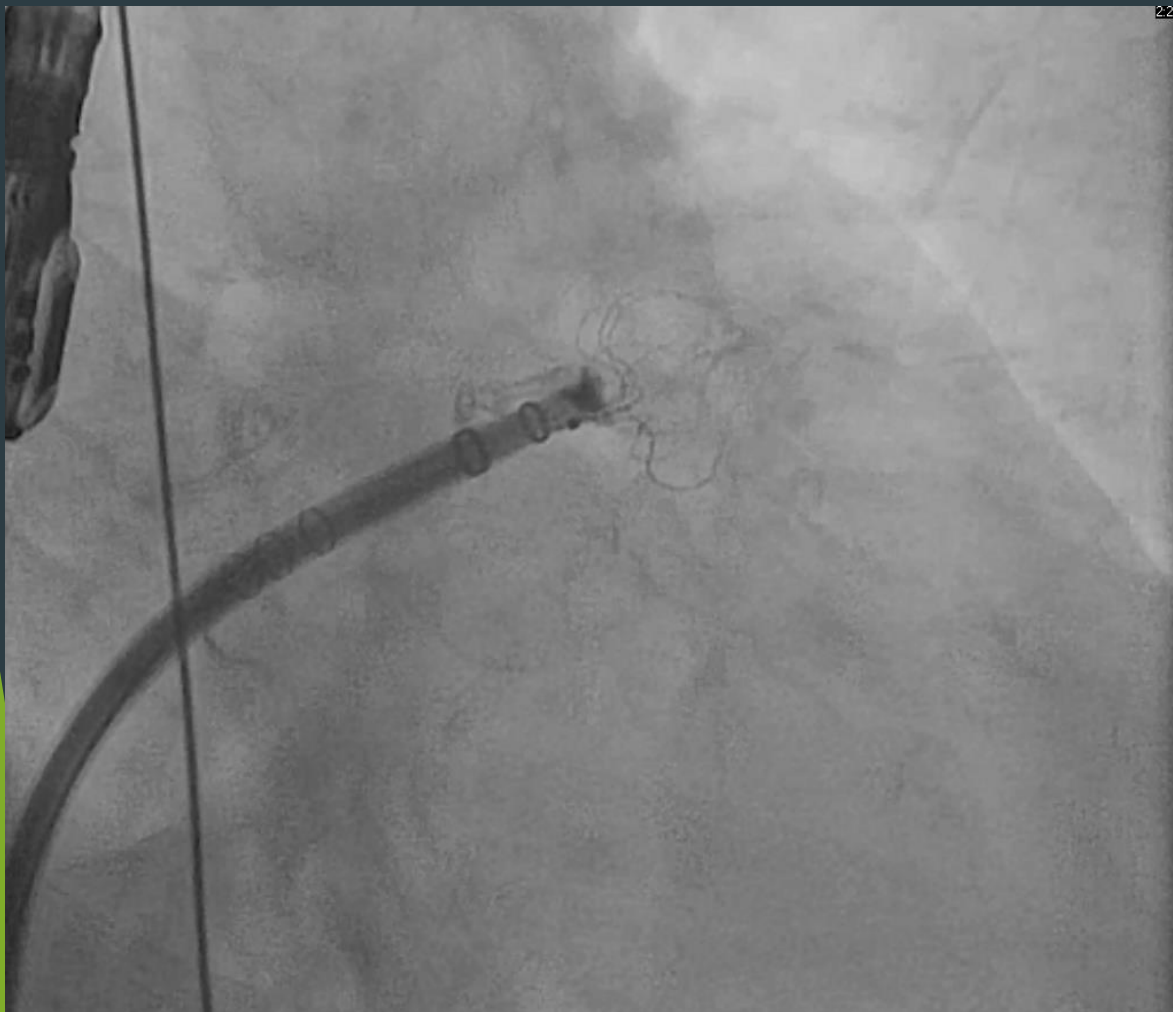
Vivek Y. Reddy et al. *J Am Coll Cardiol* 2017; 70:2964-2975.



JACC
JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY

Percutaneous Approaches to Occlude the LAA

Recommendation for Percutaneous Approaches to Occlude the LAA		
		Recommendation
IIb	B-NR	<p>Percutaneous LAA occlusion may be considered in patients with AF at increased risk of stroke who have contraindications to long-term anticoagulation.</p> <p>NEW: Clinical trial data and FDA approval of the Watchman device necessitated this recommendation.</p>



Back to our pt

She was referred to our left atrial appendage occlude device clinic

Starts DOAC 3 weeks prior to the procedure

Procedure performed under GA, TEE, venous access

Discharged home next day on anticoagulation + aspirin

TEE 30 days post procedure demonstrates good device position

Stops anticoagulation and starts clopidogrel x 6 months

Long term baby aspirin

