Cardiac Catheter Ablation: Atrial Fibrillation and Heart Failure

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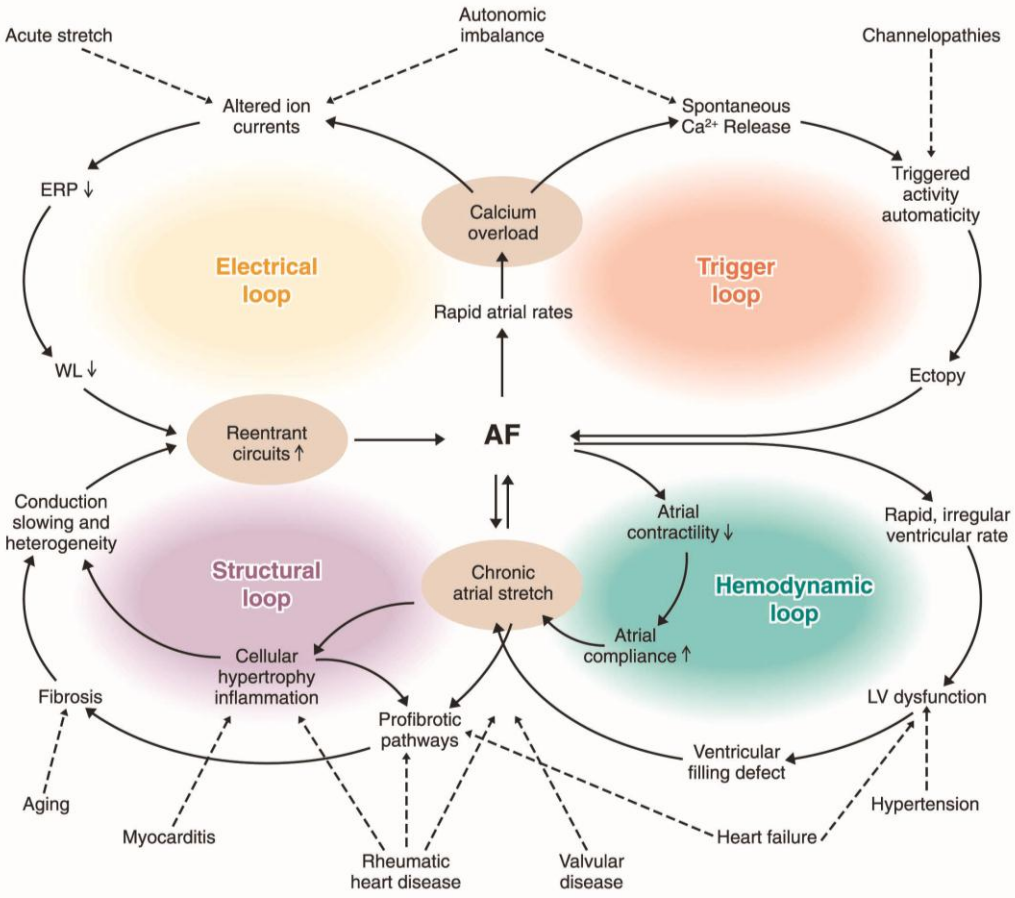
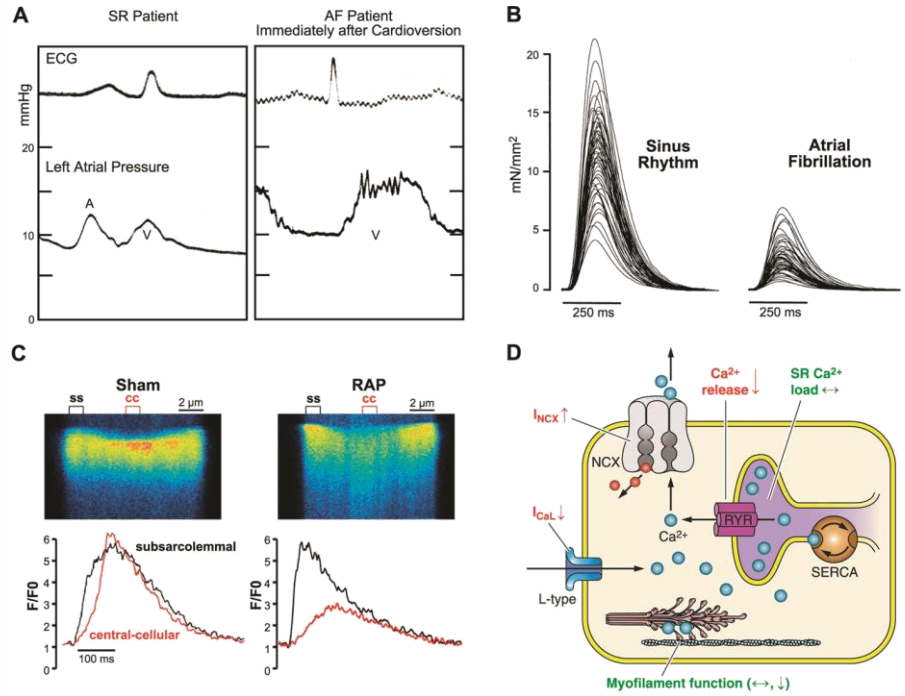
ADVANCES IN CARDIOVASCULAR ARRHYTHMIAS
AND
GREAT INNOVATIONS IN CARDIOLOGY,
Torino, Italy
Octobre 21, 2011

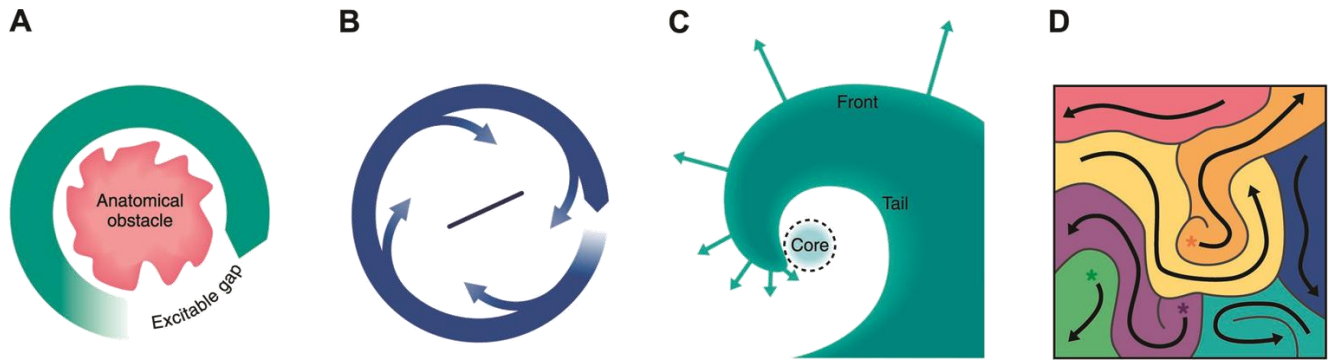
Remodelling and Contractile Dysfunction in AF



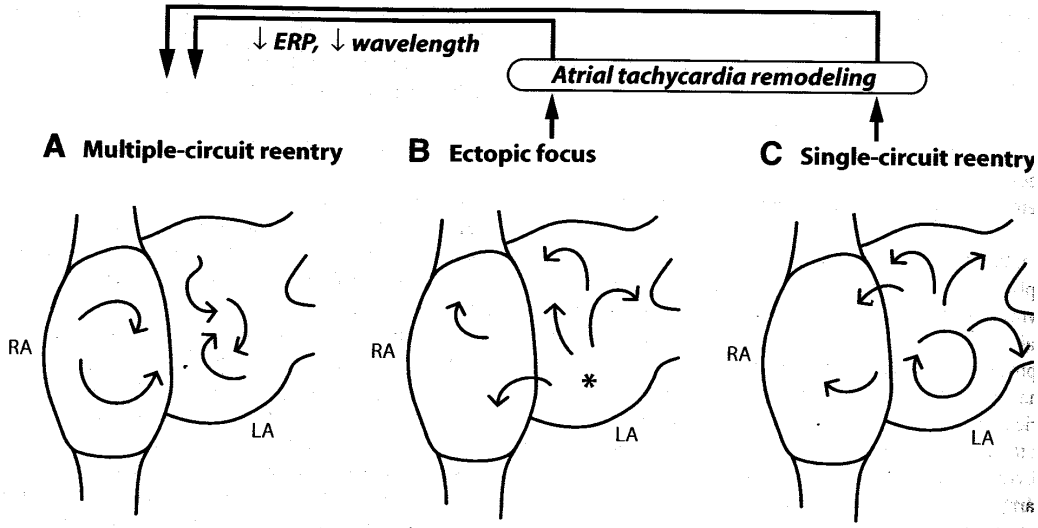


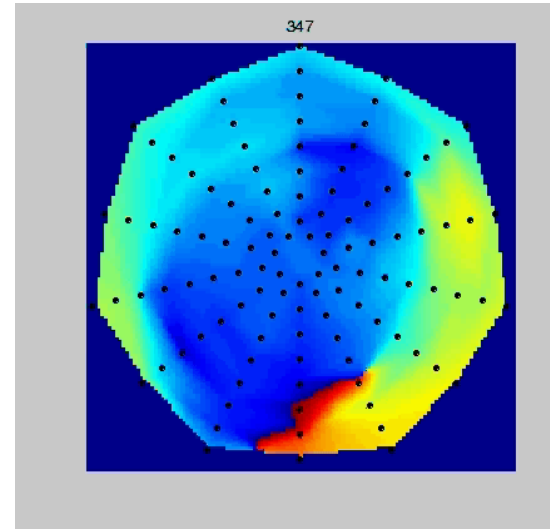
Schotten et al, Physiol Rev 2011

Reentry Models and Proposed Mechanisms of AF



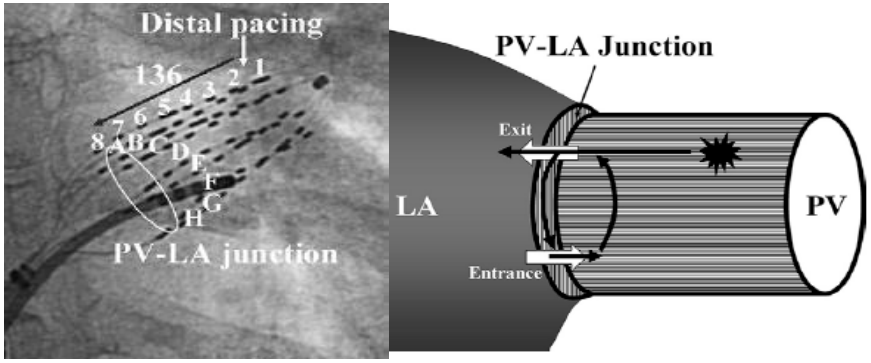
Schotten et al, Physiol Rev 2011

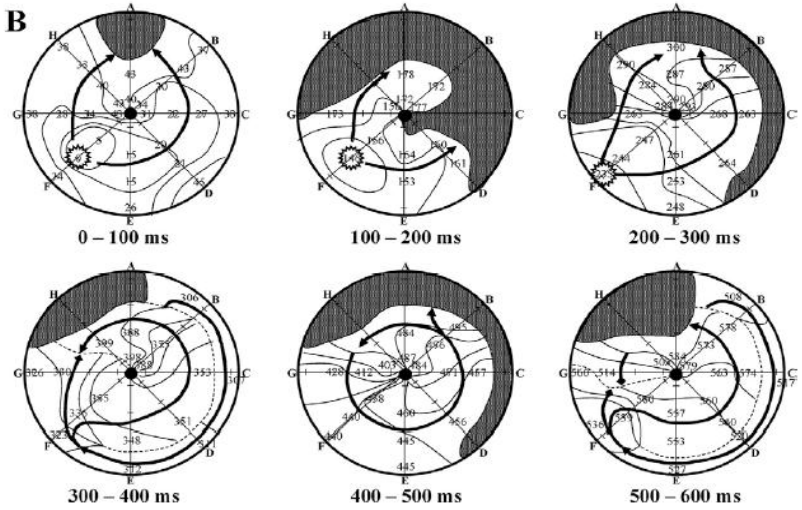




Umapathy et al, Circ Arr Electrophysiol 2010

AF in Humans: Intra- PV and PV-LA junction Reentry

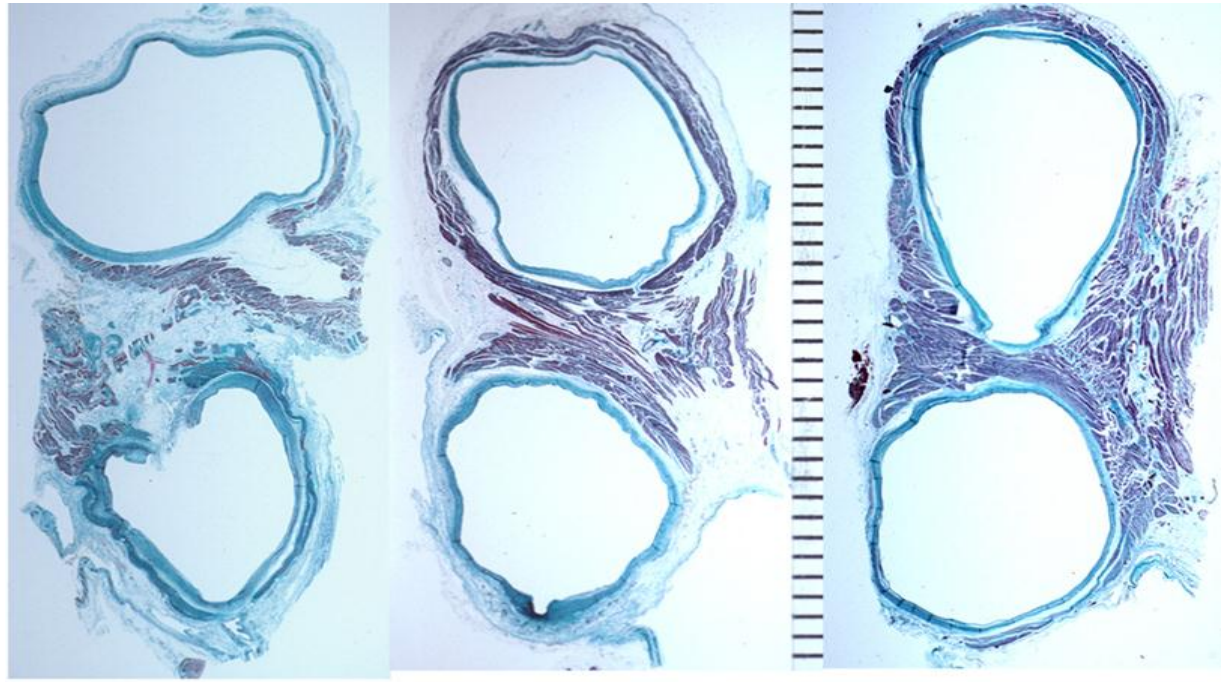




60y Male

60y Male

80y Female



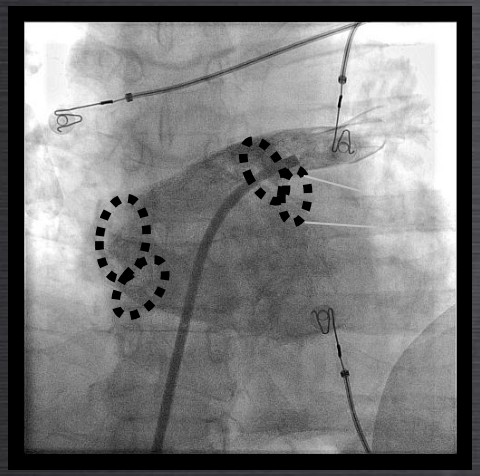
Kumagai et al, JACC 2004, 43, 2281

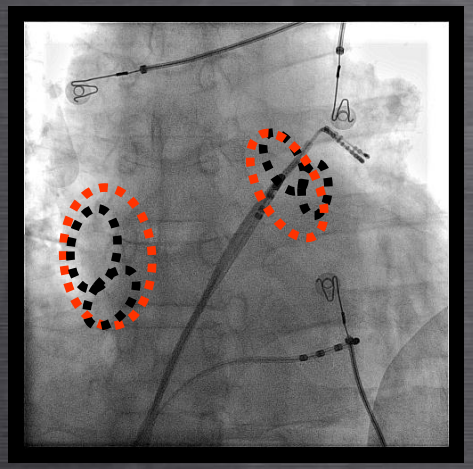
Ho SY et al, Heart 2001

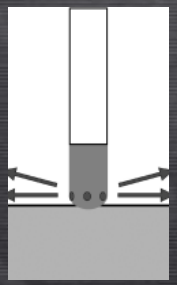
PV Isolation

for *all* patients

Single ostial isolation

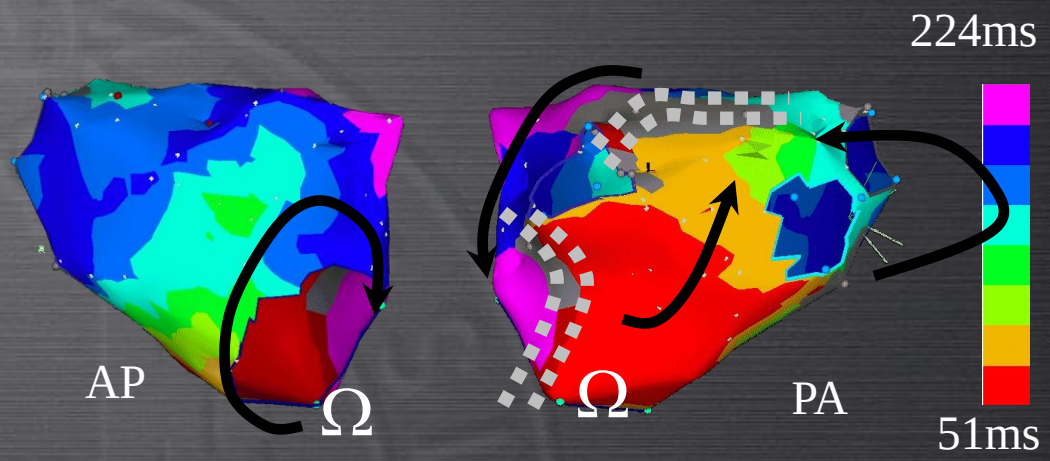




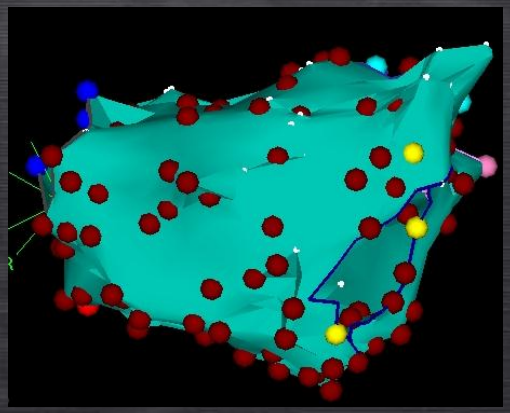


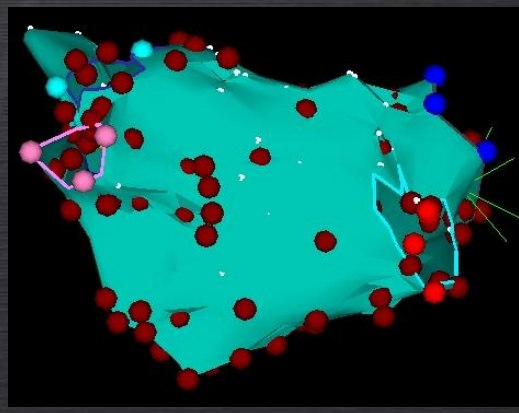
Linear LA Lesions

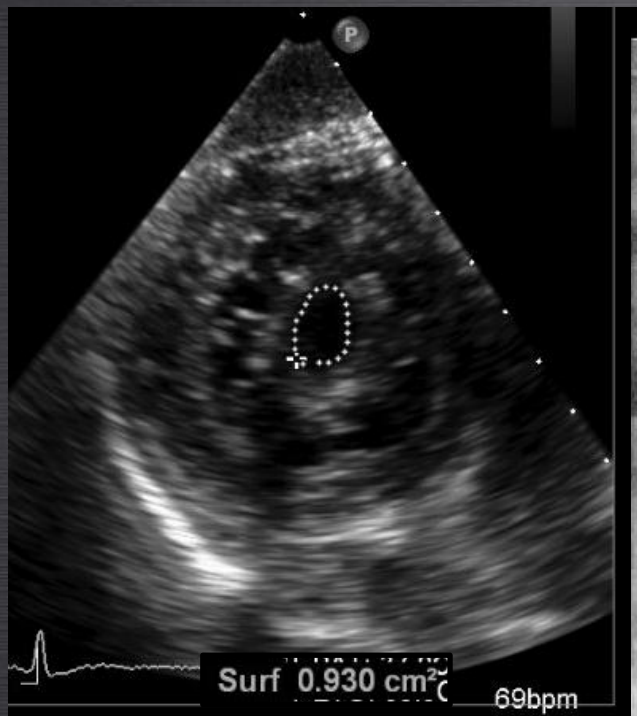
for persistent/permanent AF *

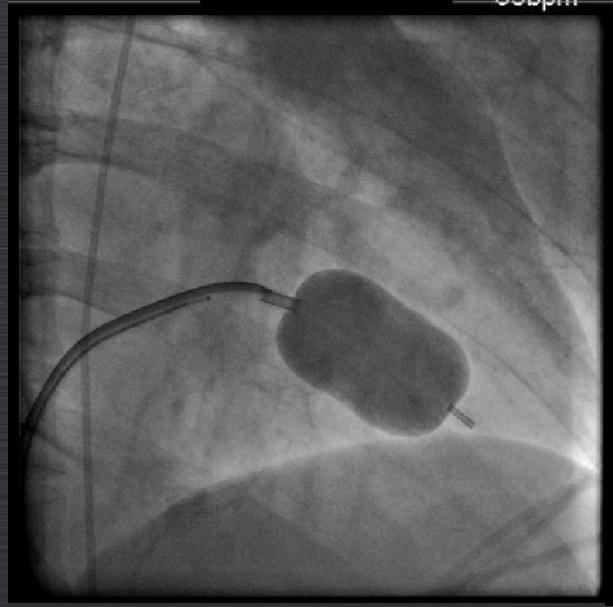


Electrogram substrate Ablation





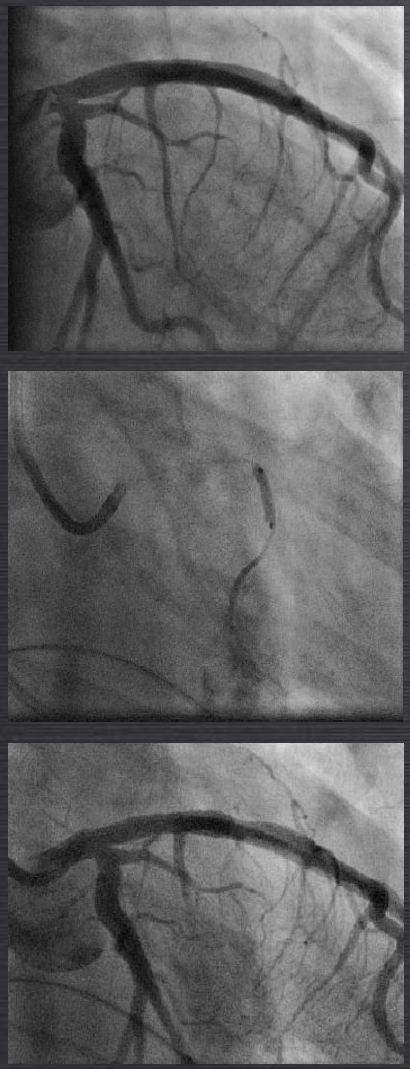


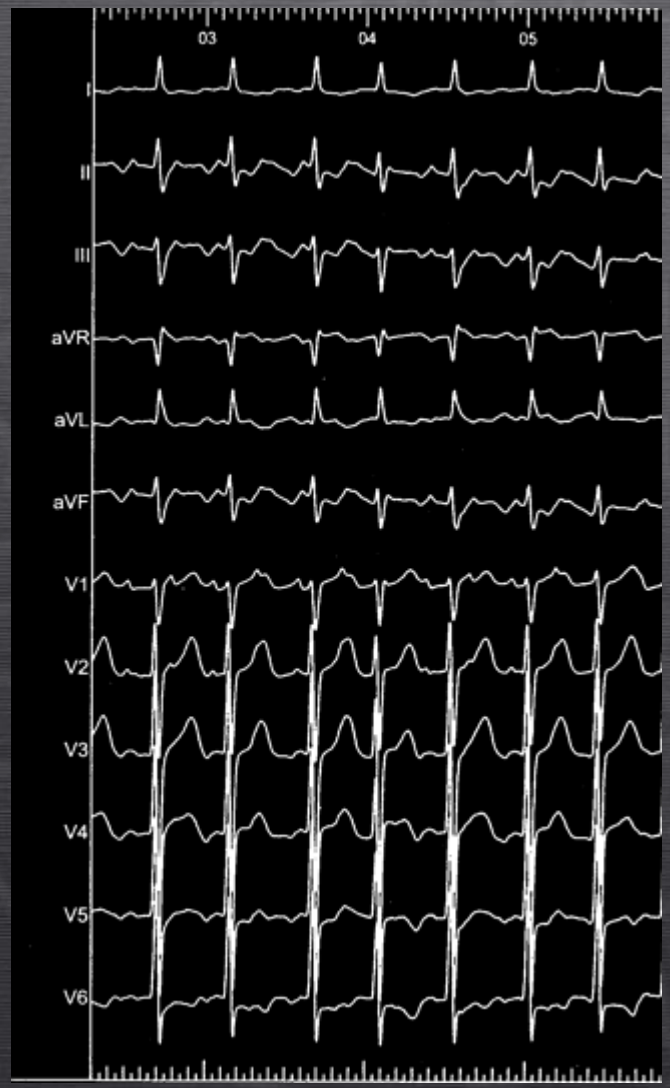


40 yrs, M, Rheumatic Mitral stenosis,
Post BMV, Persistent AF

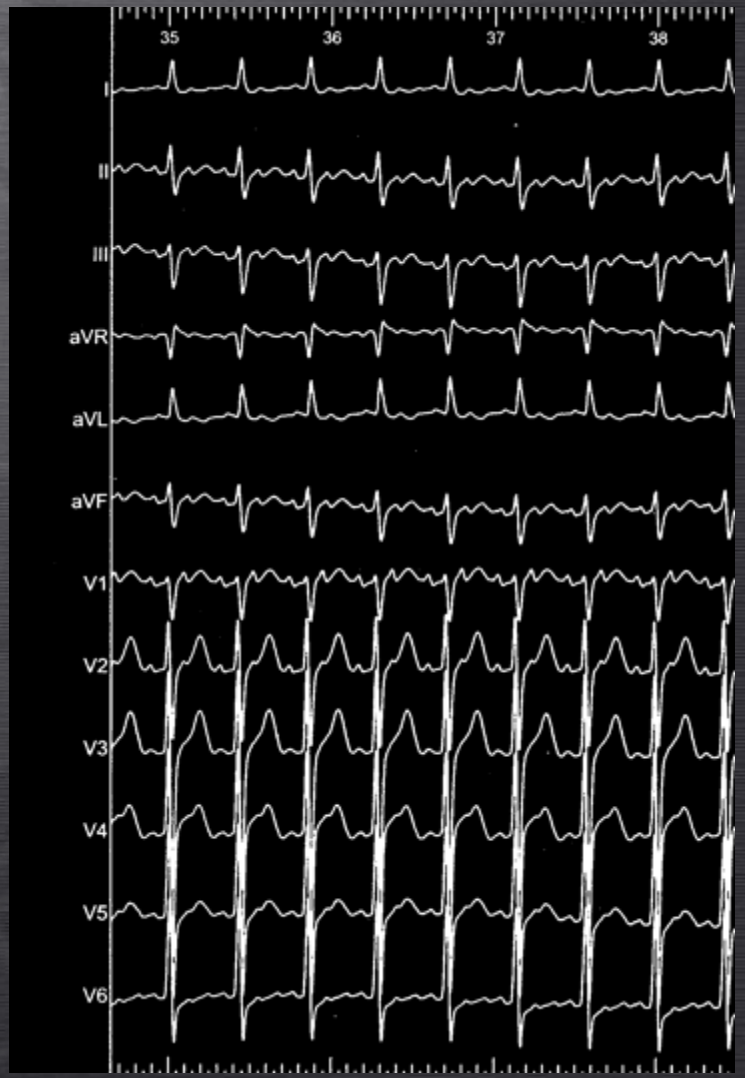
PVI+Atrial Substrate Ablation

Hypertrophic Cardiomyopathy & Persistent AF



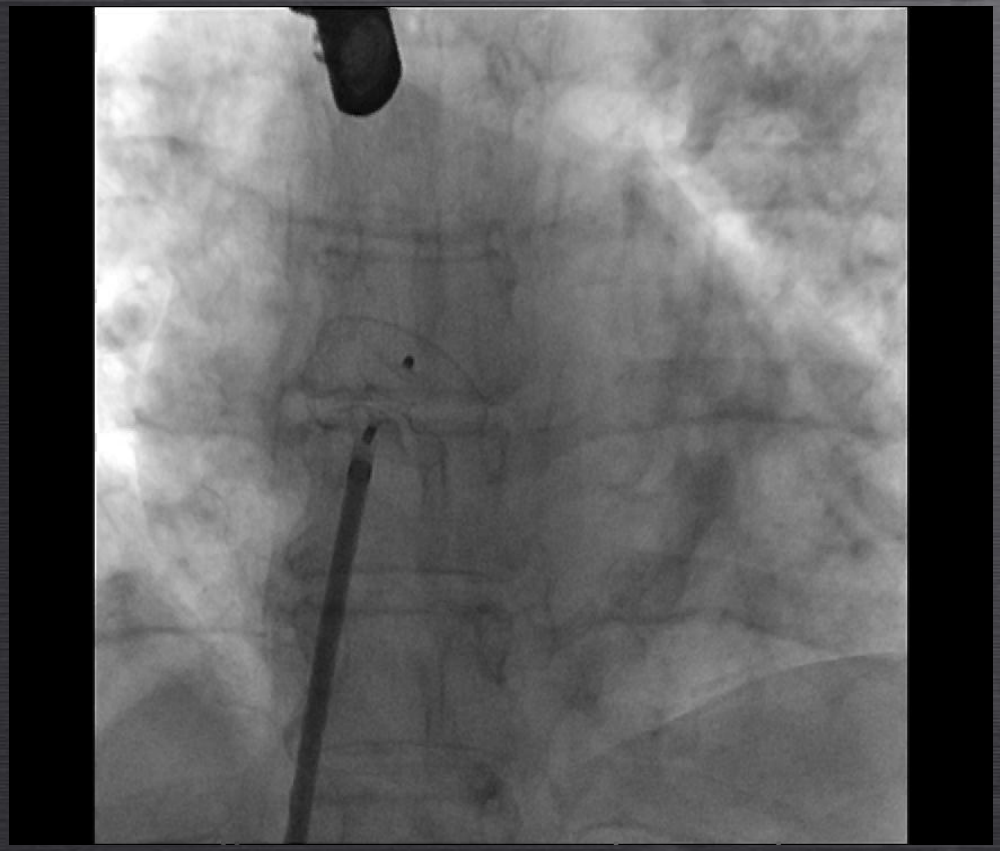


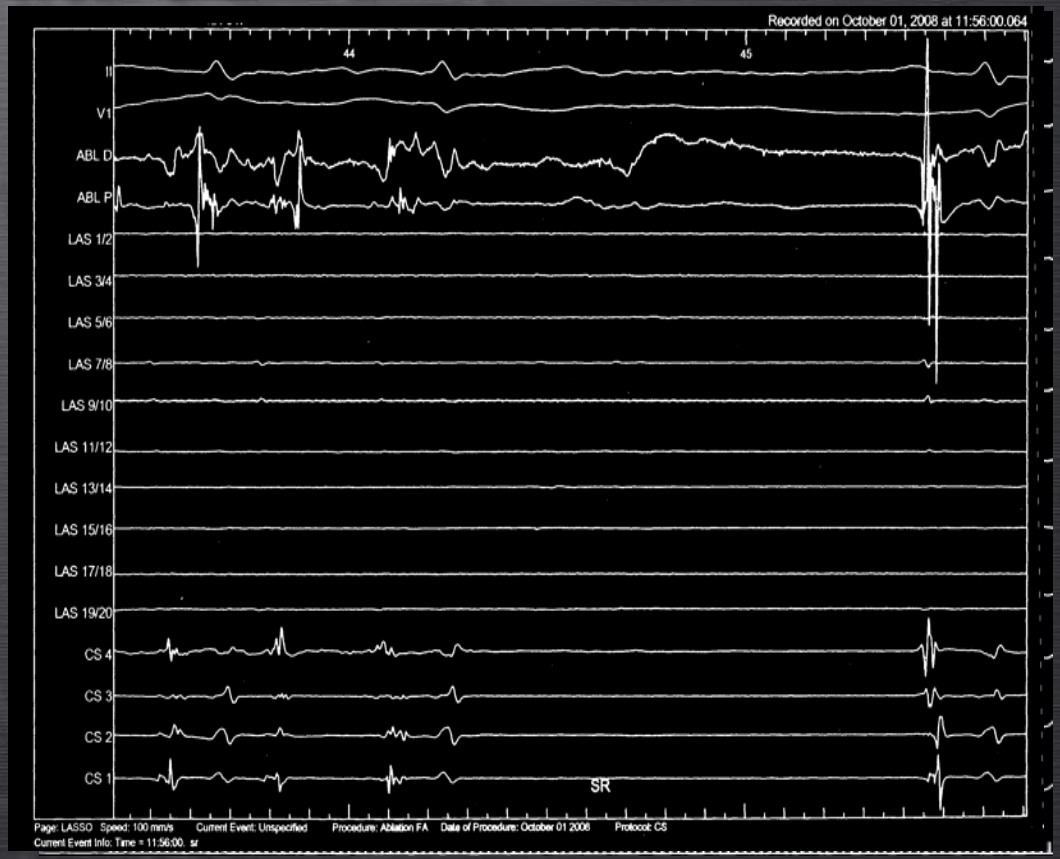
Typical Flutter



LA Flutter (Peri LPV)

ASD & Chronic AF





AF Ablation at the HUG: 2002-2010; 717 patients

Patient characteristics

Sex	566 M/151F
Age	53±9 yrs
Paroxysmal AF	505 (72%)
Pers/Permanent AF	212 (28%)
LA size	4.2±0.7 cm
Heart disease	118 (17%)
↓ LVEF (<40%)	34 (5%)
CVA	52 (7%)

AF & AT free w/o AAD @ 50±28 mnths: 78.5%*

(*No f-up:14%)

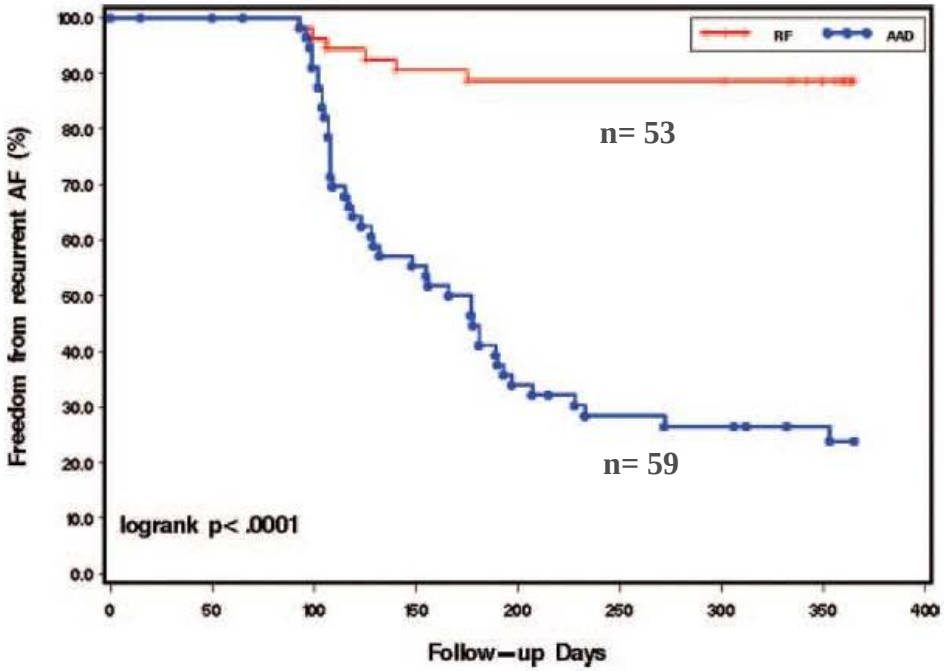
Procedural characteristics

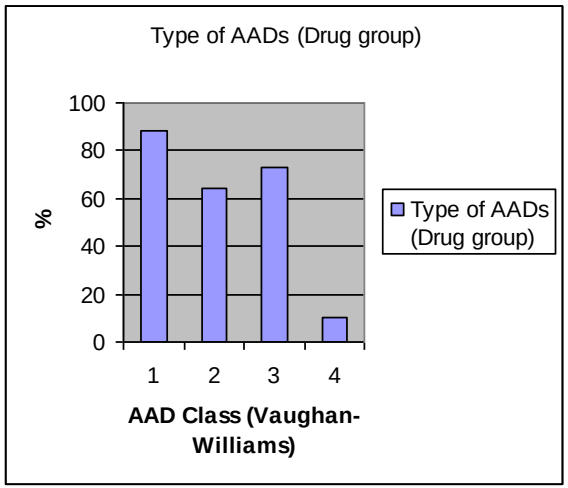
	n= 961 procedures
Procedure time	182±50 min
RF time	41±20 min
Procedures/pt	1.3
Complications	
Embolic	4* (0.4%)
Tamponade	7 (0.7%)
Gastroparesis	2 (0.2%)
PV stenosis (asymptomatic)	4 (0.4%)
Puncture site	8(0.8%)
Hemothorax	1 (0.01%)

Catheter Ablation Versus Antiarrhythmic Drugs for Atrial Fibrillation

The A4 Study

(*Circulation*. 2008;118:000-000.)





Clinical Outcomes of Catheter Substrate Ablation for High-Risk Patients With Atrial Fibrillation

J Am Coll Cardiol, 2008; 26; 51:843-849

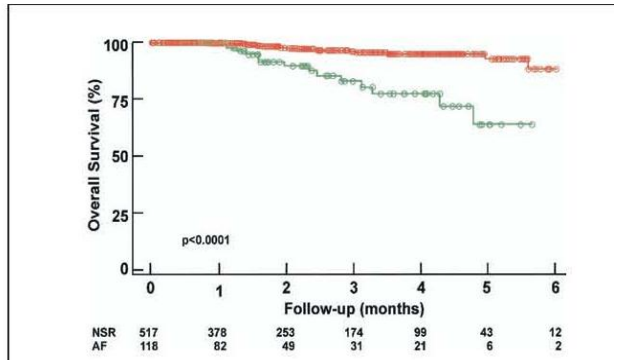


Figure 1 Effects of Maintaining NSR After AF Ablation on Survival

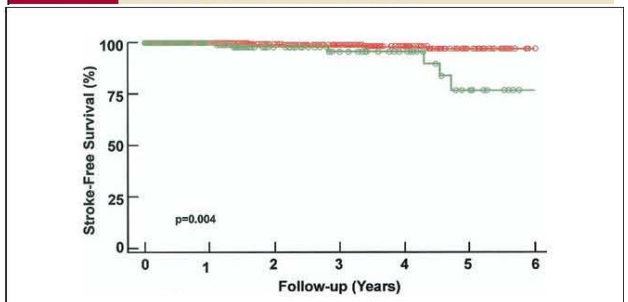


Figure 4 Comparison of Stroke-Free Survival: Warfarin vs. No Warfarin

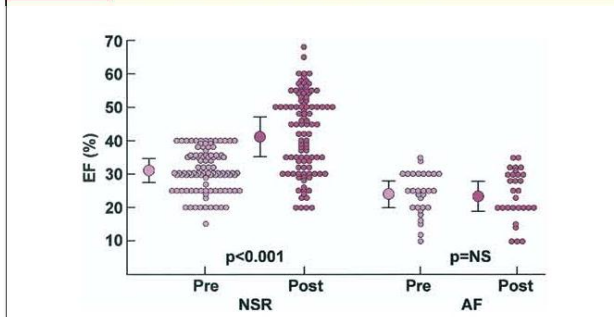
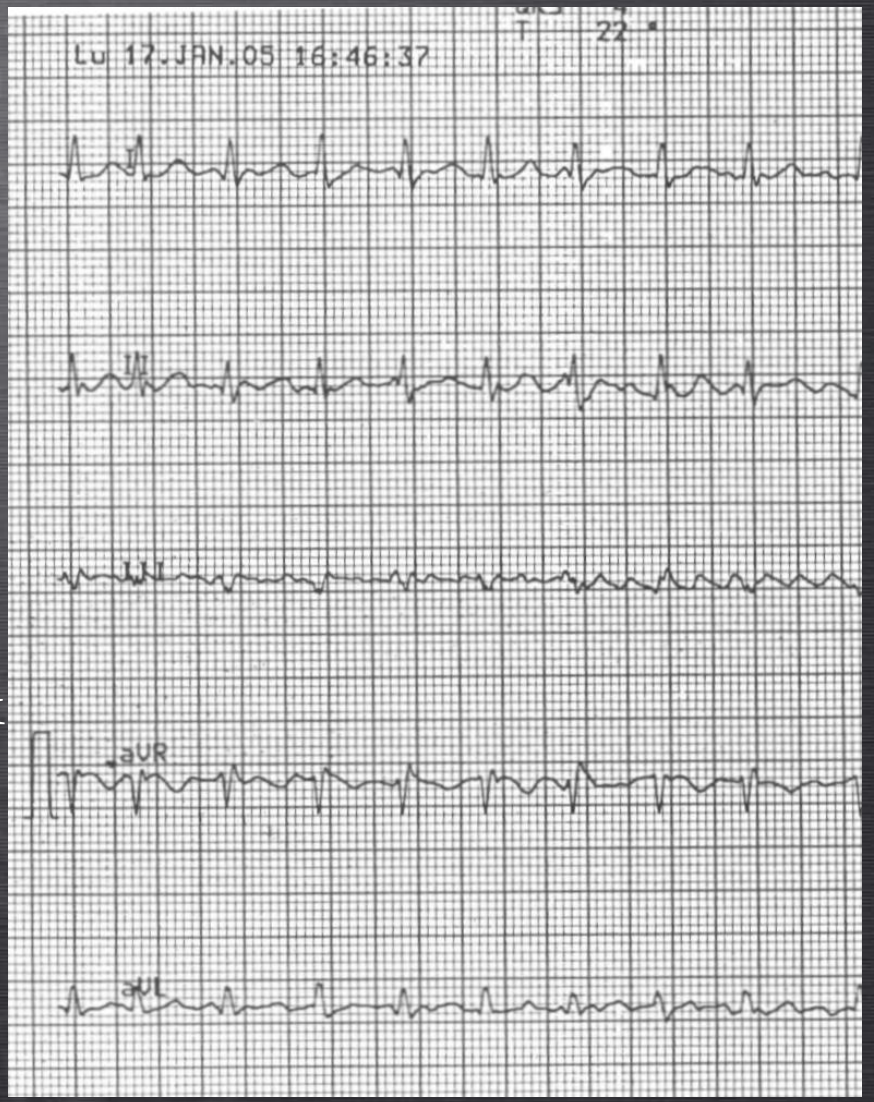


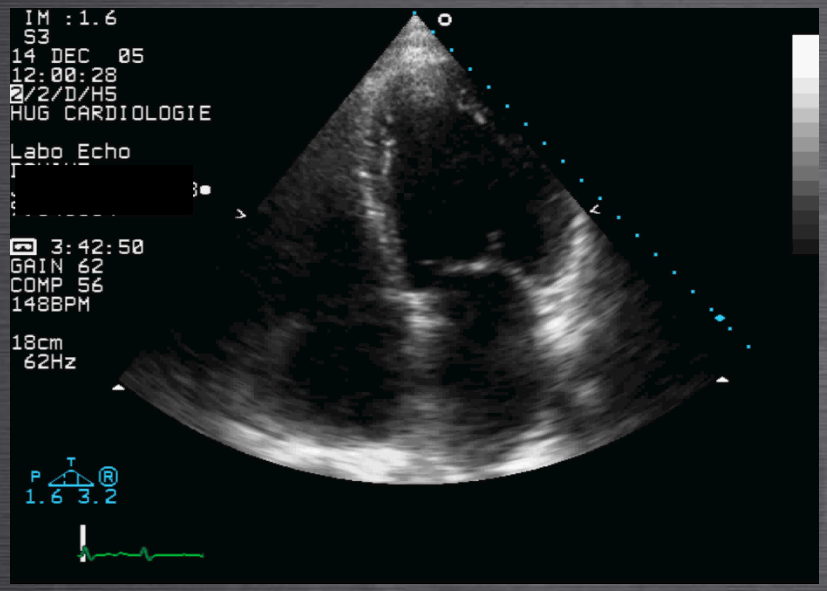
Figure 3 Beneficial Effect of NSR After AF Ablation on Left Ventricular Function

Case # 2

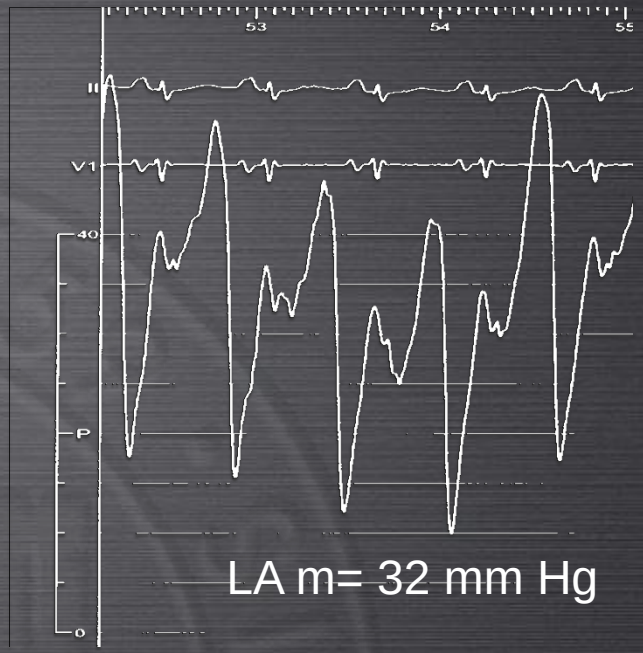
- Mr D, 62 yrs
- Symptomatic frequent atrial fibrillation and flutter
- Moderate to severe COPD (smoker)
- Status post resection Rt lung inferior lobe for benign polyp
- Status post chemotherapy for bladder carcinoma Cordarone, Beta blockers & Digoxin ineffective
- Dyspnoea on effort, NYHA III
- H/o near pulmonary edema



M, 63 yrs
Paroxysmal AF and flutter
Urothelial Ca R 2001
COPD, PAH, P/o lobectomy

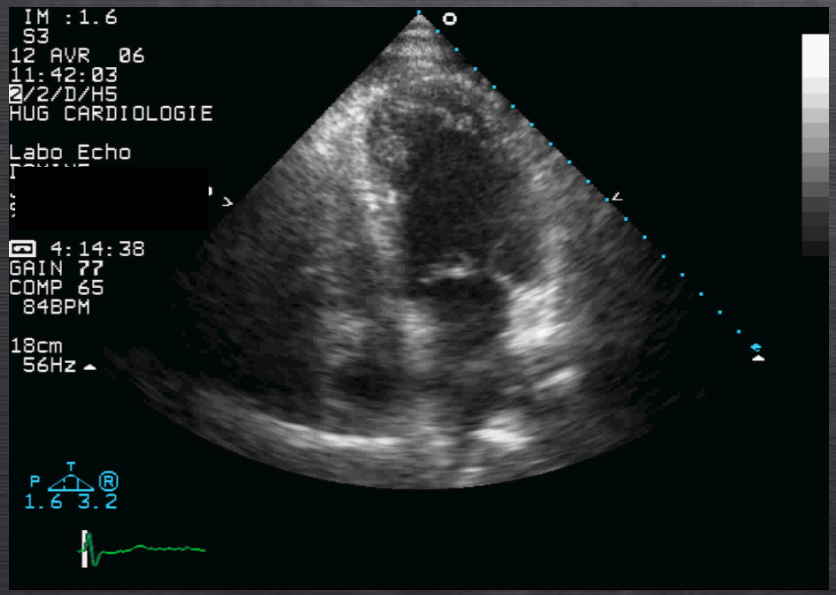


Pre-ablation

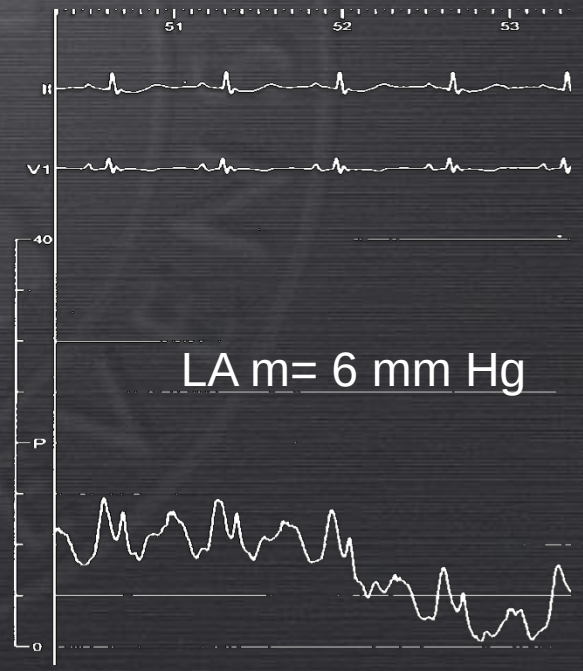


LA m= 32 mm Hg

After PV isolation and CTI ablation



4 months later



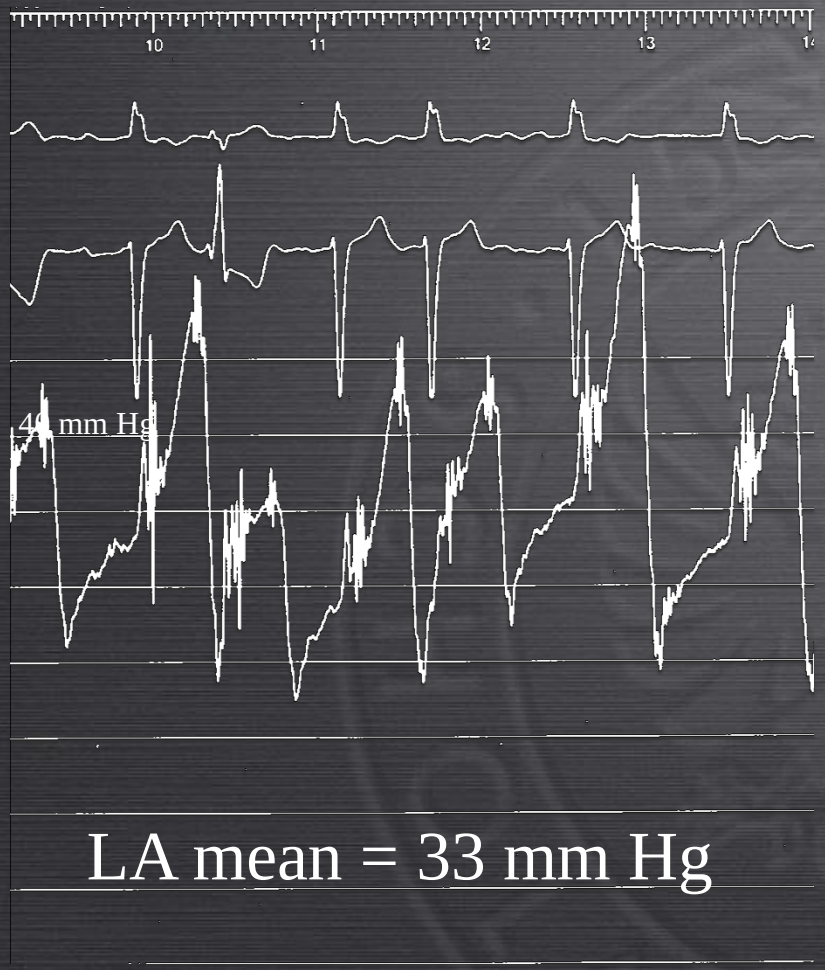
LA m= 6 mm Hg

Case # 3

- Mr J, 57 yrs
- Persistent AF (> 6 months)
- S/P CTI ablation (8 months ago)
- S/P ICD implantation
- Dyspnea, NYHA class III, orthopnea
- Type II DM, CAD: CABG 1995
- Severe LV dysfunction: LVEF 20%

- Treatment:
- Loop diuretics
- Aldactone
- Digoxin
- Carvedilol
- Amiodarone
- Pravalotin
- Sintrom

Case # 3



Extended PVI+ LAlesions

↓

Stable sinus rhythm w/o AADs

↓ Persisting class III dyspnea and orthopnea…

Cardiac resynchronisation in stable sinus rhythm …

↓ Persisting HF

Cardiac transplantation in stable sinus rhythm …

Sinus rhythm is associated with fewer heart failure symptoms: Insights from the AFFIRM trial

Table 3 NYHA status in the 2 original rate control and rhythm control arms by intention to treat

Arm	N of records	NYHA (0 + I) N of records	%	NYHA (II + III) N of records	%
Rate control	20,672	18,754	90.7	1,905	9.2
Rhythm control	20,843	19,087	91.6	1,746	8.4*

Abbreviations as in Table 1.
*$P < .01$.

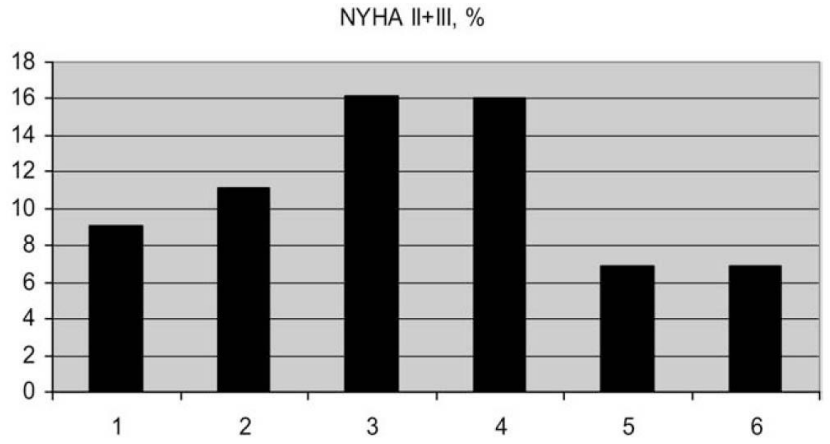


Table 5 Symptomatic HF in groups with different AF burdens

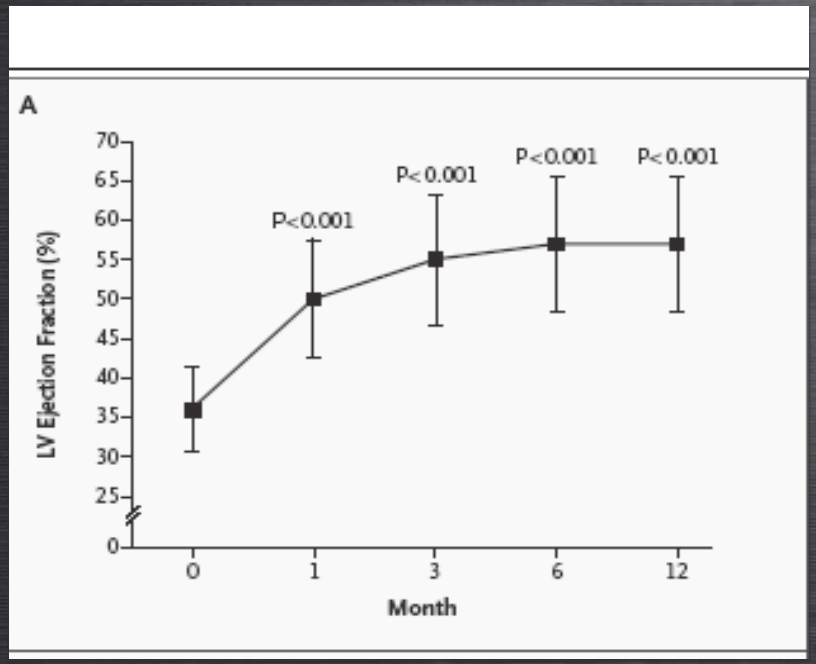
		N of records	NSR/AF	NYHA II + III, %	Odds ratio (95% confidence interval)	*P*
1	Rate	17,967	0.63	9.1	1.35 (1.12–1.63)	.0018
2	Rhythm to rate	5,894	0.75	11.1	1.69 (1.3–2.19)	<.0001
3	Rhythm to rate to rhythm	973	0.85	16.2	2.61 (1.76–3.89)	<.0001
4	Rate to rhythm to rate	712	2.15	16.0	2.56 (1.49–4.4)	.0007
5	Rate to rhythm	1,732	4.41	6.9	1.01 (0.66–1.53)	.9727
6	Rhythm	14,237	10.76	6.9	1	

Abbreviations as in Table 4.

Guglin M et. al, Heart Rhythm 2010;7:596–601

Catheter Ablation for AF in Congestive Heart Failure

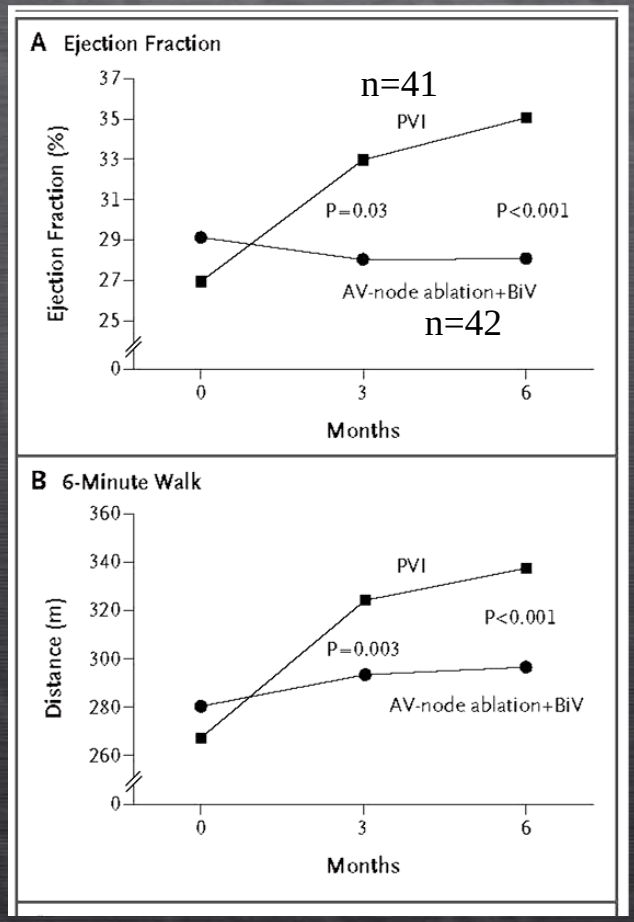
Hsu et al, N Engl J Med 2004; 351: 2373-83

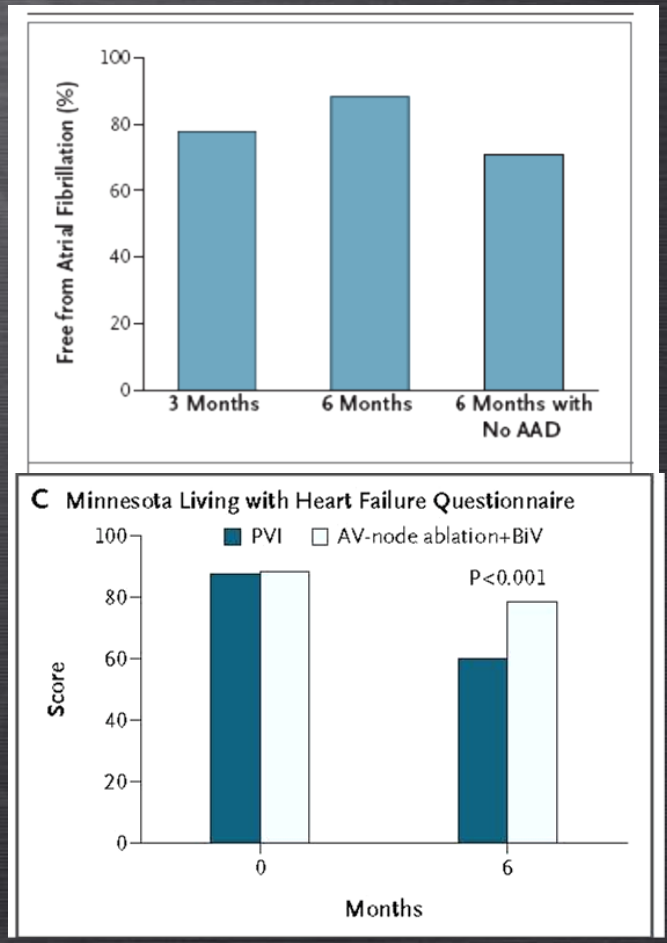


- 58 patients with CHF & EF < 45%
- 74% persistent AF
- 50% had repeat procedure
- 2% tamponade, 2% stroke
- 69% sinus rhythm w/o drugs @ 12 ±7 mnths
- LVEF ↑ Δ21± 13%

Pulmonary Vein Isolation for Atrial Fibrillation in Patients with Heart Failure

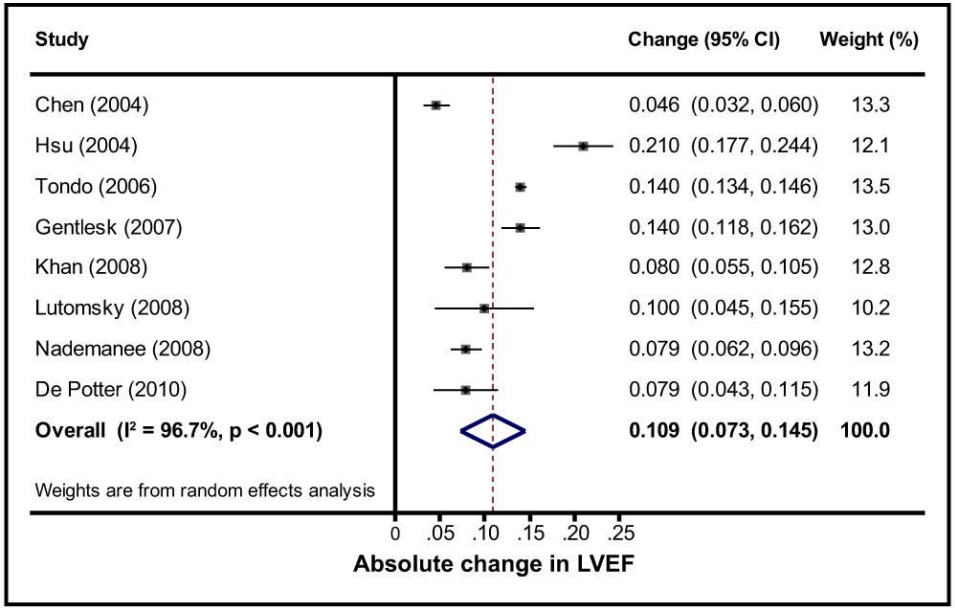
- Prospective randomised multicentre study
- Patients with symptomatic drug resistant heart failure and AF
- NYHA II or III
- EF<40%

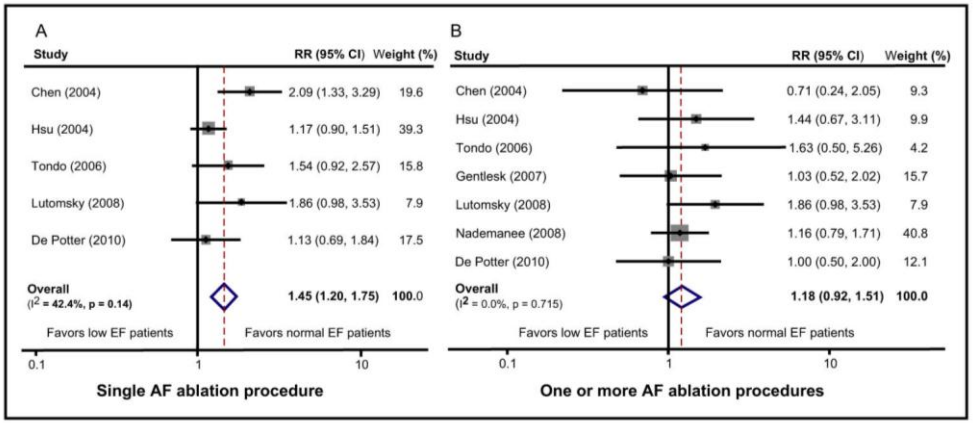




N Engl J Med 2008;359:1778-85

Catheter Ablation for AF with CHF: Meta-Analysis





- Seven observational studies and 1 randomized trial were included (total n 1,851).
- Follow-up ranged from 6 to 27 months.

Wilton et al, Am J Cardiol 2010;106:1284 –1291

AV Junction Ablation

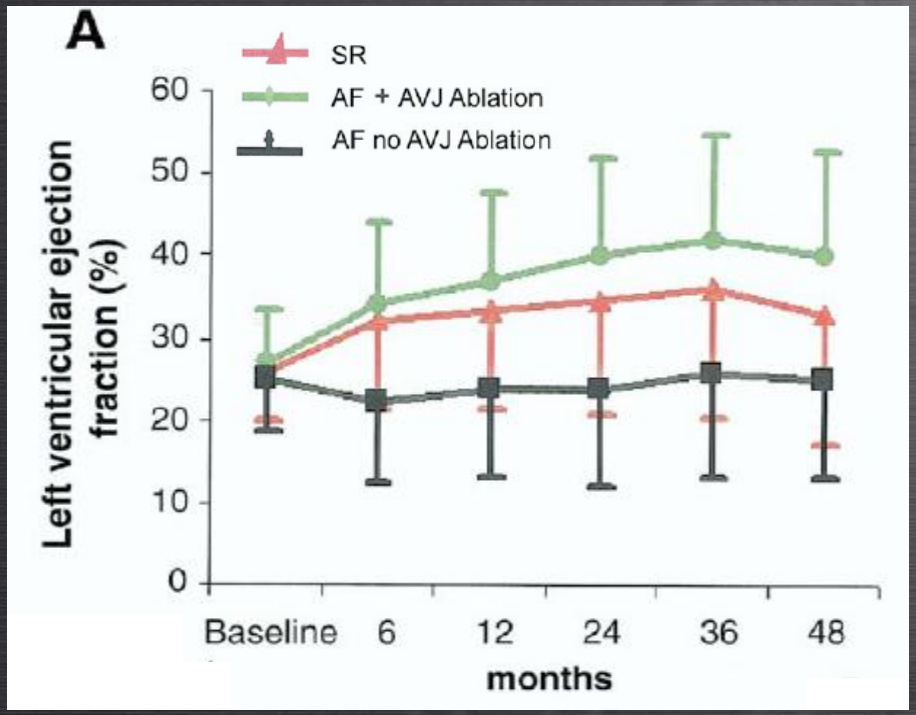
- Reduces symptoms
- Improves QOL
- Reduces hospitalizations
- Improves exercise capacity and LV function in selected patients

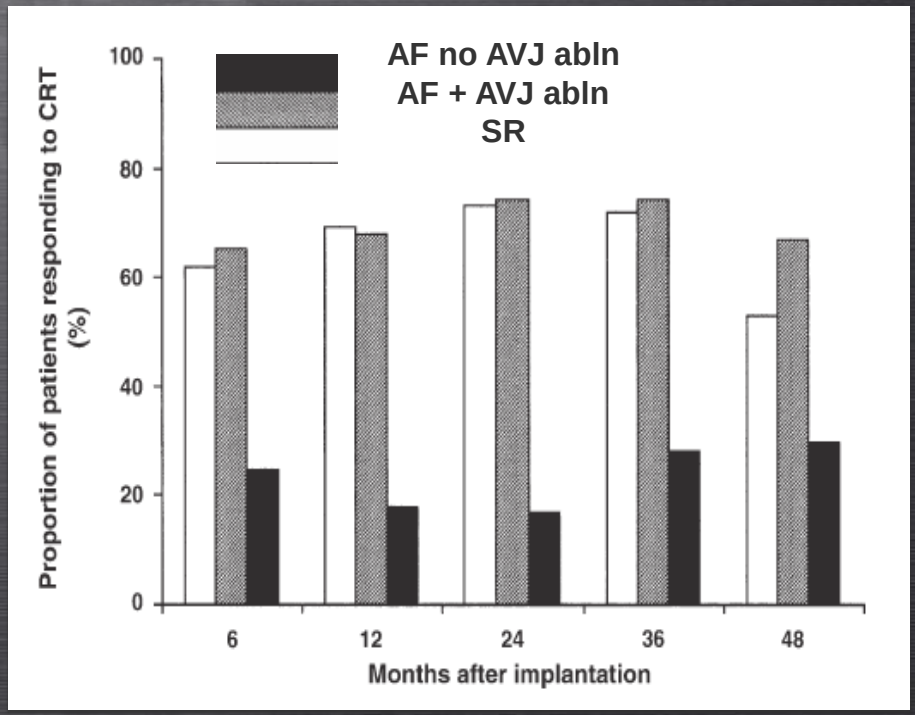
BUT

- Irreversible
- Risk of complications - SCD
- Life long PM dependency
- Maintained embolic risk
- High rate of progression to chronic AF

Cardiac Resynchronisation in AF

Gasparini et al, J Am Coll Cardiol 2006; 48: 734-43





- CRT without AVJ ablation: only 42% had > 85% BiV capture !
- Significant and sustained ↑ EF and improved functional capacity only if CRT with AV junction ablation
- EF improvement $\Delta 10.1 \pm 9\%$

Atrial Fibrillation and Heart Failure

Role of non-pharmacologic interventions

- Surgical ablation :
  - For a concomitant cardiac surgical indication
- Catheter ablation :
  - For paroxysmal AF
  - For permanent/persistent AF with limited LA size
- AV Junction ablation with CRT :
  - For failed catheter ablation
  - For permanent AF with severely enlarged LA

Catheter Ablation for AF with Heart Failure

- Currently used early in the absence of SHD (tachycardiomyopathy)
- Very useful for diastolic heart failure
- Even for asymptomatic patients ?
- With SHD: before Amiodarone trial ?
- Before cardiac resynchronisation?