Correlates of arrhythmia recurrence after hybrid epi- and endocardial radiofrequency ablation for persistent atrial fibrillation

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Original Article

Correlates of Arrhythmia Recurrence After Hybrid Epi- and Endocardial Radiofrequency Ablation for Persistent Atrial Fibrillation

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Background—Long-term efficacy of catheter-based treatment of persistent atrial fibrillation is unsatisfactory. Minimally invasive surgical ablation techniques have been developed recently, but their efficacy has never been systematically tested.

Methods and Results—Seventy patients (median age, 63.5 years) with persistent atrial fibrillation underwent epicardial thoracoscopic radiofrequency pulmonary vein isolation, linear ablation, Marshal ligament disruption, and exclusion of the left atrial appendage. The procedure was followed by electroanatomic mapping and ablation (EAM) 2 to 3 months later. Only 76% of patients were in normal sinus rhythm at the beginning of EAM. All 4 pulmonary veins and the left atrium posterior wall were found isolated in 69% and 23% of patients, respectively. Arrhythmia-free survival off antiarrhythmic drugs 12 months after EAM was 77%. Using previously ineffective antiarrhythmic drugs and reablation procedures, arrhythmia free-survival increased to 97% during follow-up (mean, 936±432 days; range, 346–1509 days). The majority of arrhythmia recurrences occurred during the first 12 months after EAM. In a multivariable-adjusted estimates, left atrium volume >165 mL, absent normal sinus rhythm at admission for EAM, and inducibility of any sustained tachyarrhythmia at the end of EAM procedure were identified as independent correlates of atrial fibrillation recurrence.

Conclusions—Our report demonstrated that the majority of patients after epicardial ablation, using bipolar radiofrequency instruments, required endocardial catheter ablation to complete the linear ablation lesions and a significant proportion of patients required spot-ablations to complete electric pulmonary vein isolation. Noninducibility of any arrhythmia after a staged hybrid procedure seemed to be the strongest correlate of long-term arrhythmia-free survival.

Clinical Trial Registration—URL: www.ablace.cz. Unique identifier: cz-060520121617.

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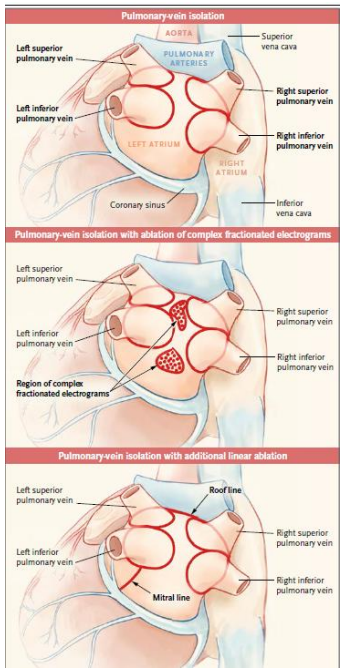
Key Words: atrial fibrillation ■ catheter ablation ■ endocardium ■ follow-up studies ■ ligaments ■ surgical procedure, cardiovascular

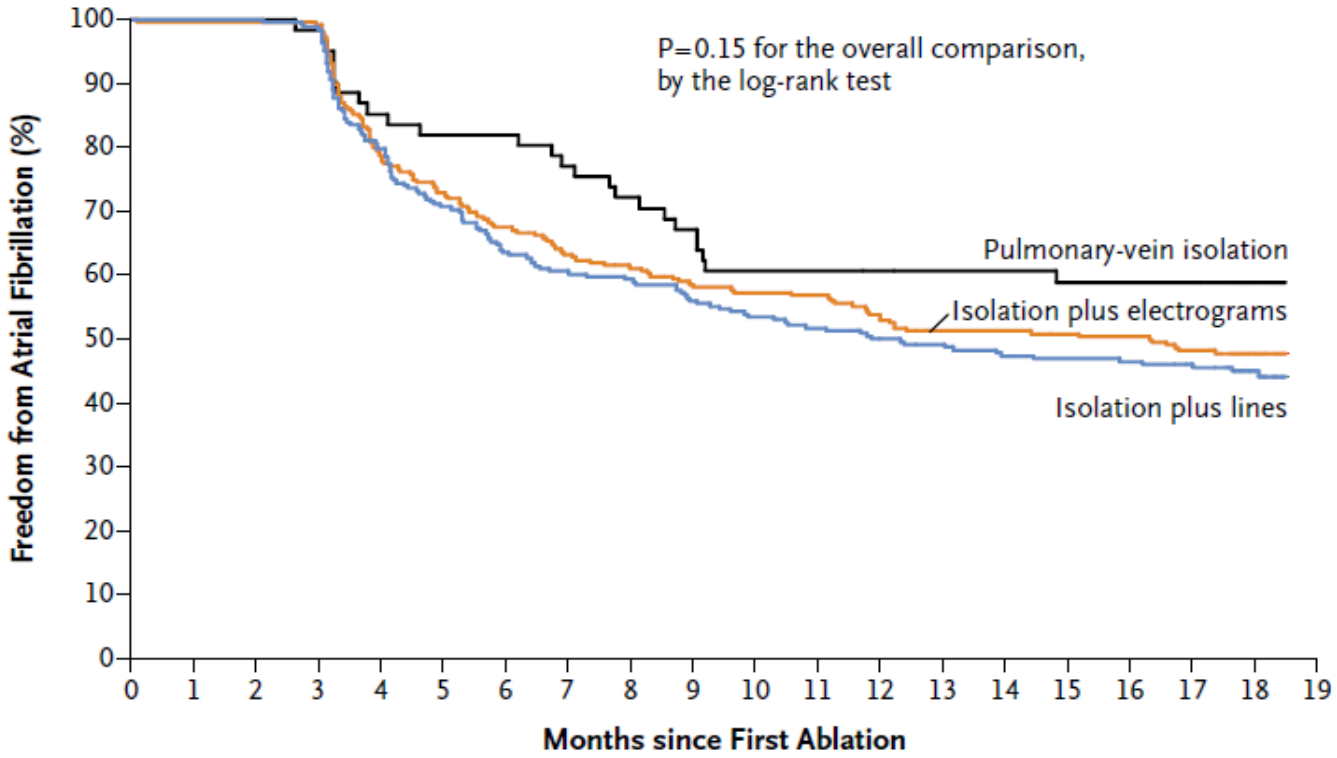
Atrial fibrillation

Table 3 Cardiovascular morbidity and mortality associated with atrial fibrillation

Event	Association with AF
Death	Increased mortality, especially cardiovascular mortality due to sudden death, heart failure or stroke.
Stroke	20–30% of all strokes are due to AF. A growing number of patients with stroke are diagnosed with 'silent', paroxysmal AF.
Hospitalizations	10–40% of AF patients are hospitalized every year.
Quality of life	Quality of life is impaired in AF patients independent of other cardiovascular conditions.
Left ventricular dysfunction and heart failure	Left ventricular dysfunction is found in 20–30% of all AF patients. AF causes or aggravates LV dysfunction in many AF patients, while others have completely preserved LV function despite long-standing AF.
Cognitive decline and vascular dementia	Cognitive decline and vascular dementia can develop even in anticoagulated AF patients. Brain white matter lesions are more common in AF patients than in patients without AF.

Catheter therapy of atrial fibrillation



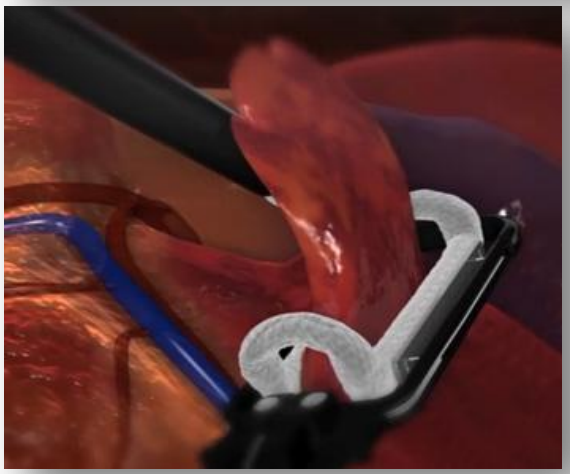


No. at Risk

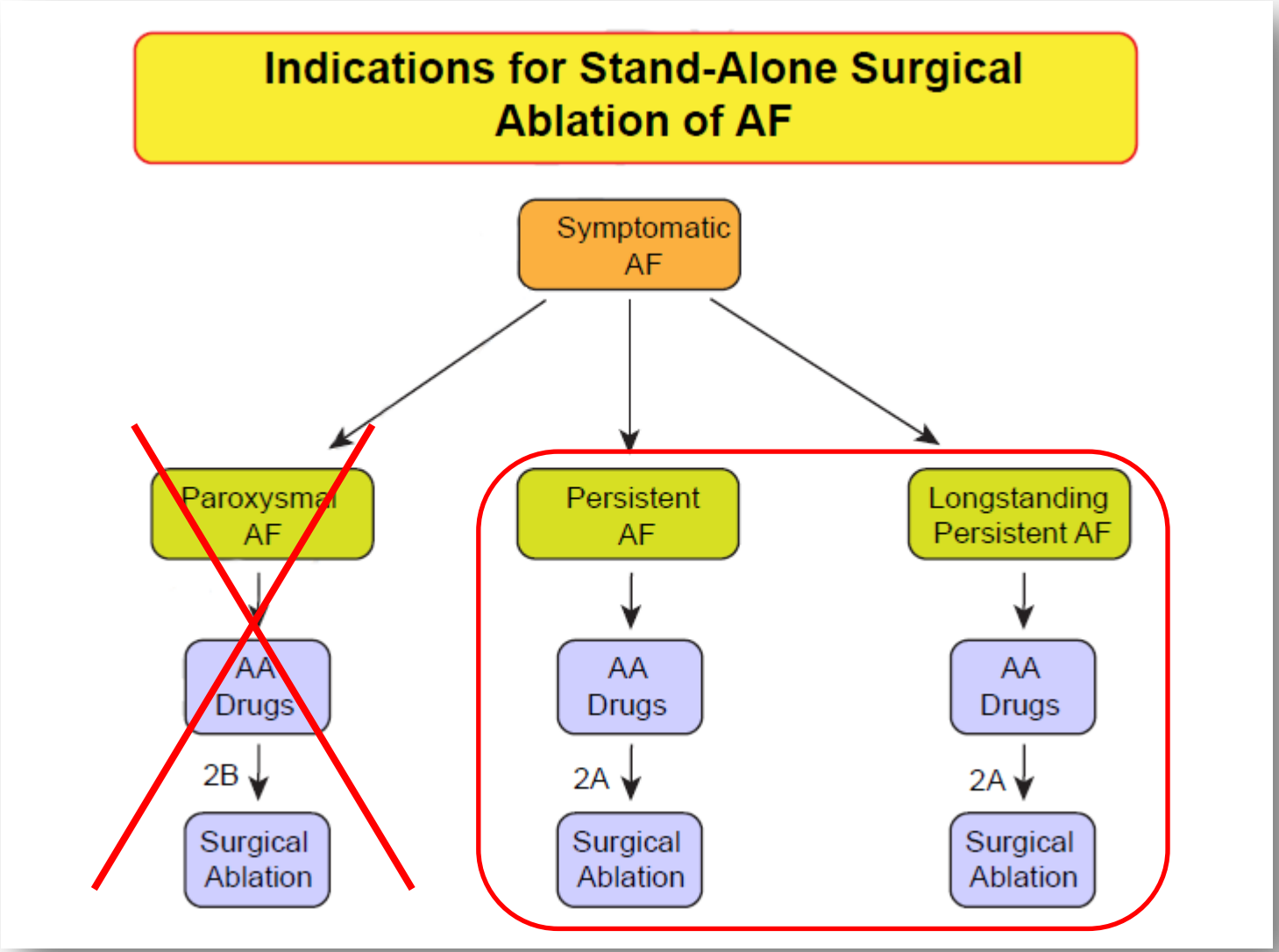
Pulmonary-vein isolation	61	60	50	41	36	23
Isolation plus electrograms	244	242	161	137	124	72
Isolation plus lines	244	240	152	133	115	57

Verma A et al. NEJM 2015;372:1812-1822

Minimally invasive techniques



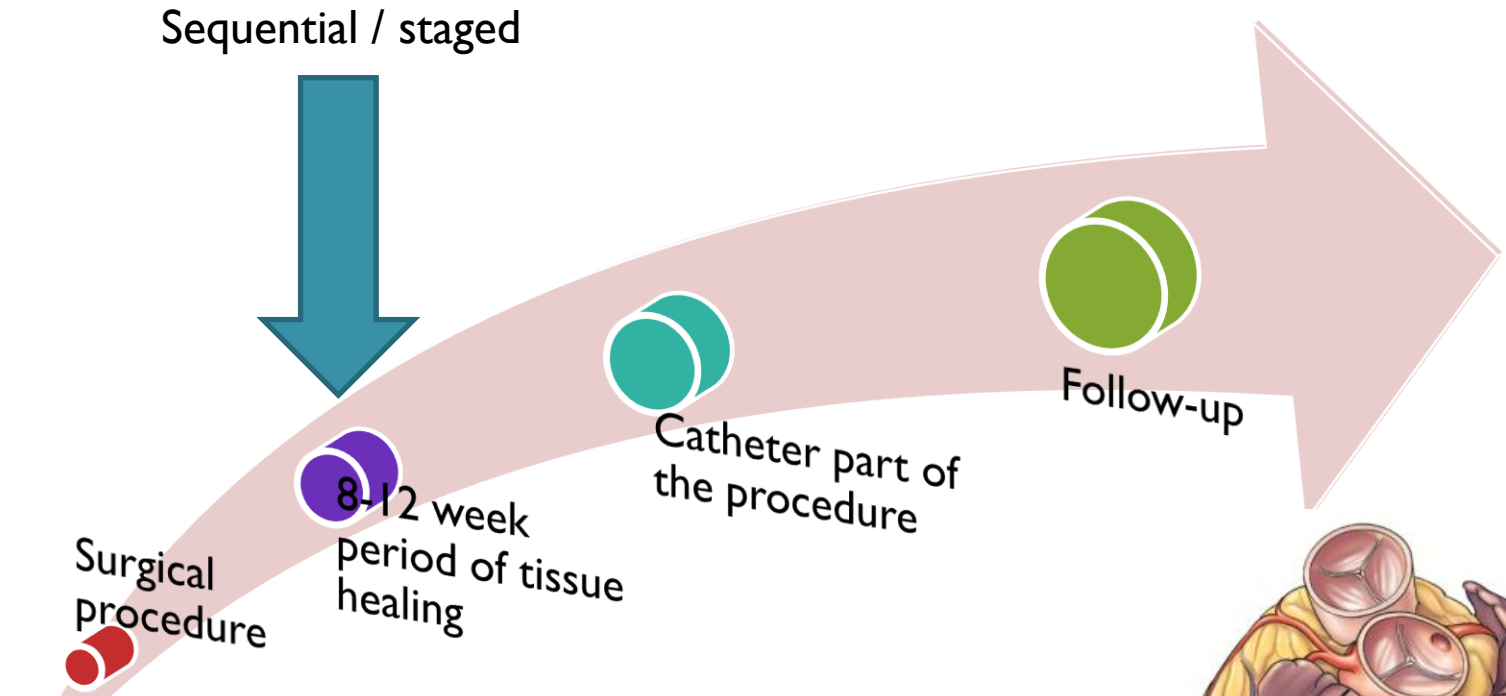
Current indication guidelines

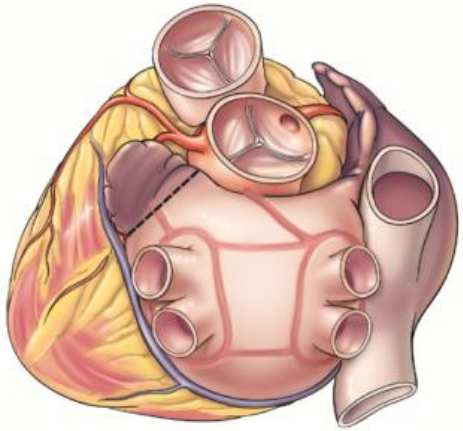


2017 HRS/EHRA/ECAS/APHRS/SOLAECE Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation

Budweis experience

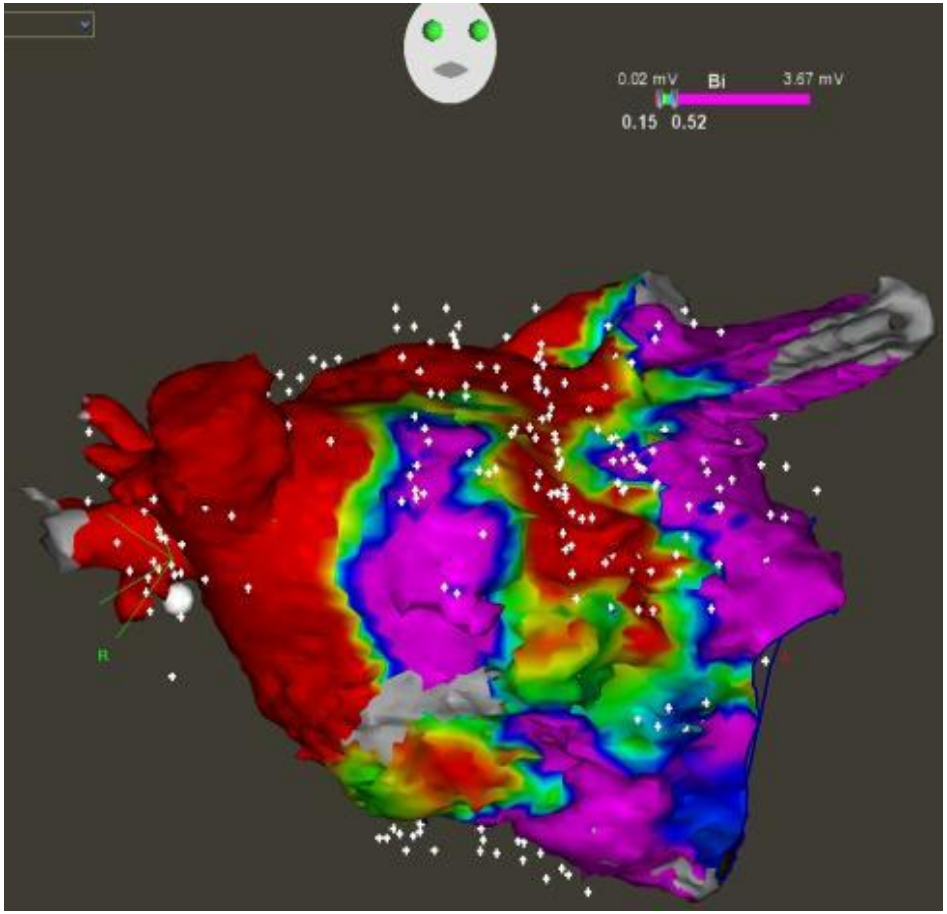
- Only patients with (LS)PeAF or LA dilatation
- Naive to previous RFA, failed ≥ 1 AA drug





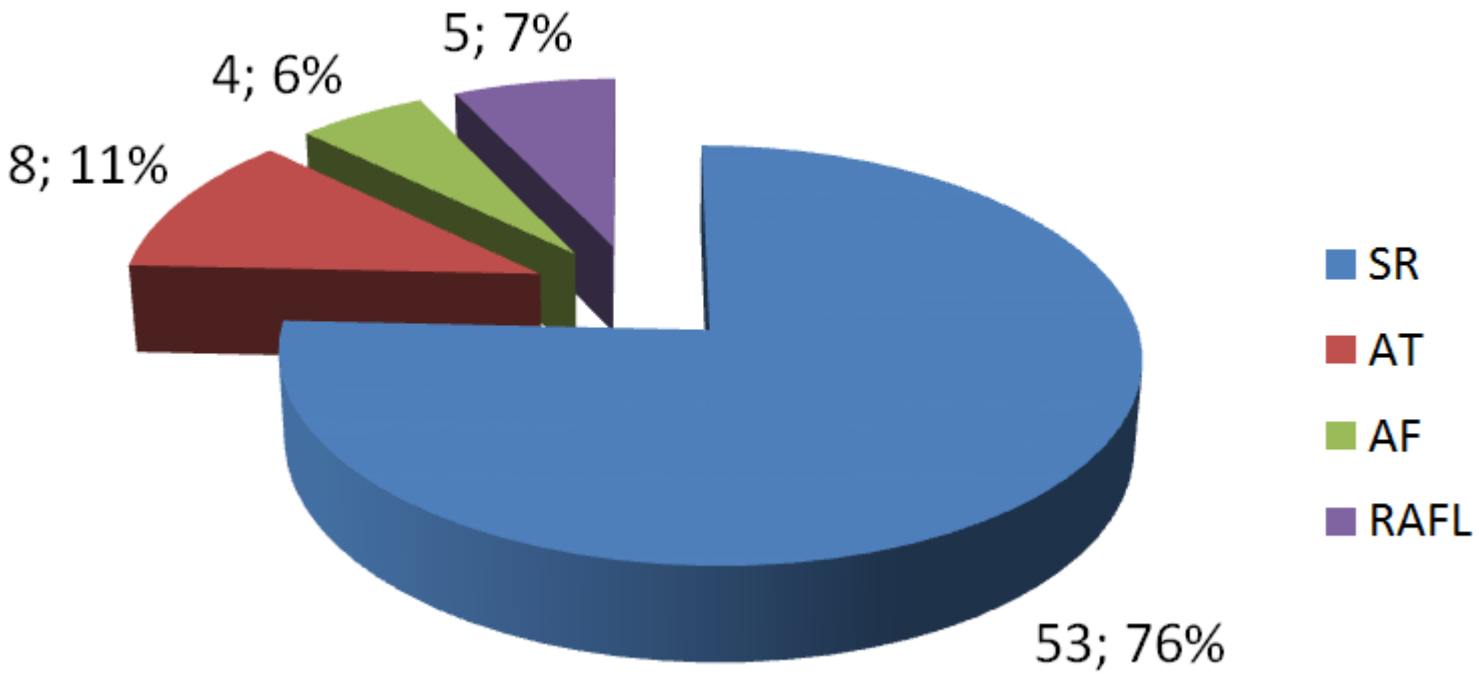
Catheter part of hybrid approach

- Detailed 3D mapping using CARTO3 system with CT integration AND contact force measurement catheter (SmartTouch) – bipolar voltage maps
- Ablation of all spontaneous ATs
- After SR was restored:
  - CTI ablation (RA) - mandatory
  - Isolation of the SVC - optional
- In the LA
  - Verification of PV isolation
  - Finalization of the trigone lesion (MI line)
  - Verification of the box lesion
- Incremental atrial pacing (2 sites) up to 300 bpm:
  - Ablation of the all ATs (both atria)
  - Ablation of AF (rotors – IA septum)



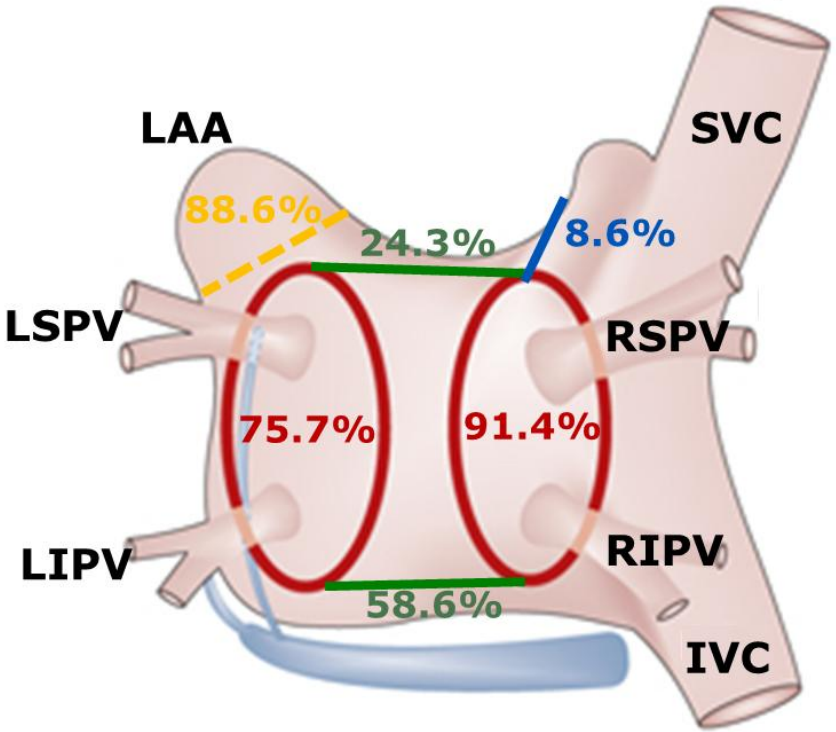
Clinical results of epicardial RF MAZE-only approach

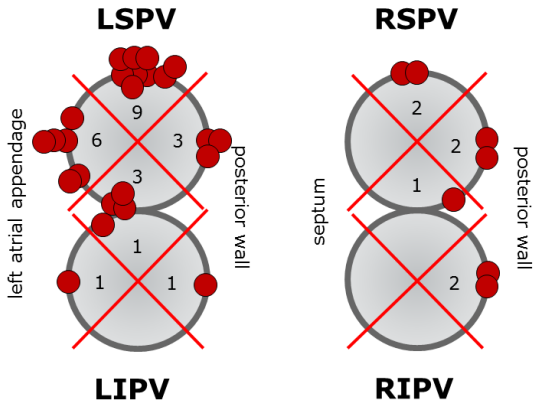
- N=70 with persistent or LSP AF
- 62 ± 8 years
- LA 49 ± 5 mm – EP (53 ± 5 mm prior to surgery)

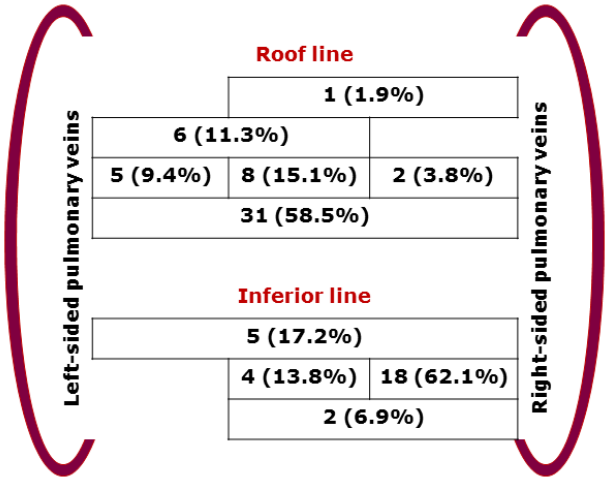


Based of 12 lead ECG at admission!
Holter monitoring – results supposed to be worse!

Gaps







Bulava A et al. Ann Thorac Surg. 2017 Jul 29. pii: S0003-4975(17)30693-8

Results

After combined epi-, endo- treatment:

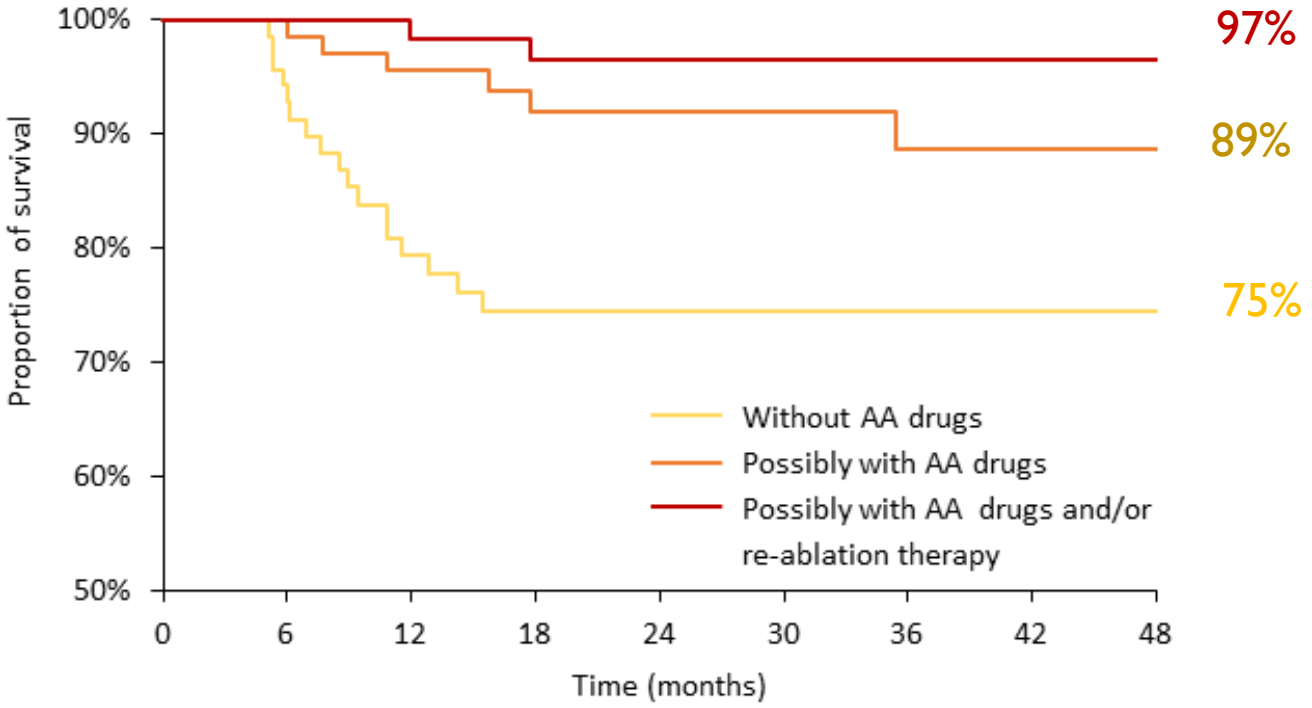
- PVI achieved in 100% (n=70)
- Box lesion achieved in 92% (n=64)
- Anterior mitral isthmus line achieved in 97% (n=68)
- After AT ablation – final induction test:
  - Non-inducibility of any SVT n = 64 (91%)
  - Inducibility of AF but spontaneous termination in n=2 (3%)
  - Sustained SVT – AF or AT (DCV/ATP) n = 4 (6%)

} 94 %

Complications

	Epicardial surgery	Endocardial ablation
Major complications (total number)	**9 (13%)**	**0 (0%)***
Conversion to sternotomy	2 (3%)	0 (0%)
Permanent phrenic nerve injury (> 12 months)	5 (7%)	0 (0%)
Clinically significant PV narrowing†	1 (1%)	0 (0%)
Tamponade	1 (1%)	0 (0%)
Minor complications (total number)	**11 (16%)**	**6 (9%)***
Clinically insignificant PV narrowing‡	7 (10%)	0 (0%)
Temporary phrenic nerve injury	2 (3%)	0 (0%)
Wound infection treated conservatively	2 (3%)	0 (0%)
Groin hematoma§	NA	5 (7%)
Arteriovenous fistula	0 (0%)	1 (1%)

Follow-up



Number of patients at risk:

Arrhythmia-free survival without AA drugs:								
70	63	49	39	31	27	24	22	16
Arrhythmia-free survival with possibility of using AA drugs								
70	67	59	48	36	31	27	25	18
Arrhythmia-free survival with possibility of using AA drugs or re-ablation therapy:								
70	67	61	50	38	33	29	27	20

Bulava A et al. Circulation Arrhythm Electrophysiol 2017;Aug 10(8). pii: e005273.

Predictors of recurrence

Predictor	Cut-off	Multivariable-adjusted estimates of HR (forward stepwise)	
		HR (95% CI)	P
Left atrial volume (ml)	> 165	3.505 (1.093; 11.237)	**0.035**
Other than SR at admission		5.426 (1.874; 15.709)	**0.002**
Positive testing*		**7.278 (2.189; 24.197)**	**0.001**

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AF Heart Team

SURGEON AND ARRHYTHMOLOGIST IN AF TREATMENT

Thank you for your attention…