Catheter Ablation of Valvular Atrial Fibrillation

Rong Bai, MD, FESC, FHRS

Beijing Anzhen Hospital, Capital Medical University

Beijing, China

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NO CONFLICT OF INTEREST TO DECLARE

How to define valvular atrial fibrillation?

- 2014 AHA/ACC/HRS Atrial Fibrillation Guidelines
- **Nonvalvular AF:** AF in the absence of rheumatic mitral stenosis, a mechanical or bioprosthetic heart valve, or mitral valve repair.

- 2012 ESC Atrial Fibrillation Guidelines
- No satisfactory or uniform definition of these terms exists.
- **Valvular AF:** AF related to rheumatic valvular disease (predominantly mitral stenosis), or prosthetic heart valves.

J Am Coll Cardiol. 2014; 64: e1-76
Eur Heart J. 2012; 33: 2719-47

Valvular heart disease & Atrial fibrillation

- Valvular heart disease has been associated with a 1.8- and 3.4-fold increased risk for AF in men and women

valvular heart disease

↓

increase LA pressure | cause atrial myopathy | alter wall stress

↓

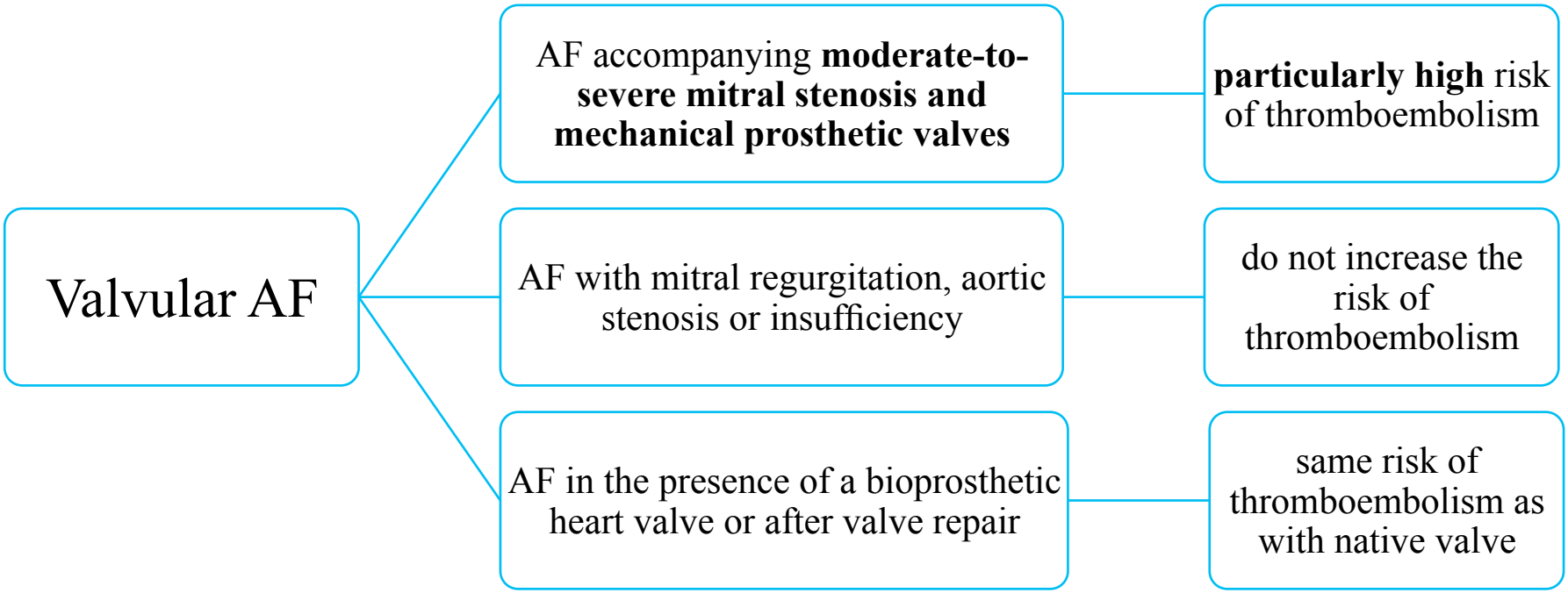
increase susceptibility to AF

- AF is the most common arrhythmia following surgery for valvular heart disease

JAMA. 2004; 291(14):1720-9
Circ Res. 2014; 114(9): 1453-68
J Am Coll Cardiol. 2014; 64: e1-76

Valvular atrial fibrillation & Thromboembolic risk

- Valvular heart disease, independent of the underlying cardiac rhythm, is associated with an increased risk of thromboembolic events.
- This risk is greatly amplified in the presence of AF.



Eur Heart J. 2014; 35(47): 3328-35

Management of valvular atrial fibrillation

- **Rate control**
- Pharmacological agents for rate control

- **Rhythm control**
- Antiarrhythmic drugs
- Catheter ablation
- Surgical ablation

Catheter Ablation in AF Patients with Valvular Heart Disease

Higher
recurrence?

AF ablation in patients with valvular heart disease or prior open heart surgery

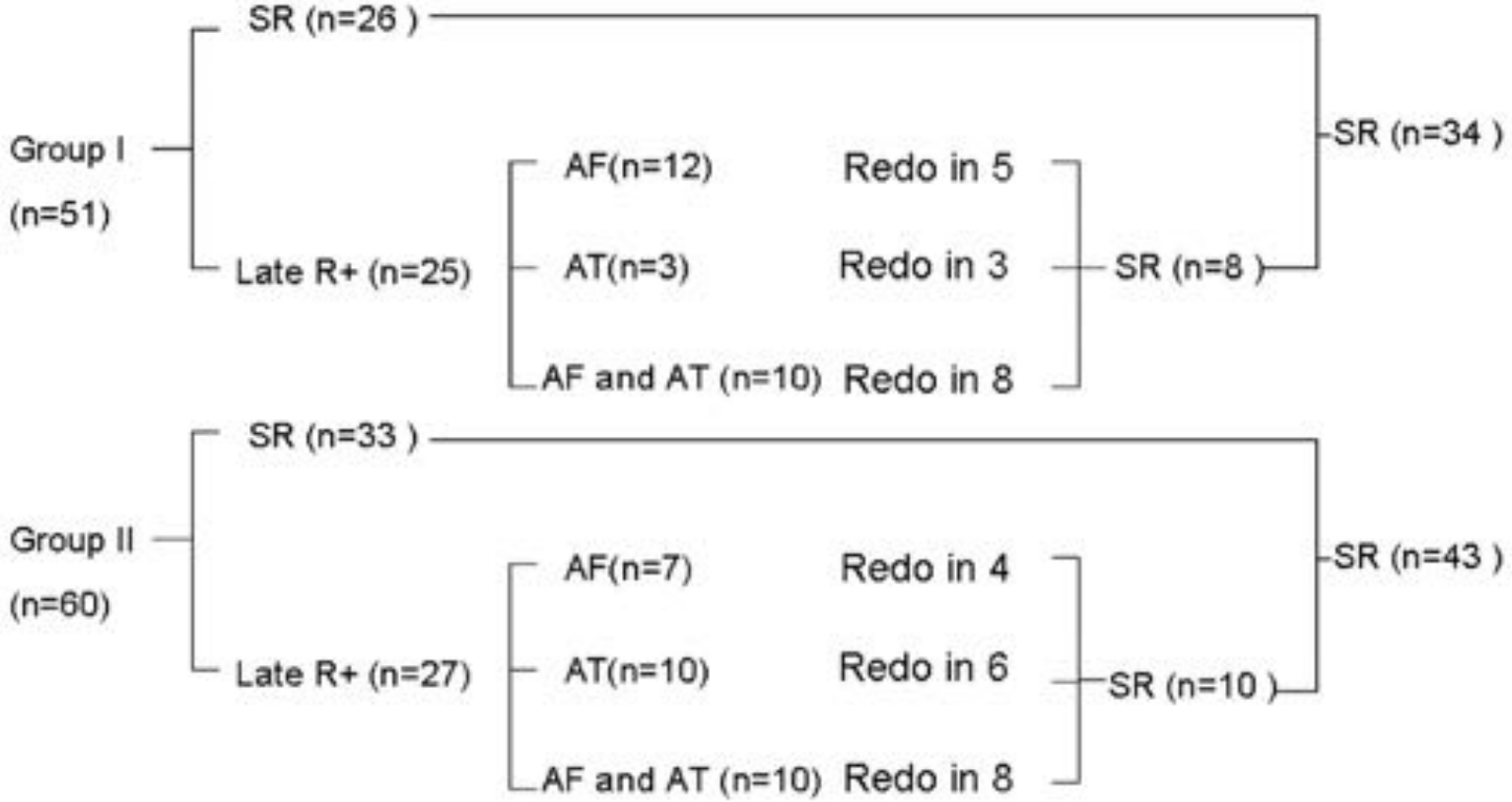
Table 3 Complications and recurrences, n (%)

	Lone AF n = 194	Valve disease n = 102	CVSx n = 40
CVA	0	1 (1)	0
TIA	1 (0.5)	0	0
Tamponade	4 (2)	0	0
Access site hematoma	1 (0.5)	1 (1)	0
Severe PV stenosis	2 (1)	1 (1)	0
Combined adverse outcomes	8 (4)	3 (3)	0
Recurrence	31 (16)	17 (17)	6 (15)
Controlled on antiarrhythmic drug	4 (2)	5 (5)	3 (8)
2nd PVI	27 (14)	12 (12)	3 (8)
On antiarrhythmic drug post 2nd PVI	0	2 (2)	0
Follow-up, mo	18 ± 7	11 ± 5	10 ± 5

- 102 pts with valve disease, 40 pts with prior open-heart surgery, 194 pts as control
- pulmonary vein antrum isolation+ superior vena cava isolation

Heart Rhythm. 2004;1(1):33-9

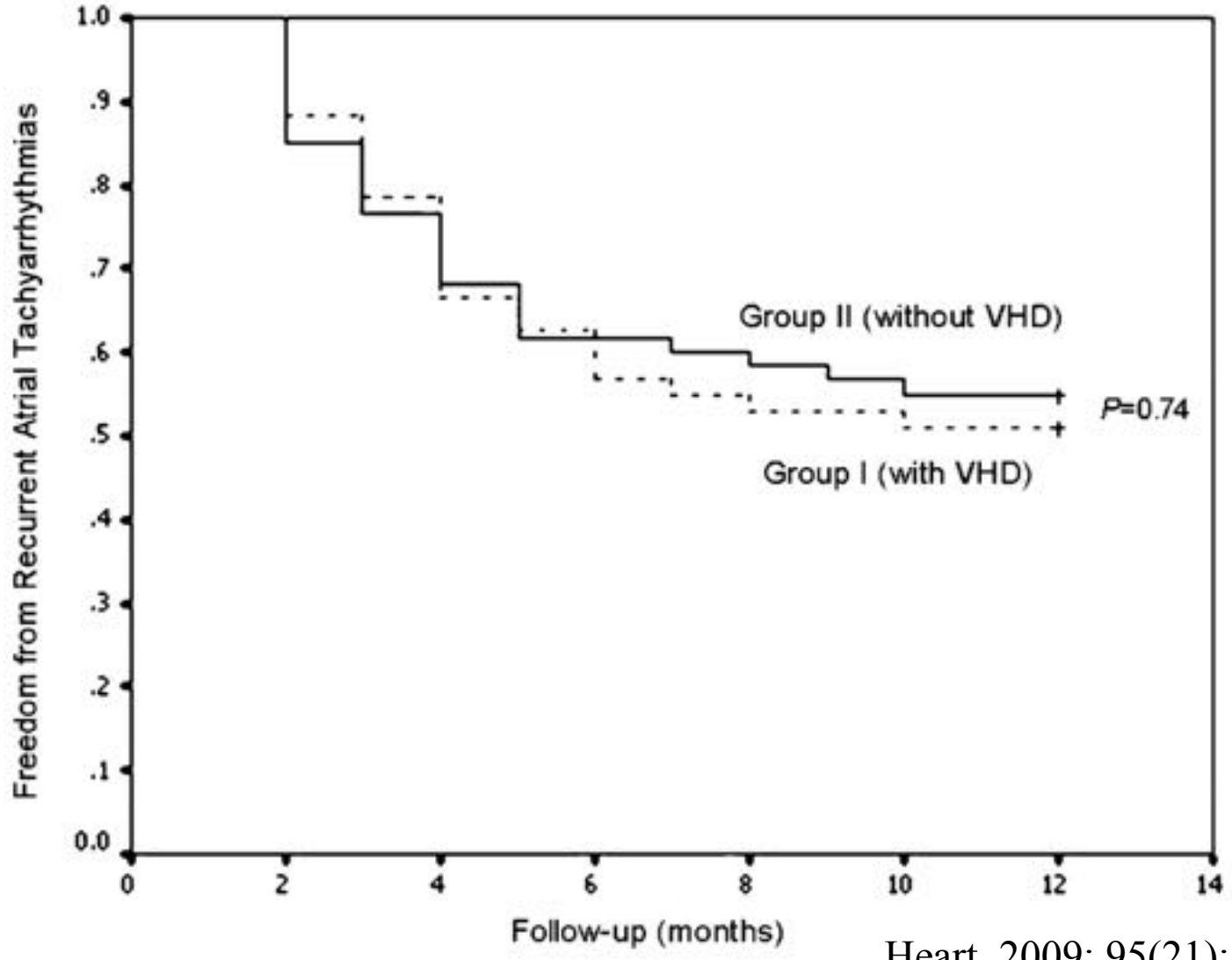
Catheter ablation of persistent AF in patients with valvular heart diseases



- Group I (51 pts with VHD), Group II (60 pts without VHD as control)
- Circumferential pulmonary vein isolation(CPVI) + complex ractionated atrial electrogram (CFAE) ablation
- FU: 12months

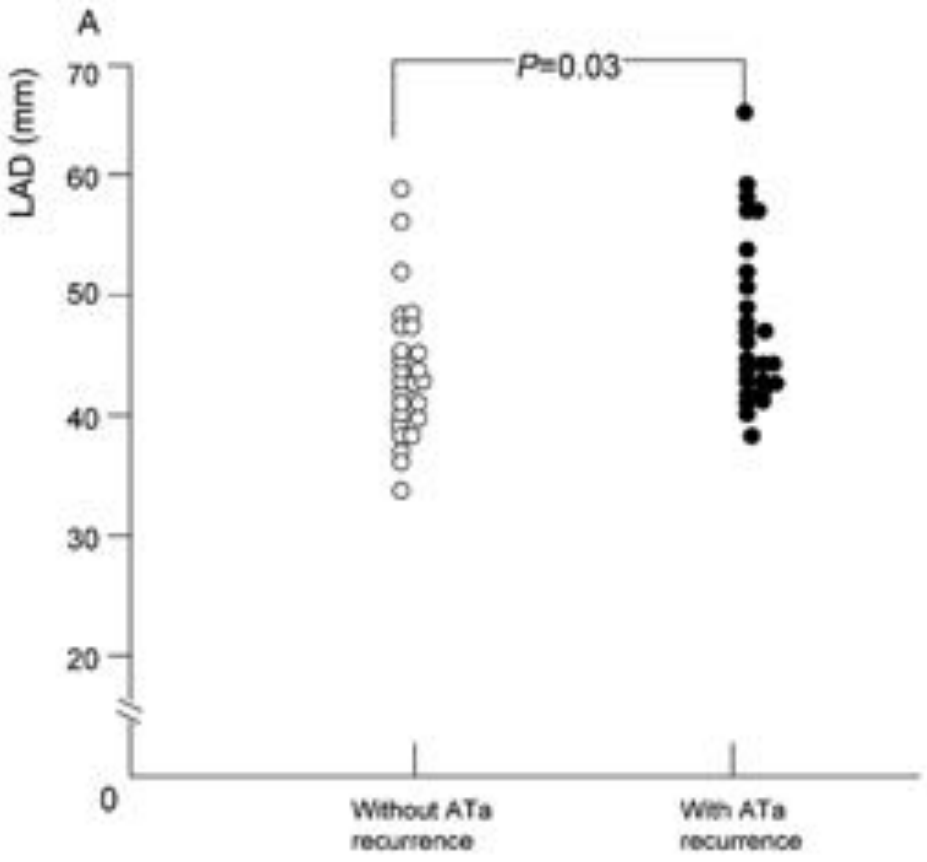
Heart. 2009; 95(21): 1773-83

No statistically significant difference in AF-free survival between the two groups

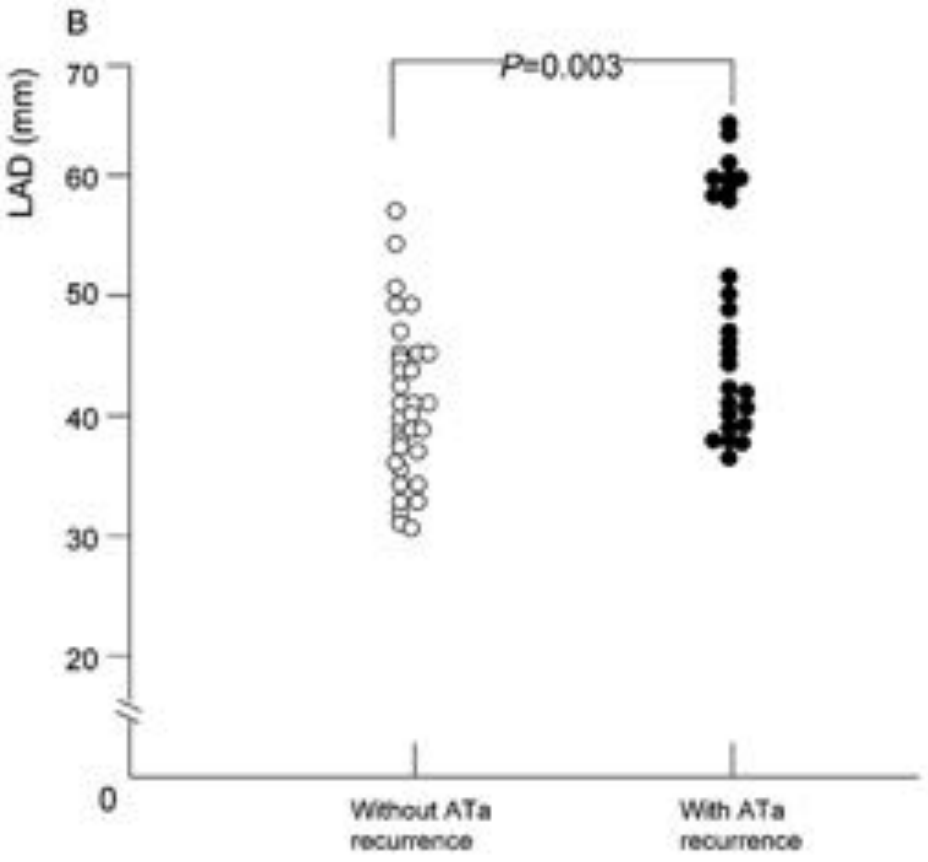


Heart. 2009; 95(21): 1773-83

Successful outcomes related to left atrium diameter (LAD)



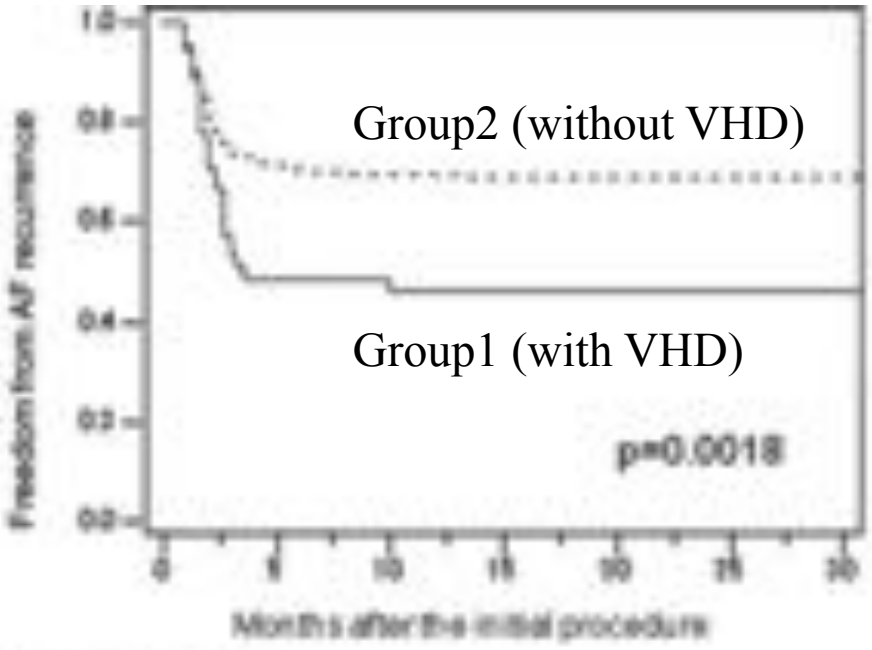
Group I

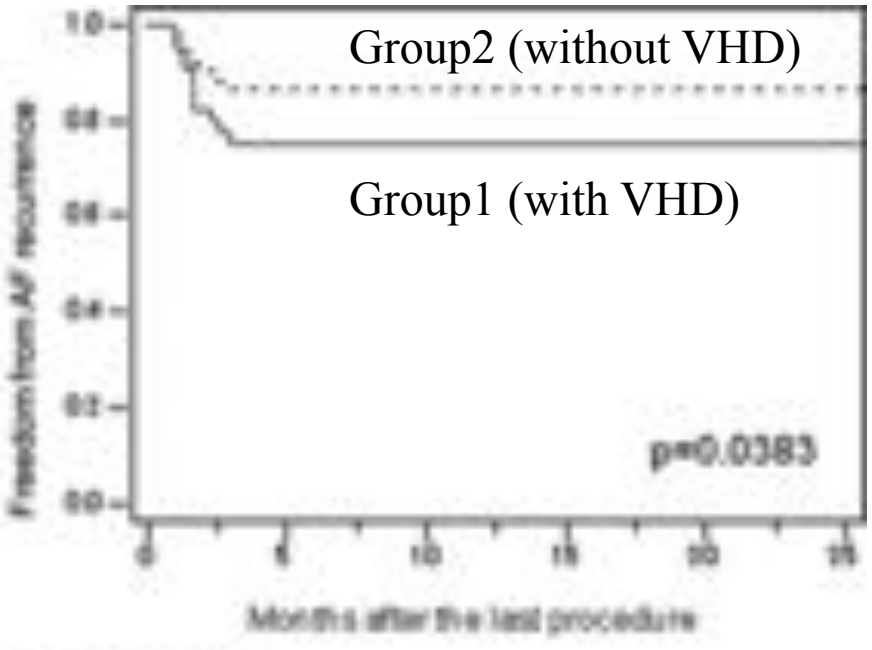


Group II

Heart. 2009; 95(21): 1773-83

Catheter ablation of atrial Fibrillation in patients with valvular heart disease





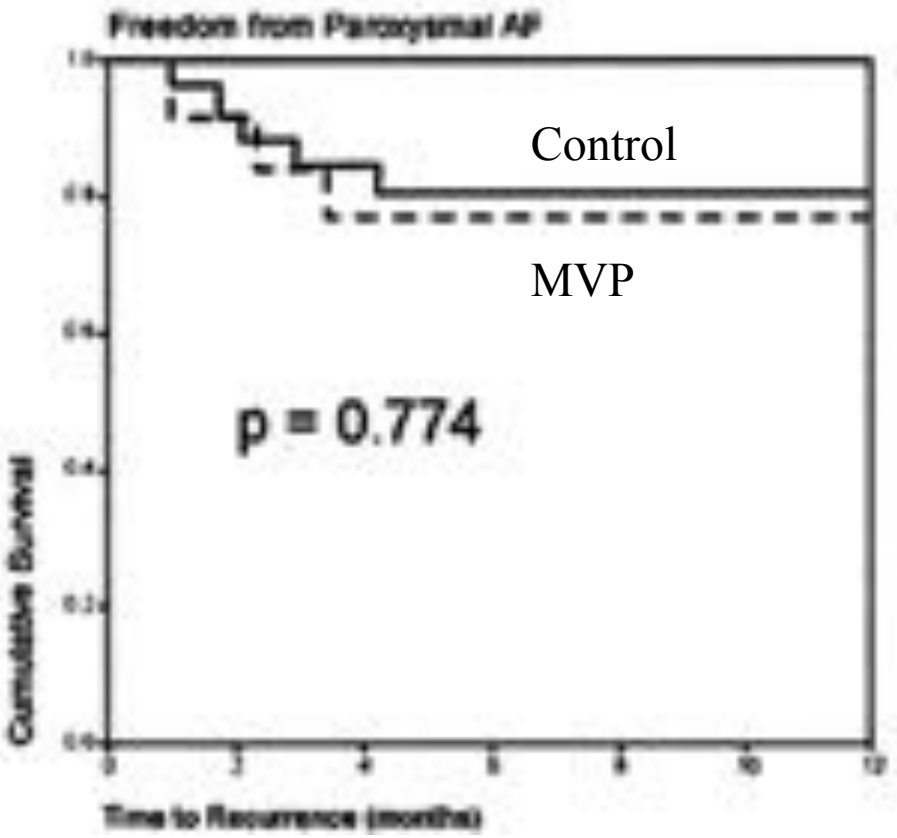
- Group1 (45 pts with moderate VHD), Group 2 (436 pts without VHD as control)
- Excluded: history of valve surgery or other structural heart disease
- pulmonary vein antrum isolation + LA linear ablation (persistent AF)
- FU: 26 months

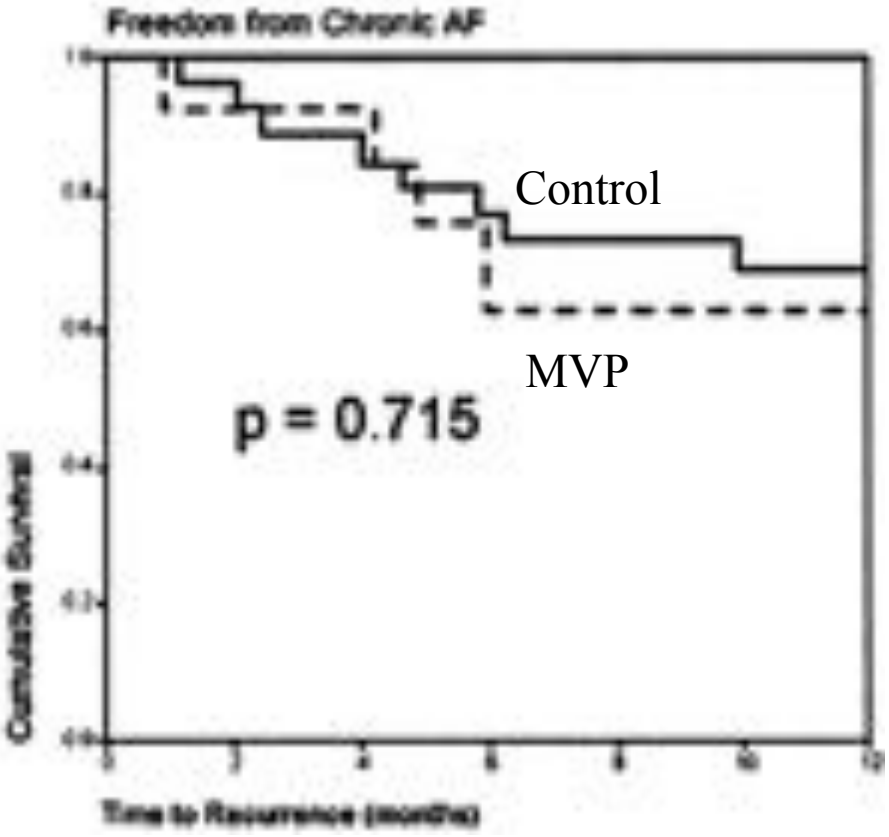
J Cardiovasc Electrophysiol. 2010; 21(11): 1193-8

Catheter Ablation in AF Patients With Mitral Mechanical Prosthetic Valve

Risk of prosthetic valvular damage and entrapment of the ablation catheter?

Ablation of AF in patients with MVP is feasible





- 26 pts with mitral valve prostheses (MVP), 52 pts without MVP as control
- circumferential pulmonary vein ablation + mitral isthmus line (81%) + posterior left atrial line
- FU: 12 months

J Am Coll Cardiol. 2005; 45(6): 868-72

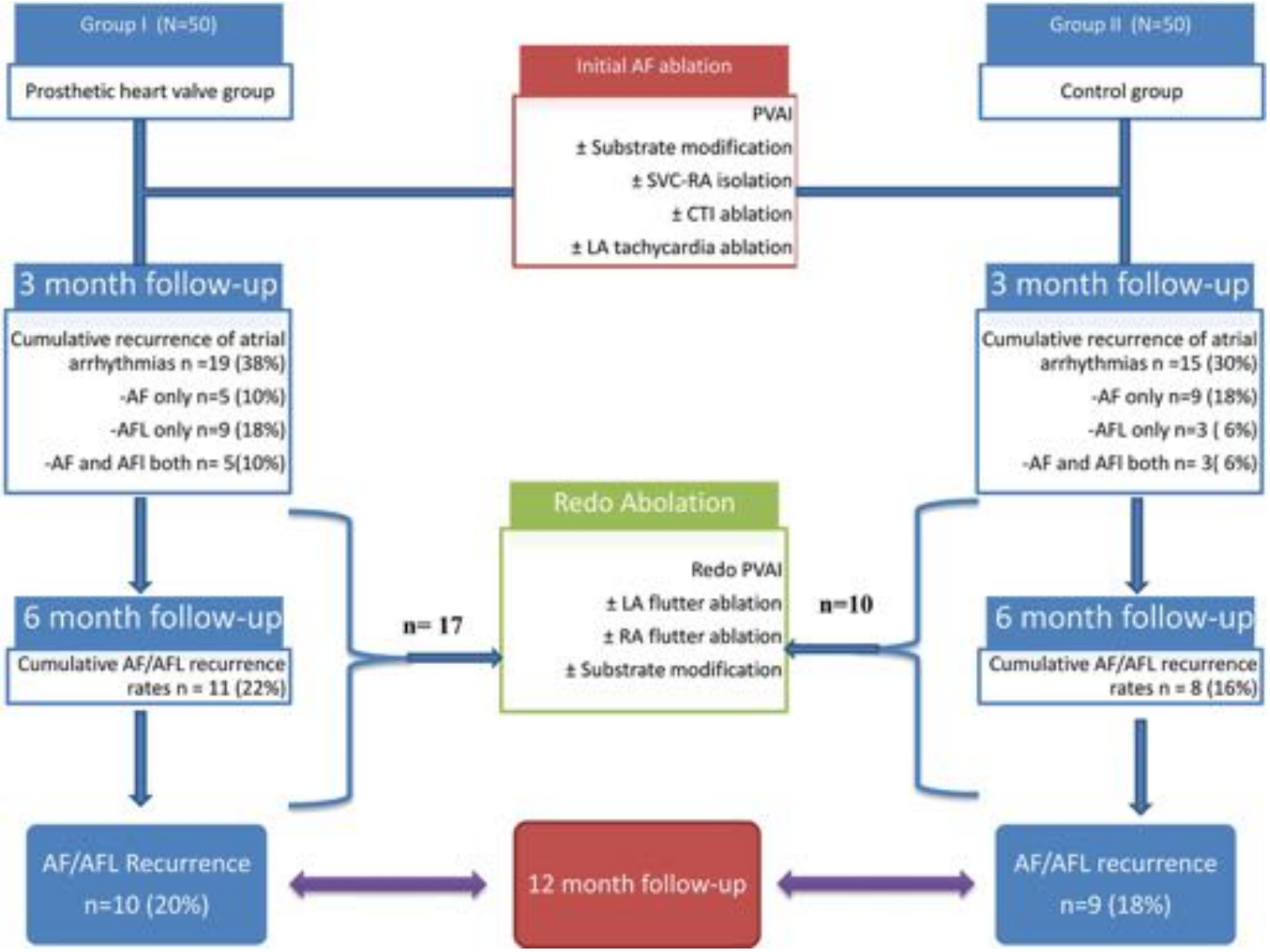
Table 2. Procedural Data and Follow-up

	MVP Patients (n = 26)	Control Subjects (n = 52)	p Value
Procedure duration (min)	134 ± 25	125 ± 31	0.24
Fluoroscopy time (min)	35 ± 21	219 ± 15	<0.001
Complications	3 (11%)	0	0.01
AF recurrence	7 (27%)	13 (25%)	1.00
Chronic AF	4 (15%)	8 (15%)	1.00
Paroxysmal AF	3 (12%)	5 (10%)	1.00
Atrial tachycardia	6 (23%)	1 (2%)	0.005
Mean follow-up* (min–max) (months)	9.8 (1–12)	10.1 (2–12)	0.78

- Higher complications
- Greater radiation exposure
- Higher incidence of post-ablation atrial tachycardia

J Am Coll Cardiol. 2005; 45(6): 868-72

RF ablation for AF patients with prosthetic valves is feasible, safe, and efficacious



Heart Rhythm. 2011; 8(7): 975-80

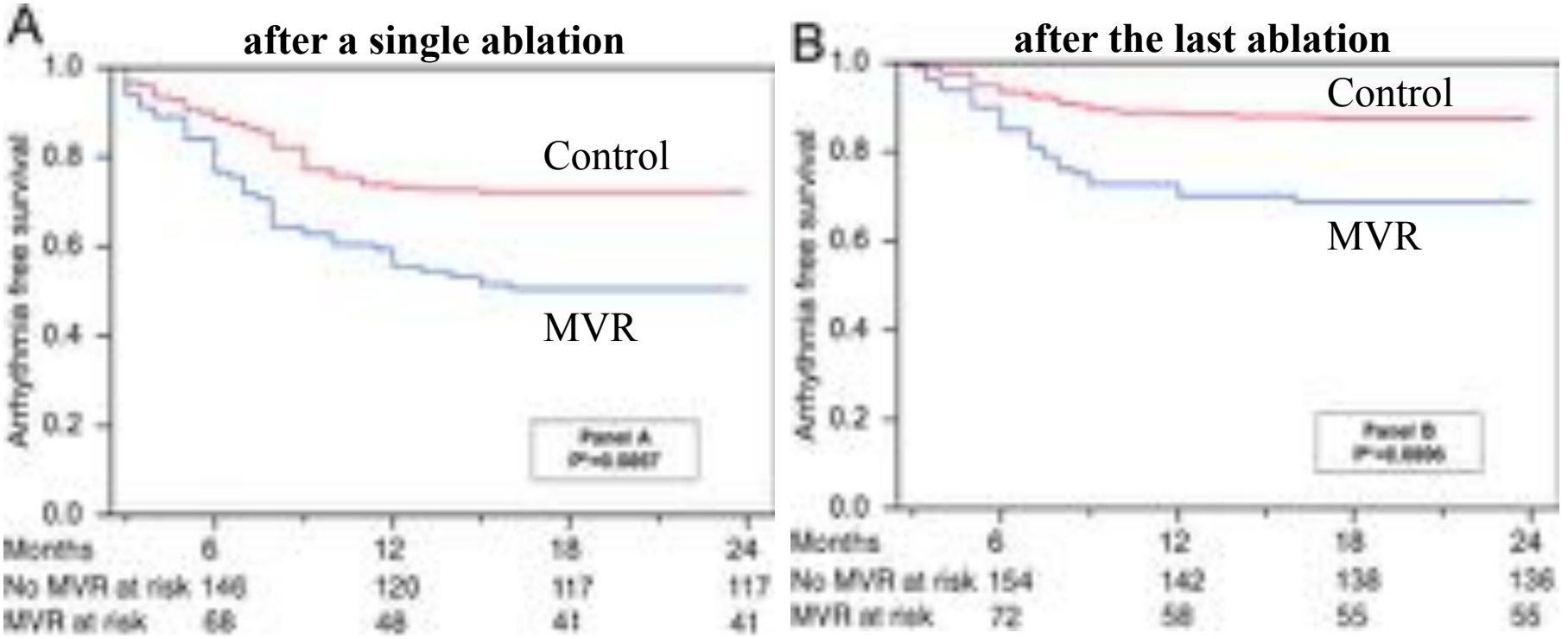
Table 2 Summary of study results

Variables	Group I (n = 50)	Group II (n = 50)	P value
Procedural time (min)	199.4 ± 49	166.6 ± 27.5	<.01
Fluoroscopy time (min)	60 ± 17	53.8 ± 6.8	<.01
Total duration of RF ablation (min)	48 ± 12	36 ± 8	<.01
Fatal complications	Nil	Nil	N/A
Nonfatal complications	4 (8%)	2 (4%)	.11
AF recurrence only	5 (10%)	9 (18%)	.40
Atrial flutter recurrence only	9 (18%)	3 (6%)	.1
Combination of AF and atrial flutter recurrence	5 (10%)	3 (6%)	.7
Cumulative recurrence rates off AAD at 3 months	19 (38%)	15 (30%)	.5
Redo ablations	17/19 (89%)	10/15 (67%)	.2
Recurrence rates off AAD at 6 months	11/50 (22%)	8/50 (16%)	.6
Recurrence rates off AAD at 12 months	10/50 (20%)	9/20 (18%)	.6

- longer procedural and fluoroscopy times
- higher recurrence rates for atrial flutter

Heart Rhythm. 2011; 8(7): 975-80

Radiofrequency ablation of AF is feasible and safe for patients with MVR



- 81 pts with mitral valve replacement (MVR), 162 pts without MVR as control
- pulmonary vein antral isolation
- 1.4±0.6 vs. 1.2±0.5 ablations per person in patients with and without MVR
- FU: 24 months

J Am Coll Cardiol. 2011; 58(6): 596-602

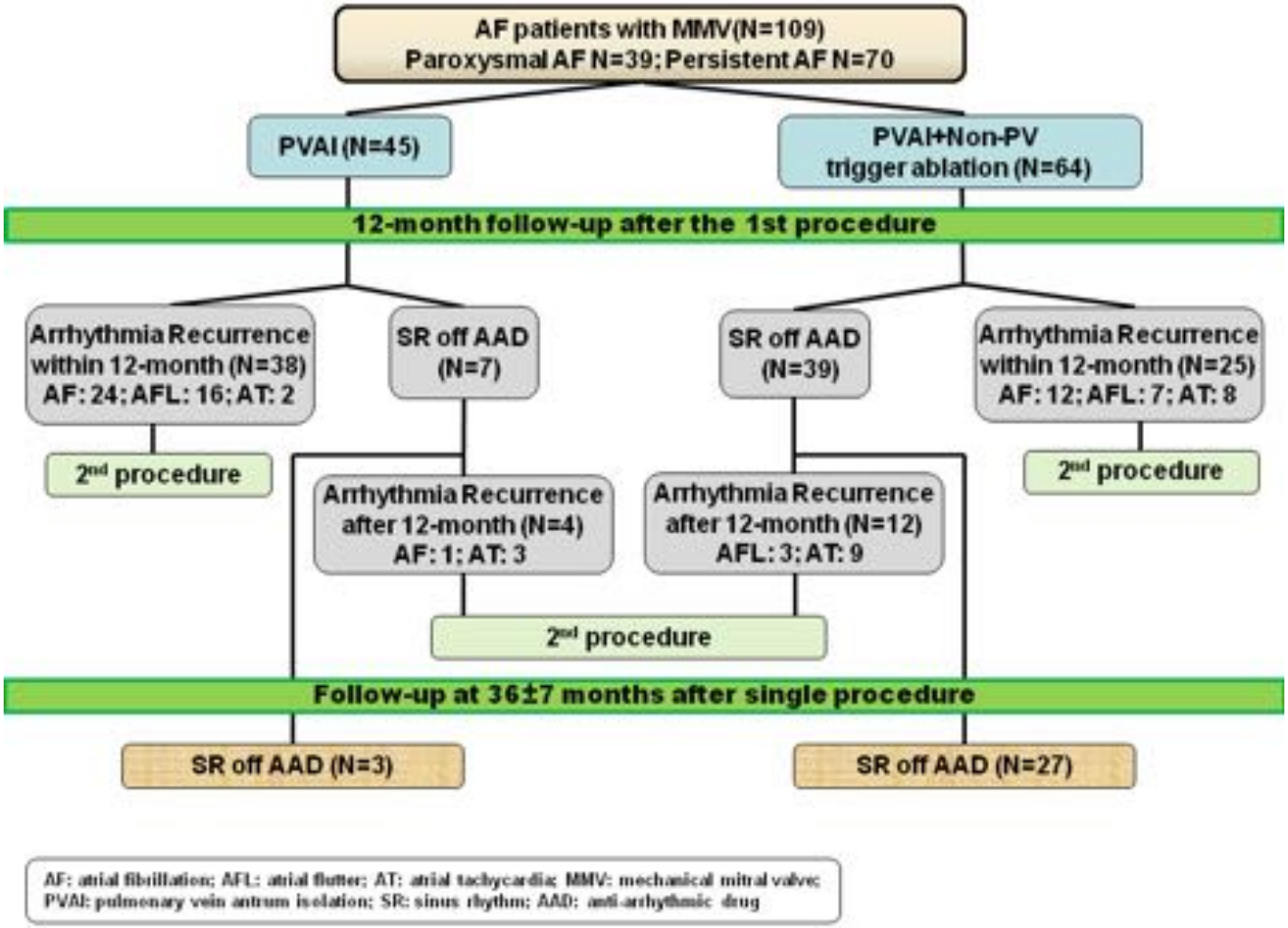
Table 4 Procedure-Related Complications in Patients With and Without Mechanical MVR

Parameter	No MVR (n = 162)	MVR (n = 81)	p Value
Minor complications, %			0.20
Pericardial effusion, no intervention	1.2	0	
Major complications, %			0.52
Bleeding requiring transfusion	0.6	1.2	
Hematoma requiring intervention	1.2	1.2	
Femoral pseudoaneurysm	0	1.2	
Tamponade	0.6	0	
Stroke	0	0	
Native or prosthetic valve damage	0	0	

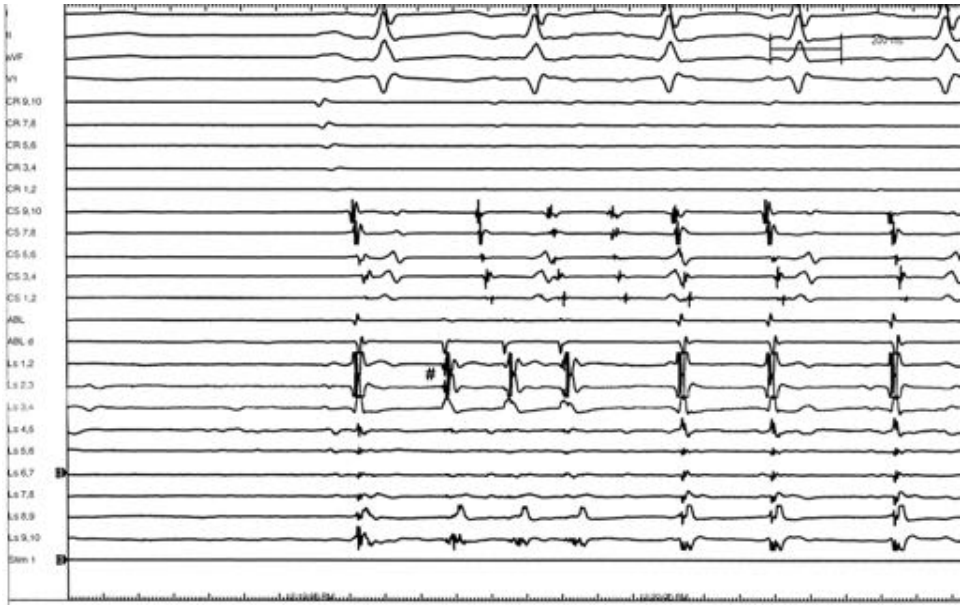
- Similar incidence of procedure related complications

J Am Coll Cardiol. 2011; 58(6): 596-602

Catheter Ablation of Atrial Fibrillation in Patients with Mechanical Mitral Valve: PVAI w/wo non-PV Trigger ablation



J Cardiovasc Electrophysiol; 2014; 25(8): 824-33



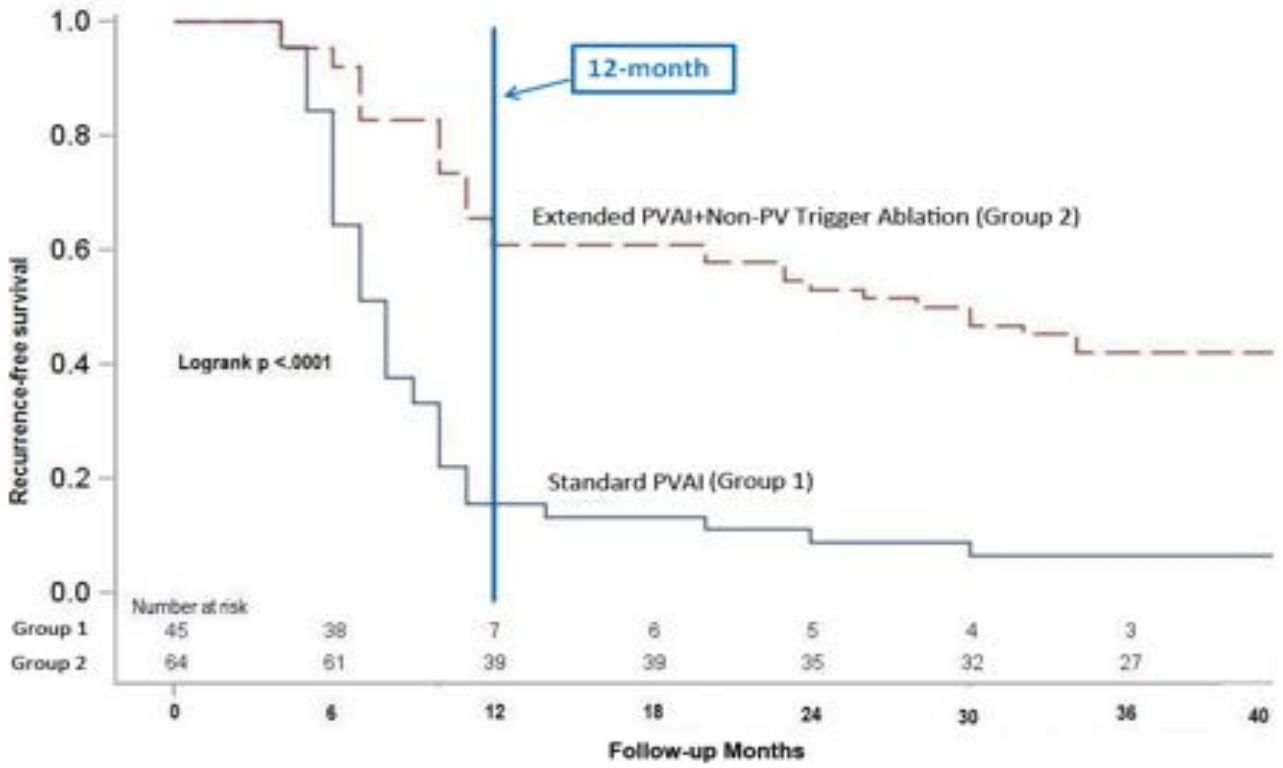
LAPW | **LAA**

CS

- Origin of non-PV triggers: CS 53.1% , LAA 62.5% , MV annulus 18.7%, LA roof/free wall 14.1%, interatrial septum 32.8%, and SVC or crista terminalis19.8%

J Cardiovasc Electrophysiol; 2014; 25(8): 824-33

Catheter Ablation of Atrial Fibrillation in Patients with Mechanical Mitral Valve: PVAI w/wo non-PV Trigger ablation



Study Groups	12-mo Follow-up Arrhythmia-Free (95% CI)	Long-Term (36±7 mo) Follow-up Arrhythmia-Free (95% CI)
Group 1	16% (5-26%)	7% (1-14%)
Group 2	61% (49-73%)	42% (32-64%)
Log-rank p	<0.001	<0.001

J Cardiovasc Electrophysiol; 2014; 25(8): 824-33

Catheter ablation of mitral annular flutter is feasible and safe in patients with prior MV replacement or repair

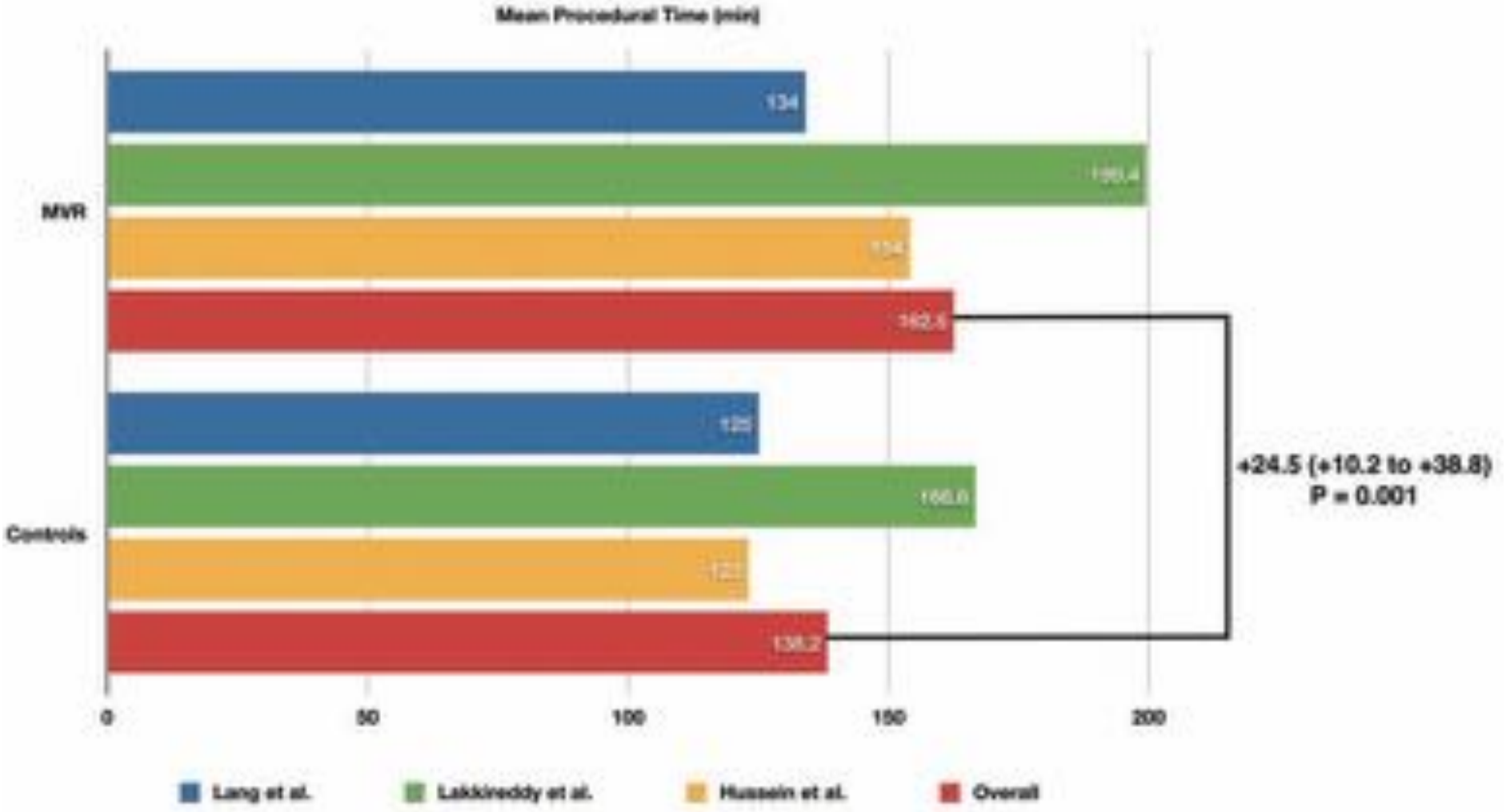
Table 3 Follow-up outcomes

Follow-up data	Group 1: history of MV Surgery (n = 21)	Group 2: controls (n = 21)	P
Follow-up time, months	7.1 ± 5.0	6.9 ± 3.9	.891
Freedom from atrial flutter (%)	18 (86)	18 (86)	1.000
Freedom from AF and flutter (%)	15 (71)	14 (67)	1.000
Antiarrhythmics at follow-up (%)	12 (57)	15 (71)	.520

- 21 pts with a history of MV surgery, 21 pts as control
- mitral isthmus line ablation
- FU: 6 months

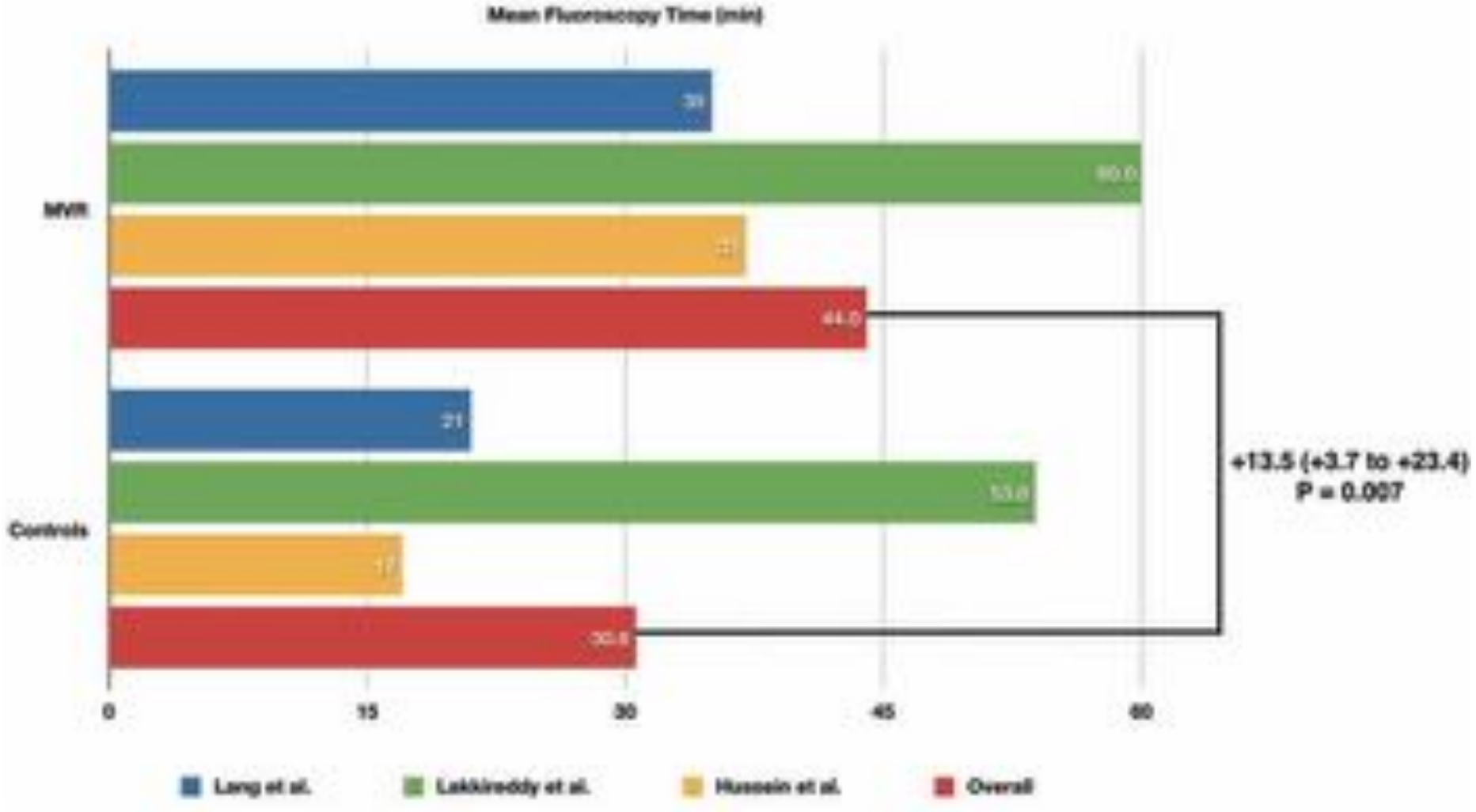
Heart Rhythm. 2011; 8(6): 809-14

Reviews: Advances in catheter ablation in AF patients with mitral mechanical prosthetic valve



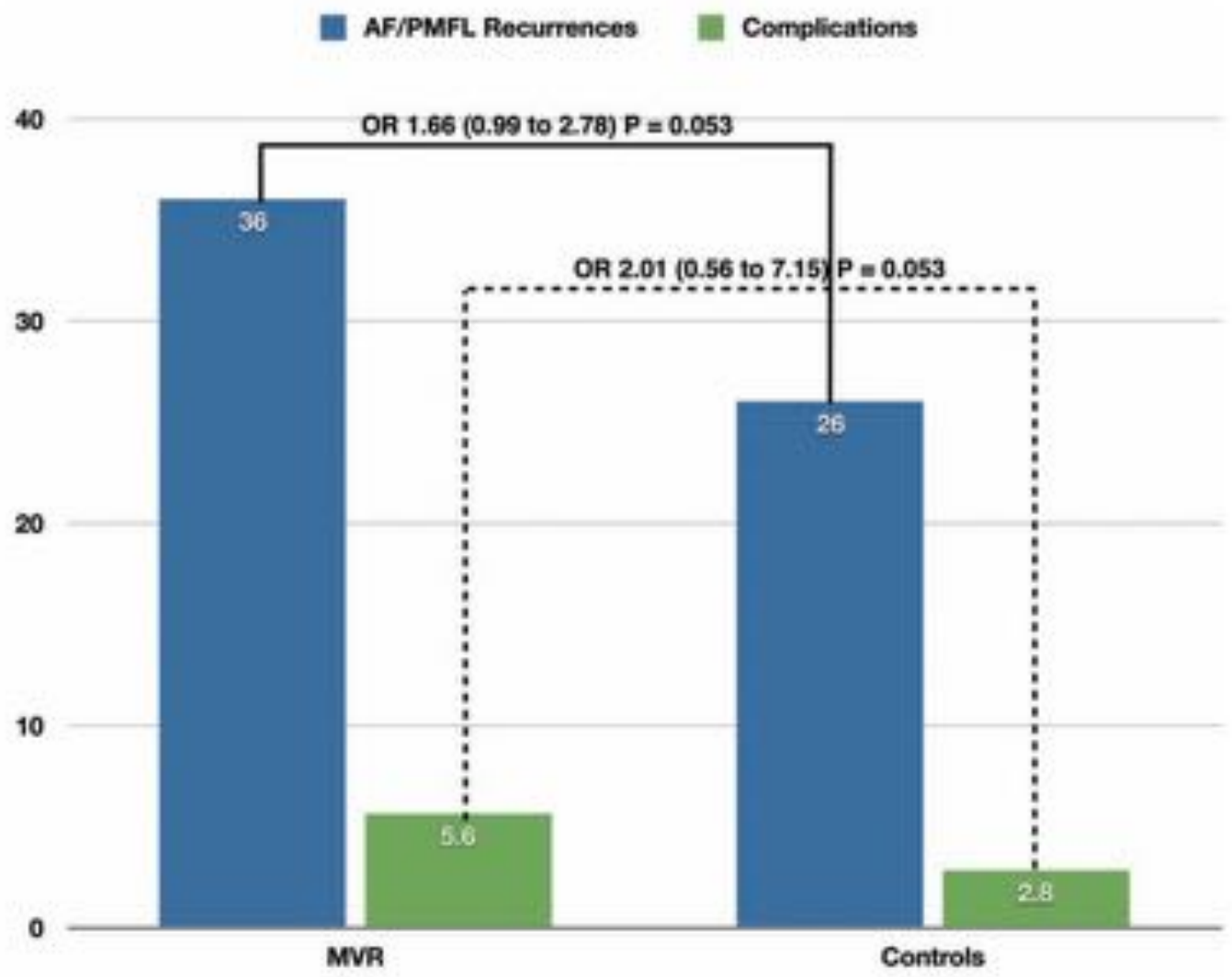
Curr Cardiol Rev. 2012; 8(4): 362-7

Reviews: Advances in catheter ablation in AF patients with mitral mechanical prosthetic valve



Curr Cardiol Rev. 2012; 8(4): 362-7

Reviews: Advances in catheter ablation in AF patients with mitral mechanical prosthetic valve

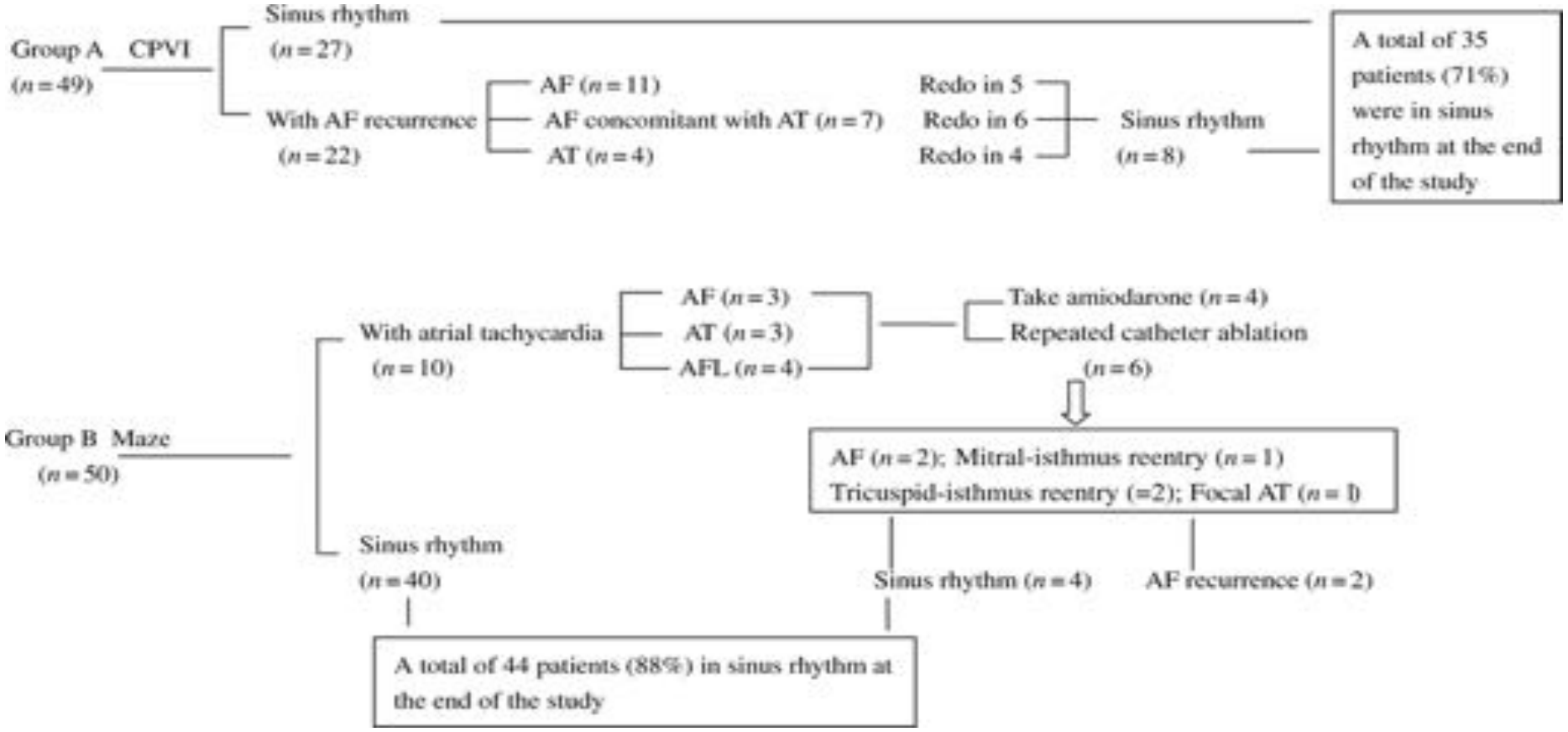


Curr Cardiol Rev. 2012; 8(4): 362-7

Comparison of Catheter Ablation and Surgical Ablation in Patients with AF and VHD

Which is better?

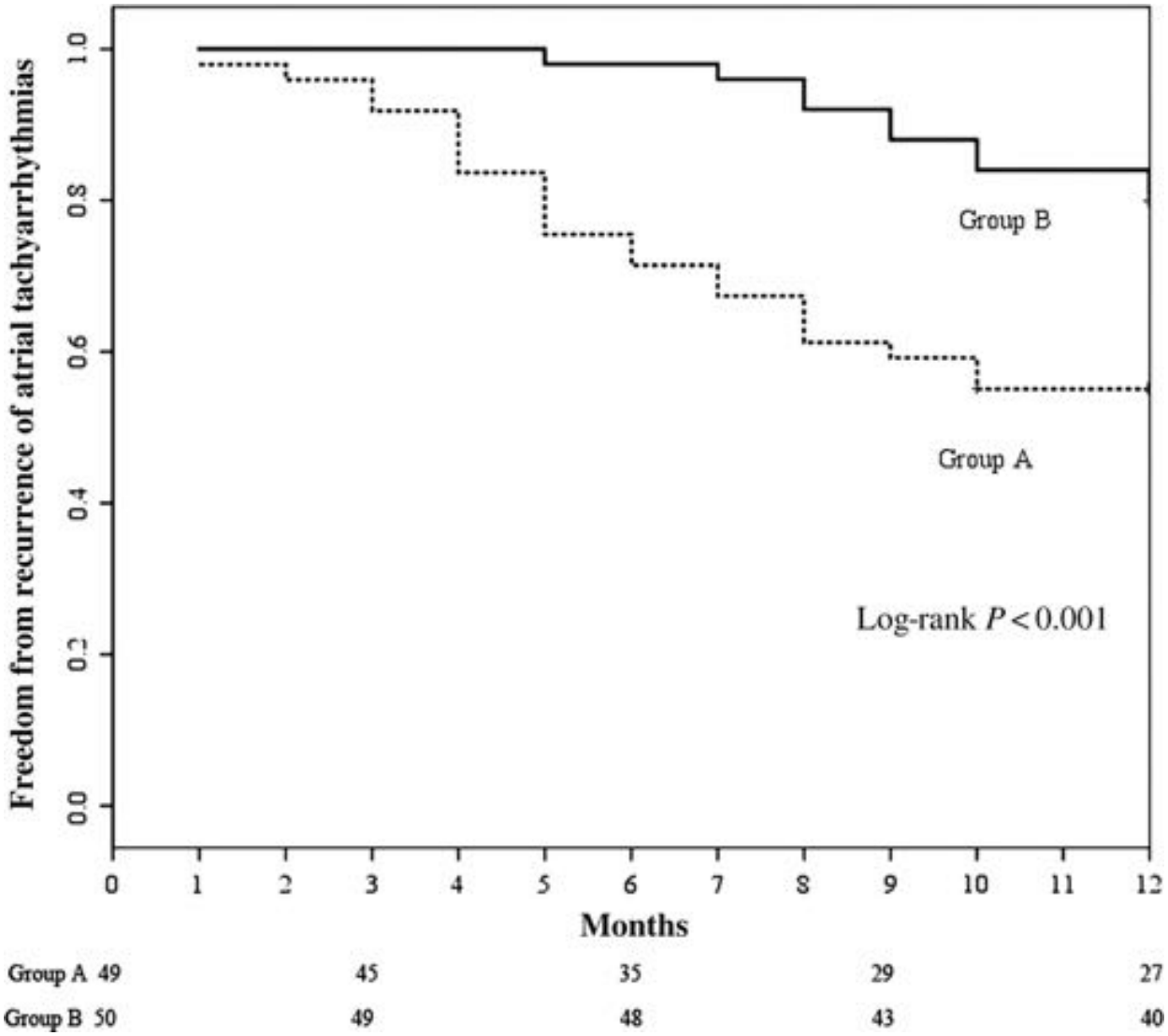
Catheter ablation vs. Surgical CryoMaze procedure in patients with long-lasting persistent AF and RHD



- patients with RHD and persistent AF pre-existing for more than 1 year
- Group A (valvular operation and CPVI combined with substrate modification 6 months after the surgery), Group B (valvualr operation and concomitant Maze procedure with SICTRA)
- Circumferential pulmonary vein isolation + complex fractionated atrial electrograms ablation
- FU: 12months

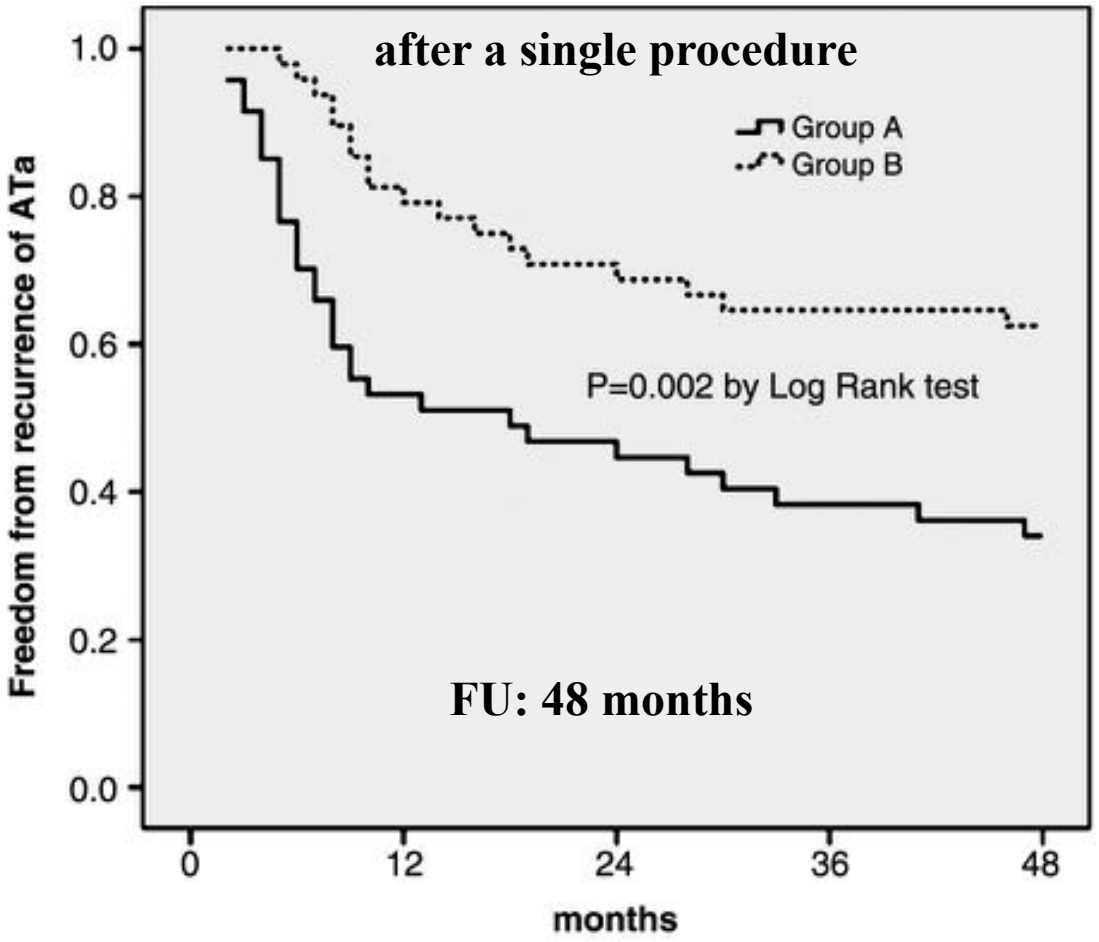
Eur Heart J. 2010; 31(21): 2633-41

The concomitant Cox Maze procedure using SICTRA is more effective than subsequent CPVI combined with substrate modification



Eur Heart J. 2010; 31(21): 2633-41

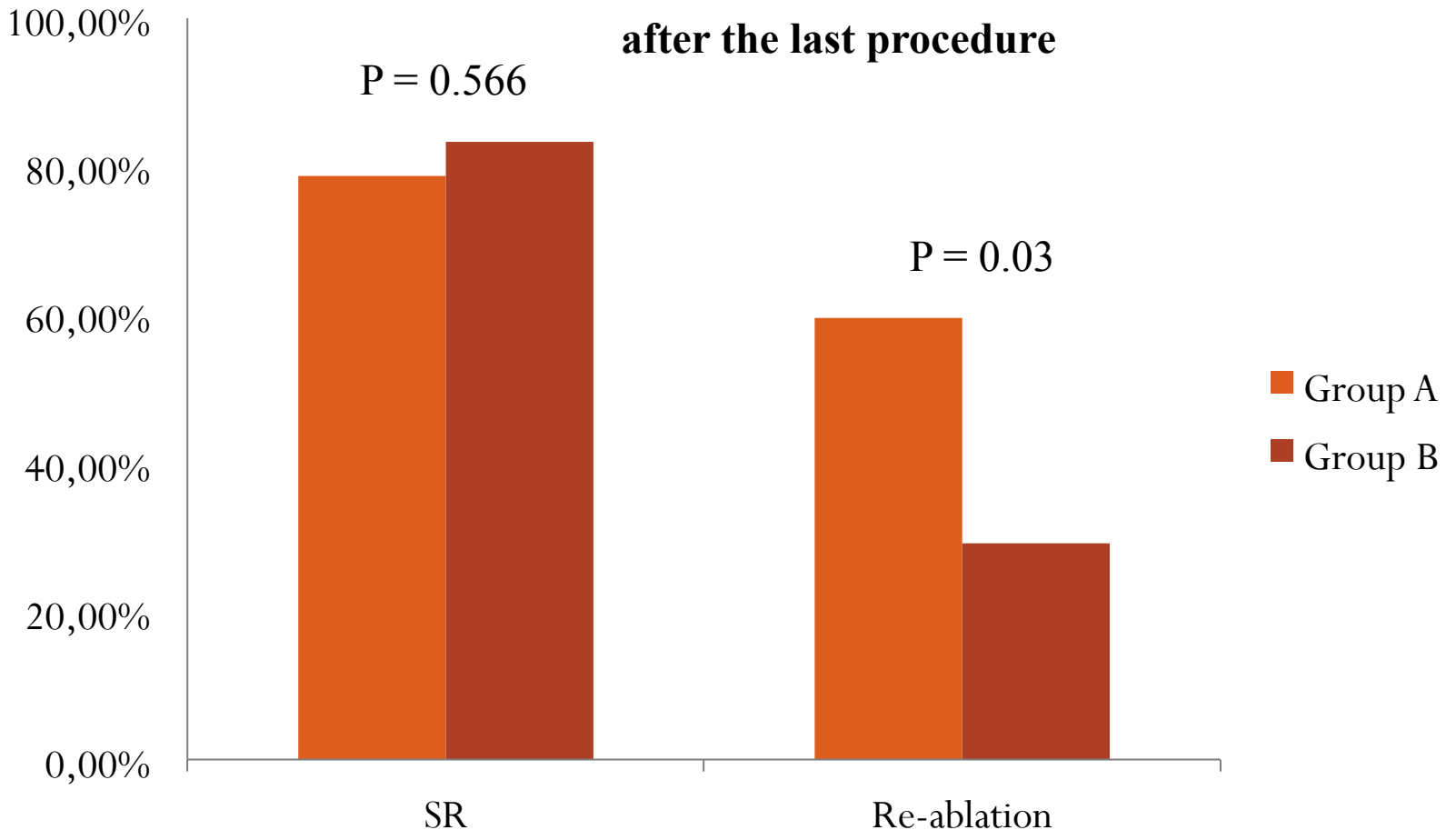
Single procedure success seems to be higher with SICTRA



Group A	47	25	21	18	16
Group B	48	38	33	31	30

Int J Cardiol. 2013; 168(6): 5372-7

Repeated catheter ablation potentially results in comparable outcomes in treating patients with LS-AF and RHD during 48 months follow-up



Int J Cardiol. 2013; 168(6): 5372-7

Conclusions

- Increased atrial size and pressure, surgical scarring and fibrosis, in addition to probable atrial myopathy from long-standing valvular disease potentially underlie arrhythmia recurrences following catheter ablation of valvular AF
- AF ablation in patients with prosthetic valve is feasible and safe
- Catheter ablation of valvular AF could achieve similar outcome to that of non-valvular AF; however, multiple procedures, atrial substrate modification on top of PVAI, longer procedure time and more X-ray exposure may be required.