

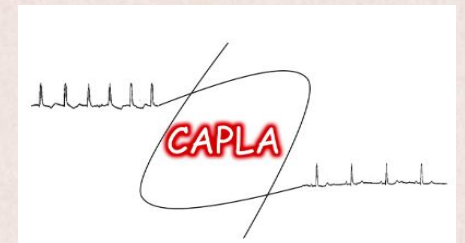
# The Impact of Low Posterior Left Atrial Wall Voltage on the Outcomes of Catheter Ablation for Persistent Atrial Fibrillation

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**KHRS 2023**

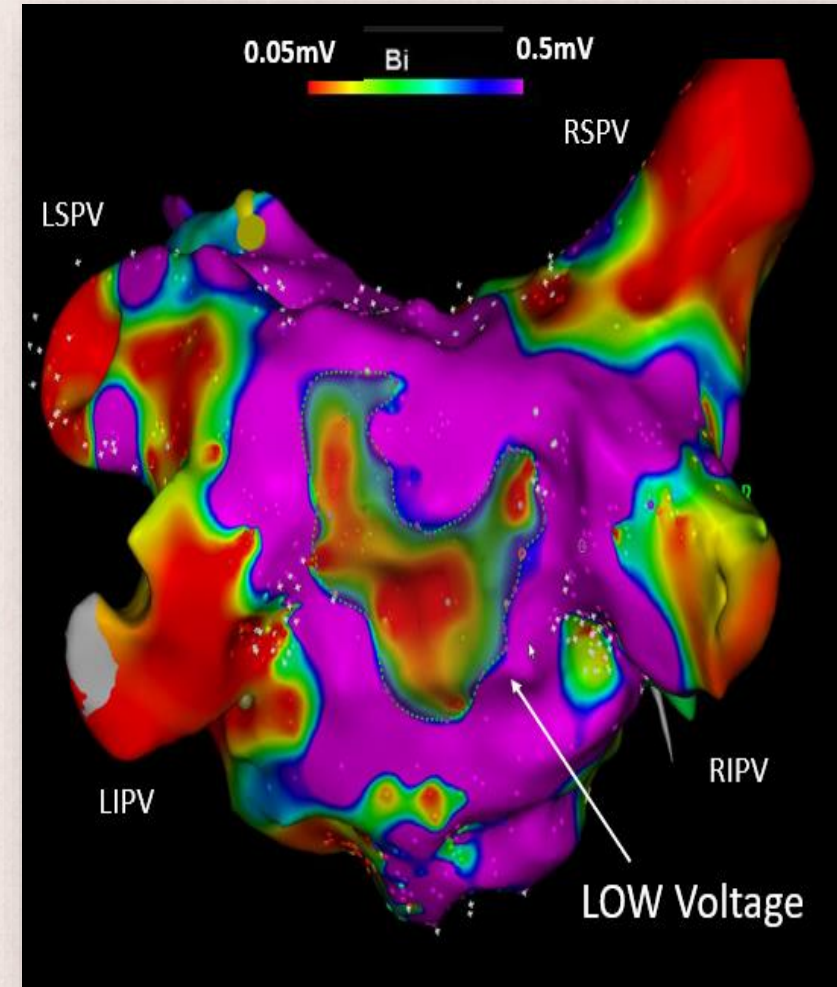
## **Declaration Of Interest**

- No relevant disclosure



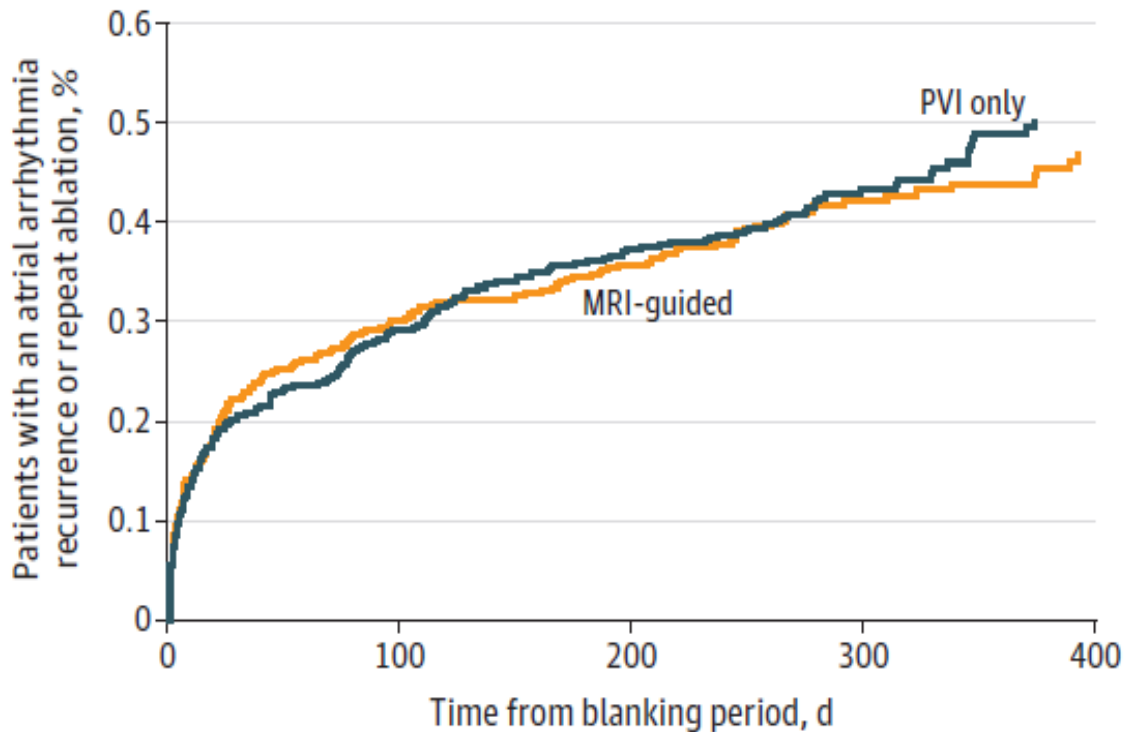
## Introduction

- **Pulmonary vein isolation (PVI):** less effective in persistent AF
  - Adjunctive ablation strategies – did not improve outcomes over PVI alone
- **Atrial fibrosis:** structural remodelling and substrate
  - Late gadolinium enhancement(LGE) on cardiac MRI
  - Low voltage areas(LVA) on EAM:  $<0.5$  mV
- **Low voltage areas**
  - Increased arrhythmia recurrence post catheter ablation





## Introduction



No. at risk	0	100	200	300	400
MRI-guided	407	277	251	114	64
PVI only	408	284	249	118	69

## DECAAF II

- PVI + MRI-guided atrial fibrosis ablation (421 patients)

Vs

- PVI alone (422 patients)

**HR 0.95 [95% CI, 0.77-1.17]; *P* = .63)**



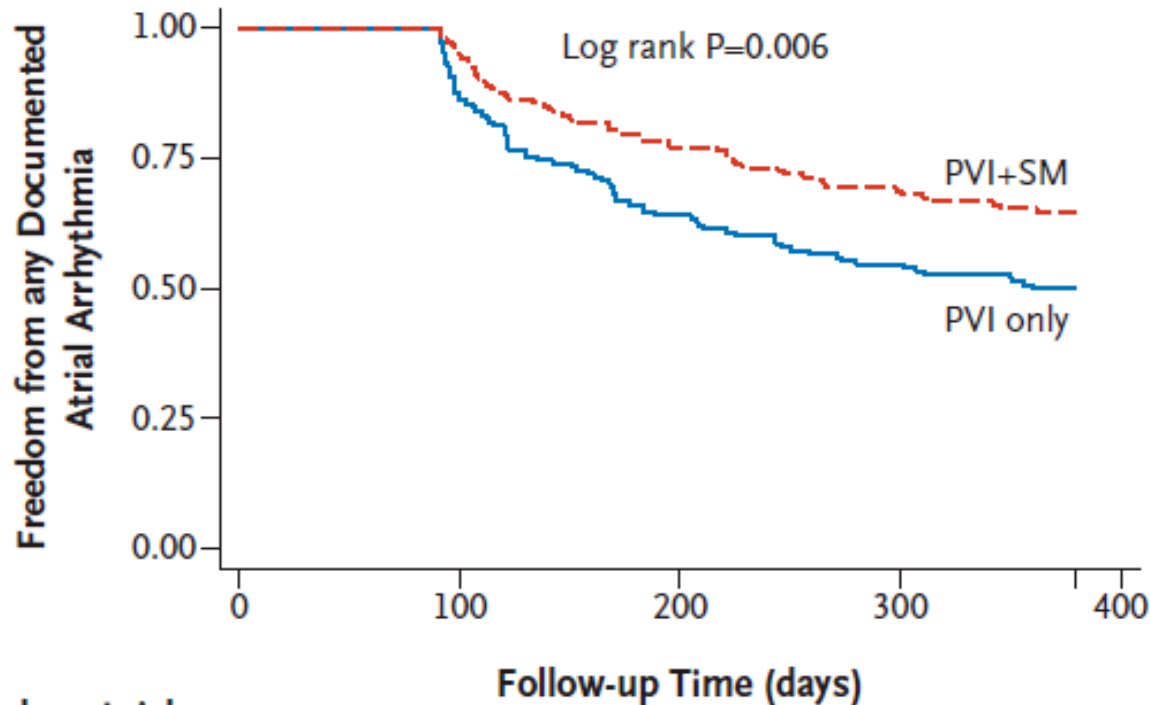
## Introduction

### ERASE AF

- PVI + substrate modification (161)  
Vs
- PVI alone (163)

**HR 0.62 [95% CI, 0.43-0.88]; P = .006)**

Prevalence of LVA in SM group : 34%



#### Number at risk

	0	100	200	300	400
PVI only	163	131	96	82	75
PVI+SM	161	147	118	105	99



## Introduction

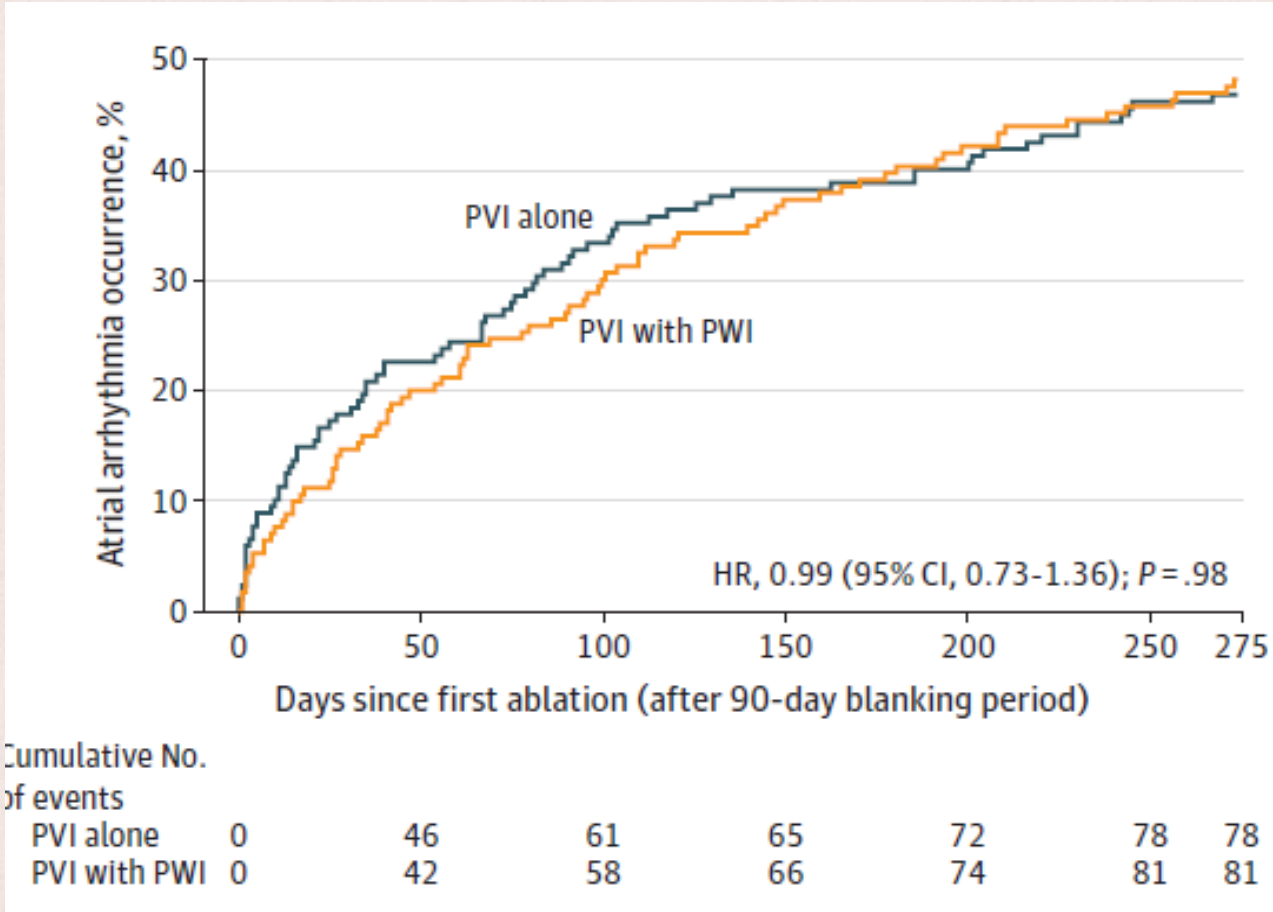
### CAPLA

- PVI + Posterior wall isolation (170)

Vs

- PVI alone (168)

**HR 0.99 [95% CI, 0.73-1.36]; P = .98)**





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## **Aims**

- To examine the outcomes of catheter ablation as determined by the presence or absence of posterior wall LVA



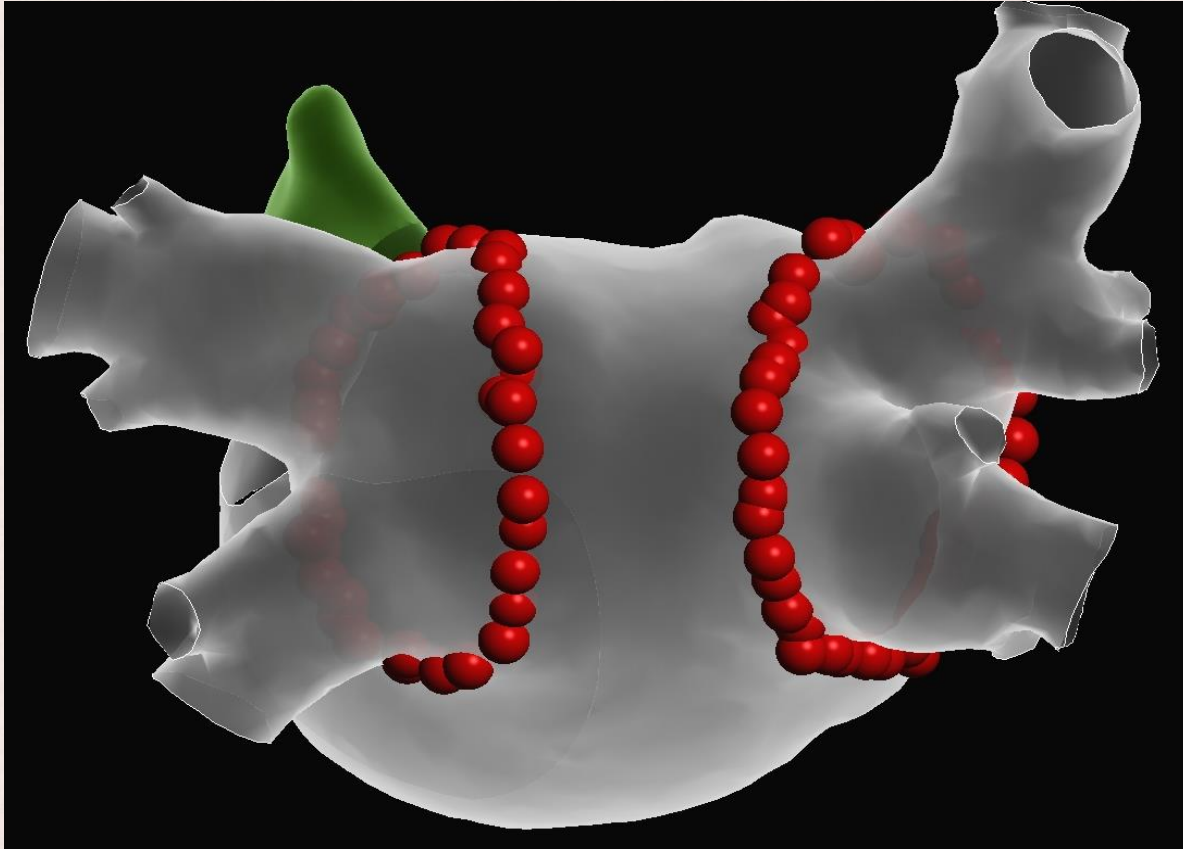
## Methods

- Pre-specified subgroup analysis
- CAPLA : Multi-centre, international, randomized controlled study
  - Australia, Canada, UK

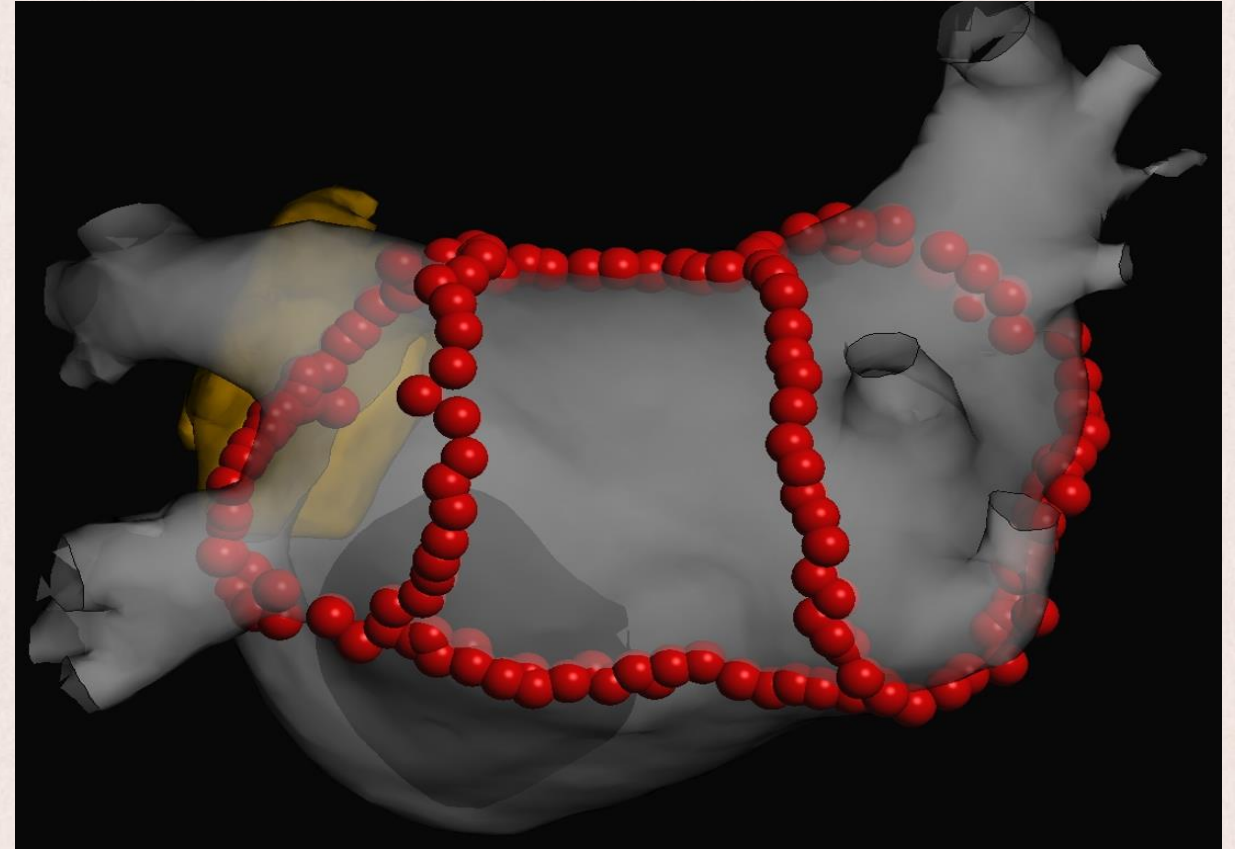
Inclusion Criteria	Exclusion Criteria
<ol style="list-style-type: none"><li>1. Persistent AF: AF &gt;7 days</li><li>2. First-time ablation procedure</li><li>3. Symptomatic AF refractory to anti-arrhythmic drug (AAD)</li></ol>	<ol style="list-style-type: none"><li>1. Paroxysmal AF</li><li>2. Long-standing persistent AF &gt;3 years</li><li>3. AF secondary to reversible cause</li><li>4. Contraindication to anticoagulation</li><li>5. End stage renal or hepatic failure</li><li>6. Severe valvular heart disease</li><li>7. Hypertrophic cardiomyopathy</li></ol>

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## PVI ONLY



## PVI + PWI

- GA, TOE guided trans-septal puncture
- Contact force sensing irrigated RF catheter: 40-50W ; target LSI or AI
- Oesophageal temperature monitoring



## Methods

### **Electroanatomic mapping**

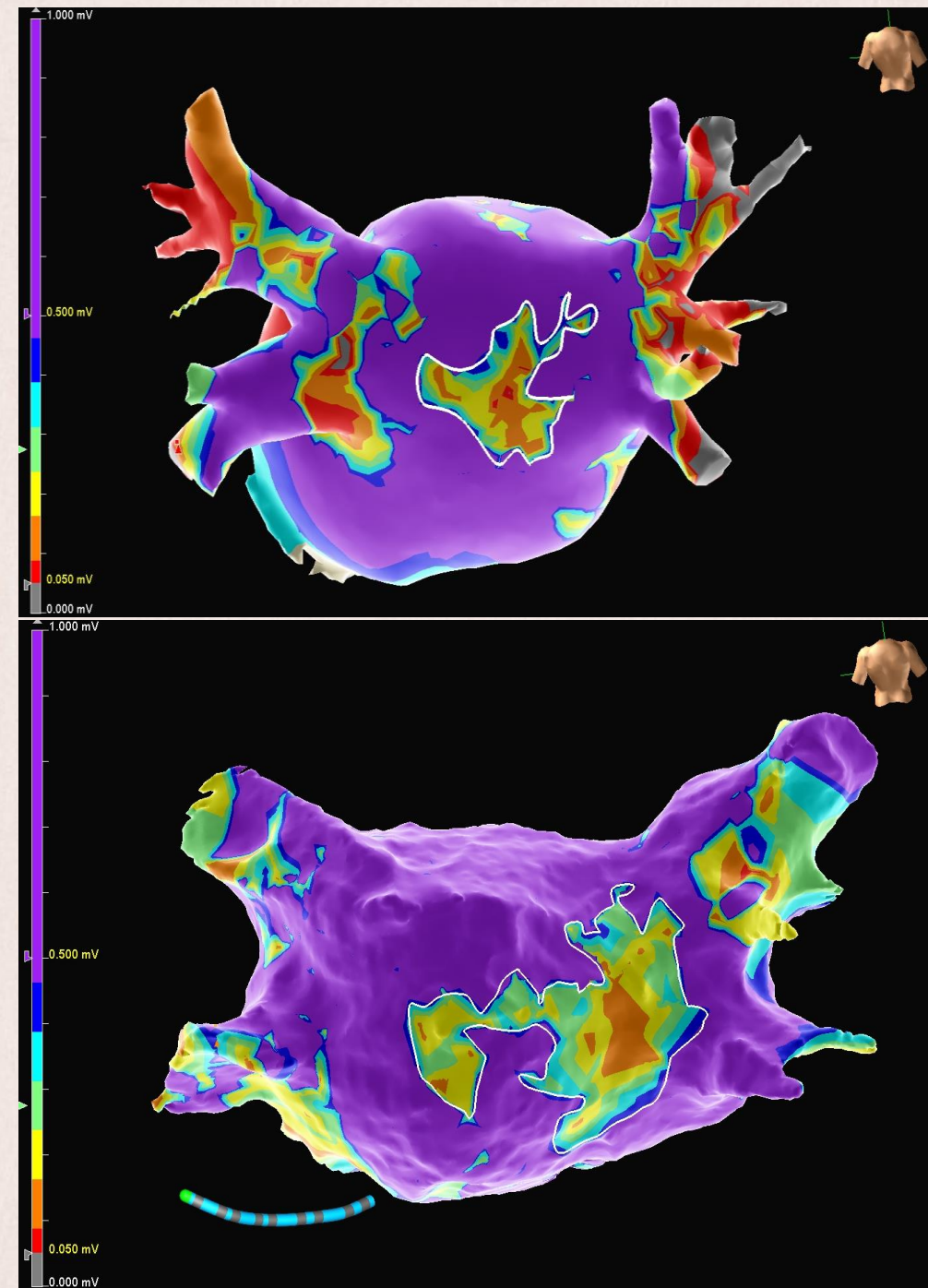
- Patients included : sinus rhythm at the time of ablation/ successful cardioversion following transseptal access
- LA voltage mapping at CSd 600ms
- CARTO (Biosense Webster), or Ensite Precision/ Velocity (Abbott Medical)
  - High density mapping - minimum of 1,000 evenly distributed mapping
  - Acquired points - manually reviewed off line and annotated



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## Methods

- Left atrium – divided into segments:
  - Anterior
  - Posterior
  - Roof
  - Inferior
  - Left and right PV antrum
- Bipolar voltage
  - Low-voltage area(LVA):  $<0.5$  mV
  - Scar:  $<0.05$  mV
- Surface area of LVA - manually measured on CARTO/Ensite systems





## Methods

### Post ablation management

- Anti arrhythmic drug
  - Discontinued at 3 months
  - Amiodarone - discontinued prior to ablation and not restarted
- Clinical reviews - 3 months, and 12 months post ablation
- Phone/ Telehealth consultations - 6 weeks, 6 months, 9 months post ablation



## Methods

### Cardiac rhythm monitoring

- Implantable loop / intracardiac device
- Twice daily ECGs with Alive Cor device
  - Additional ECGs for symptoms
- 24 hour Holter 3, 6, 9, 12 months post ablation
  - If non-compliant with ECG monitoring
- Arrhythmia events: blinded adjudication



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## Endpoints

- **Primary:**
  - Freedom from any documented atrial arrhythmia of >30 seconds, at 12 months follow up after a single ablation procedure off AAD, **in patients with posterior LVA**, who underwent PVI with PWI compared to PVI alone
- **Secondary:**
  - Posterior LVA and correlation with other atrial LVA
  - Effects of adding PWI to PVI in **patients with posterior LVA**, compared to PVI alone, on freedom from any arrhythmia after **multiple ablation** procedures, on or off AAD
  - Arrhythmia recurrence outcomes in patients **with and without posterior LVA**

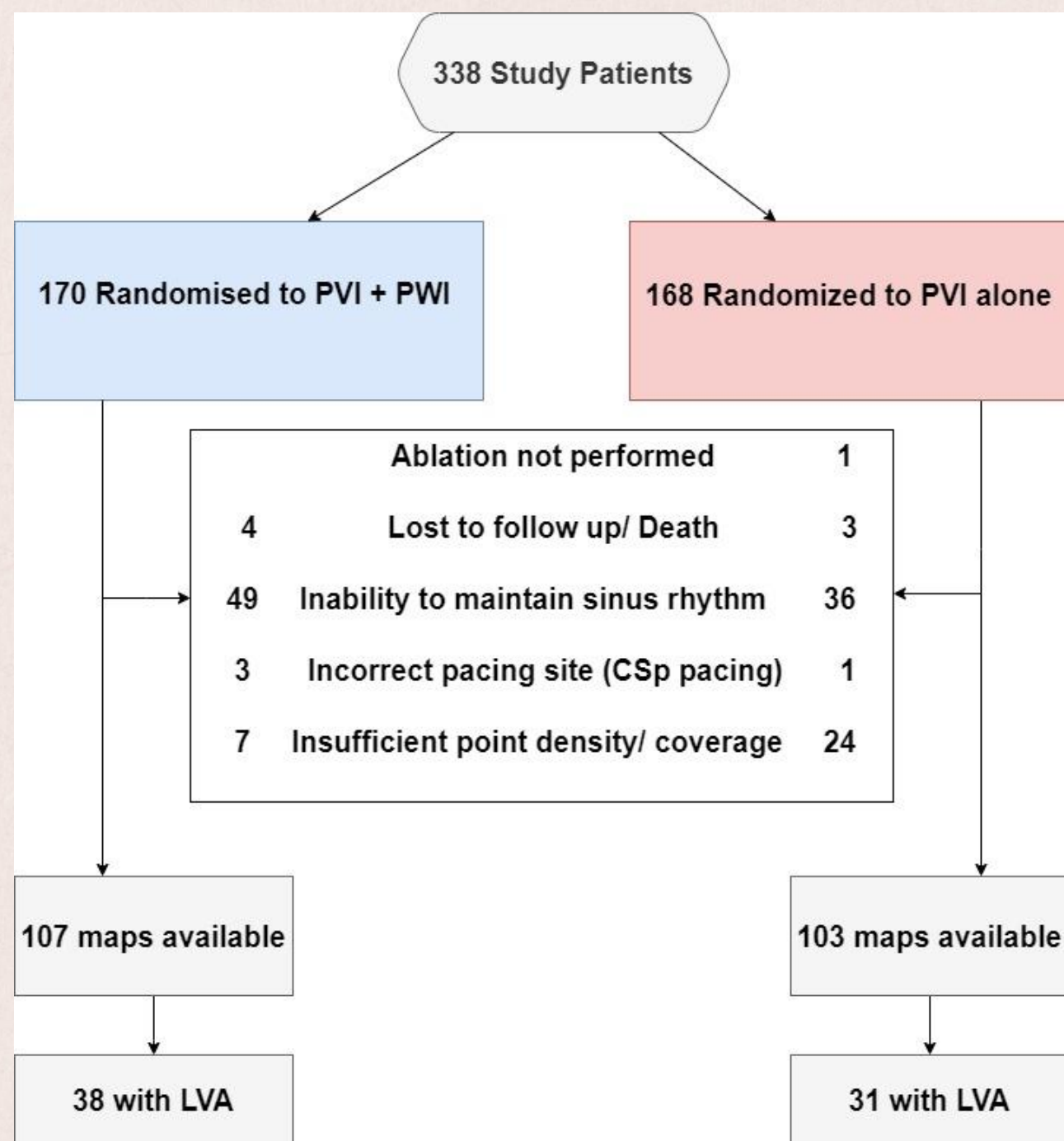


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## Results

Posterior LVA prevalence:

69 (32.9%)





## Results

	Additional LA segment(s) with evidence of LVA	P value
Posterior wall LVA	<b>51/56 (91.7%)</b> <ul style="list-style-type: none"><li>• Inferior (56.5%)</li><li>• Anterior (52.2%)</li><li>• Left antrum(27.5%)</li><li>• Right antrum (24.6%)</li><li>• Roof (23.2%)</li></ul>	P<0.01
No posterior wall LVA	56/98 (57.1%)	

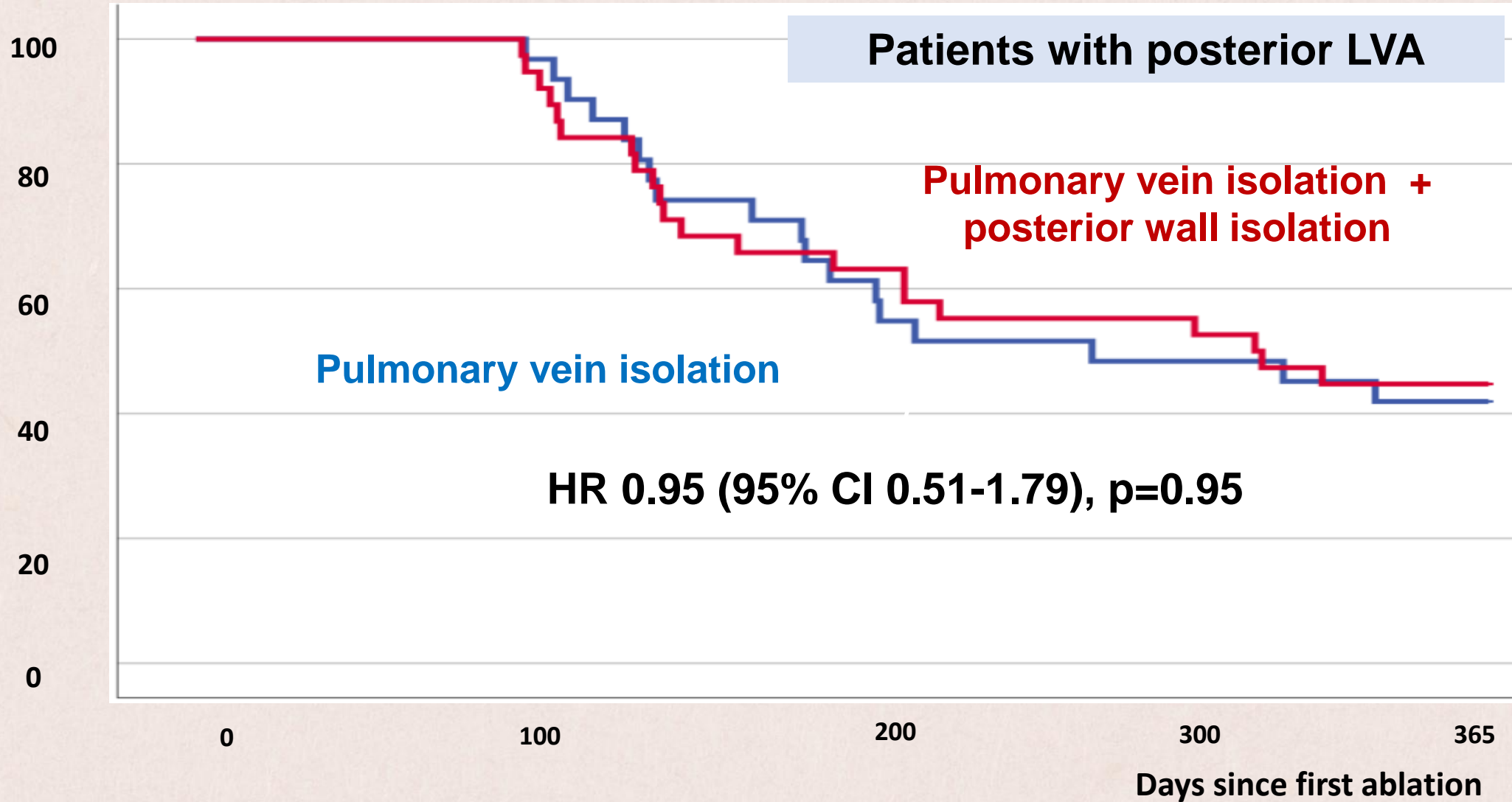




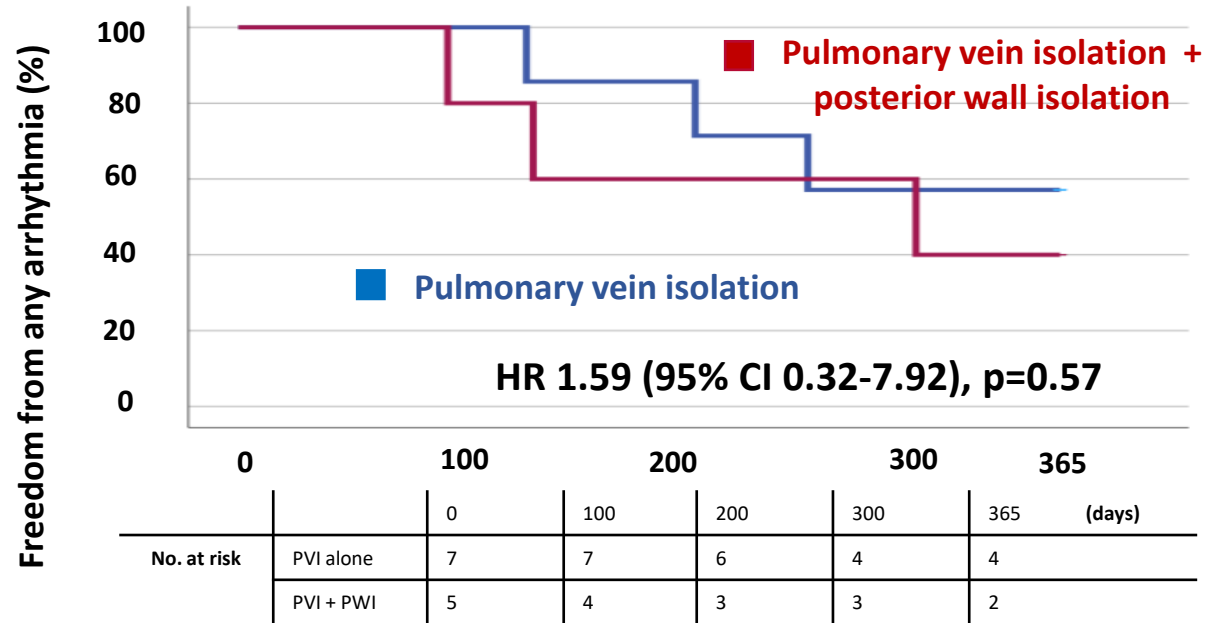
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# Primary Outcome

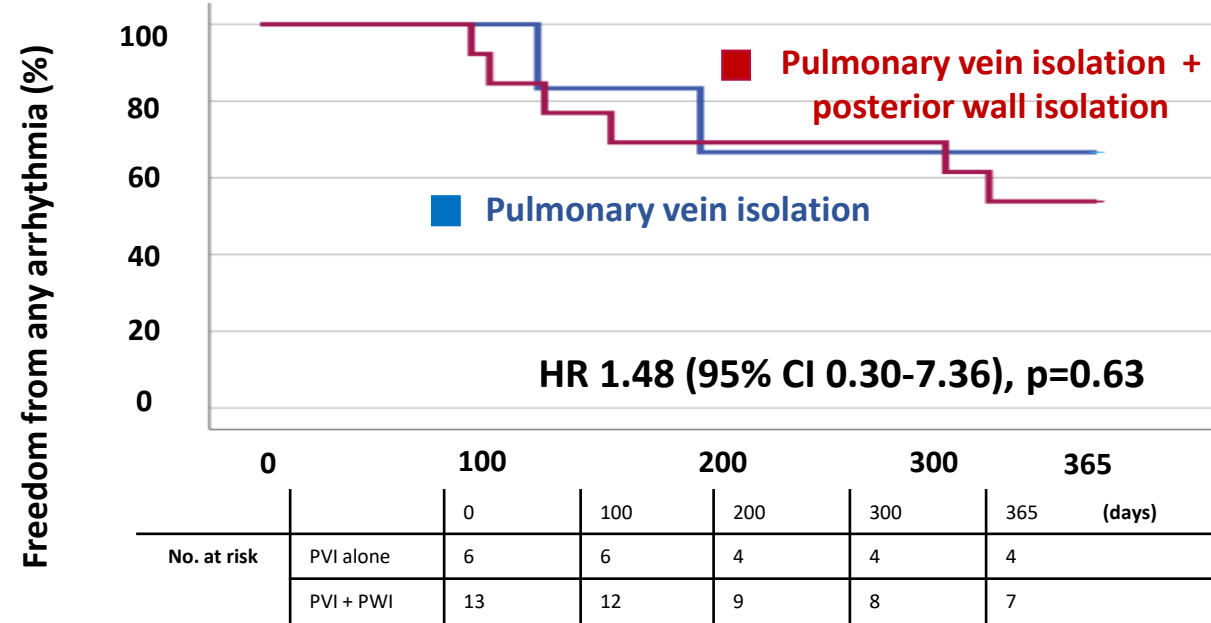
Freedom from atrial arrhythmia (%)



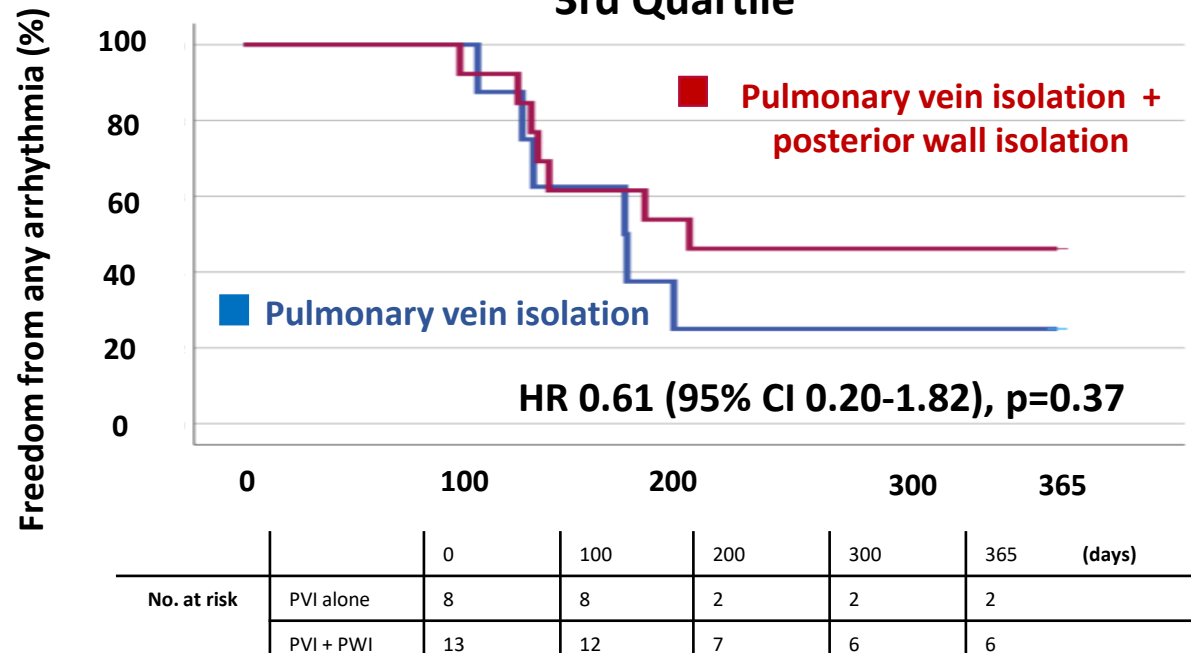
### Lowest Quartile



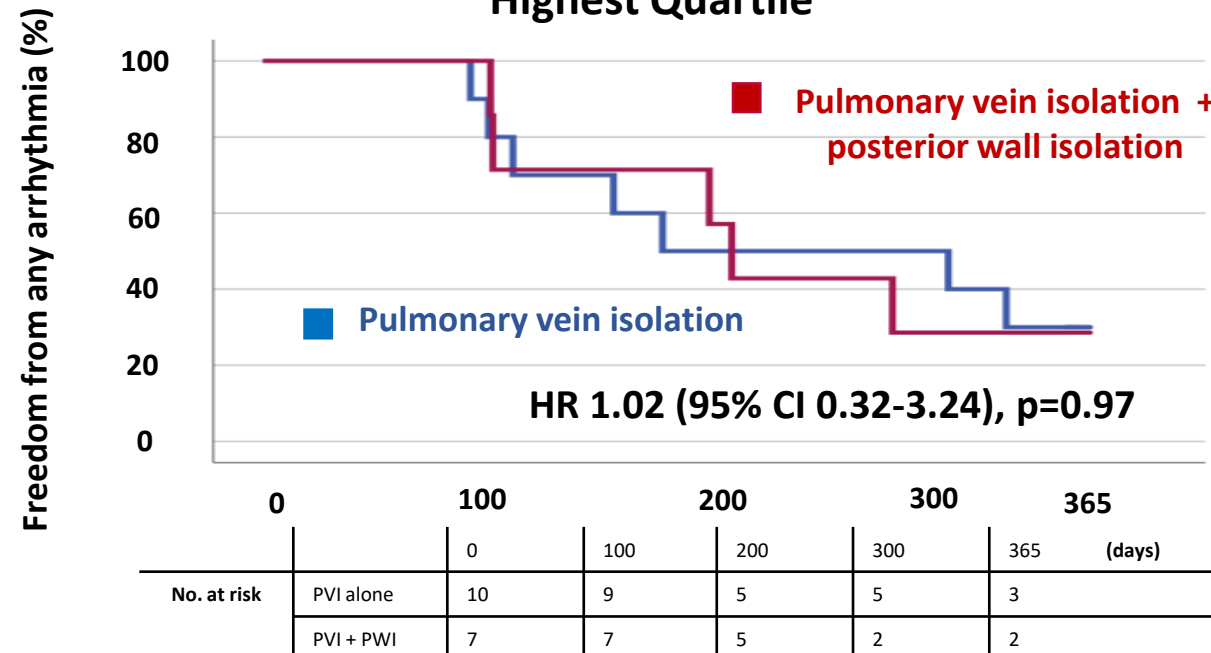
### 2nd Quartile



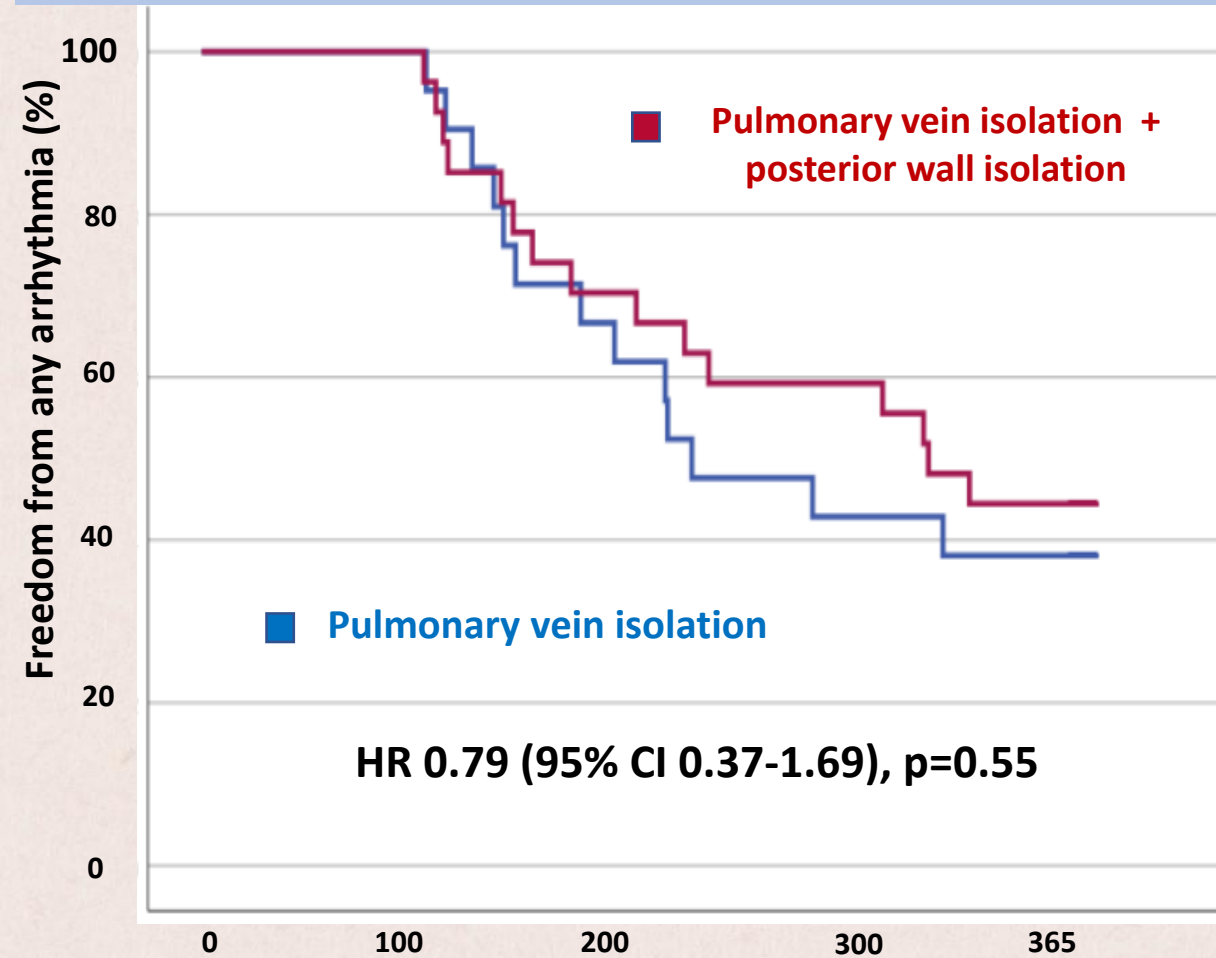
### 3rd Quartile



### Highest Quartile

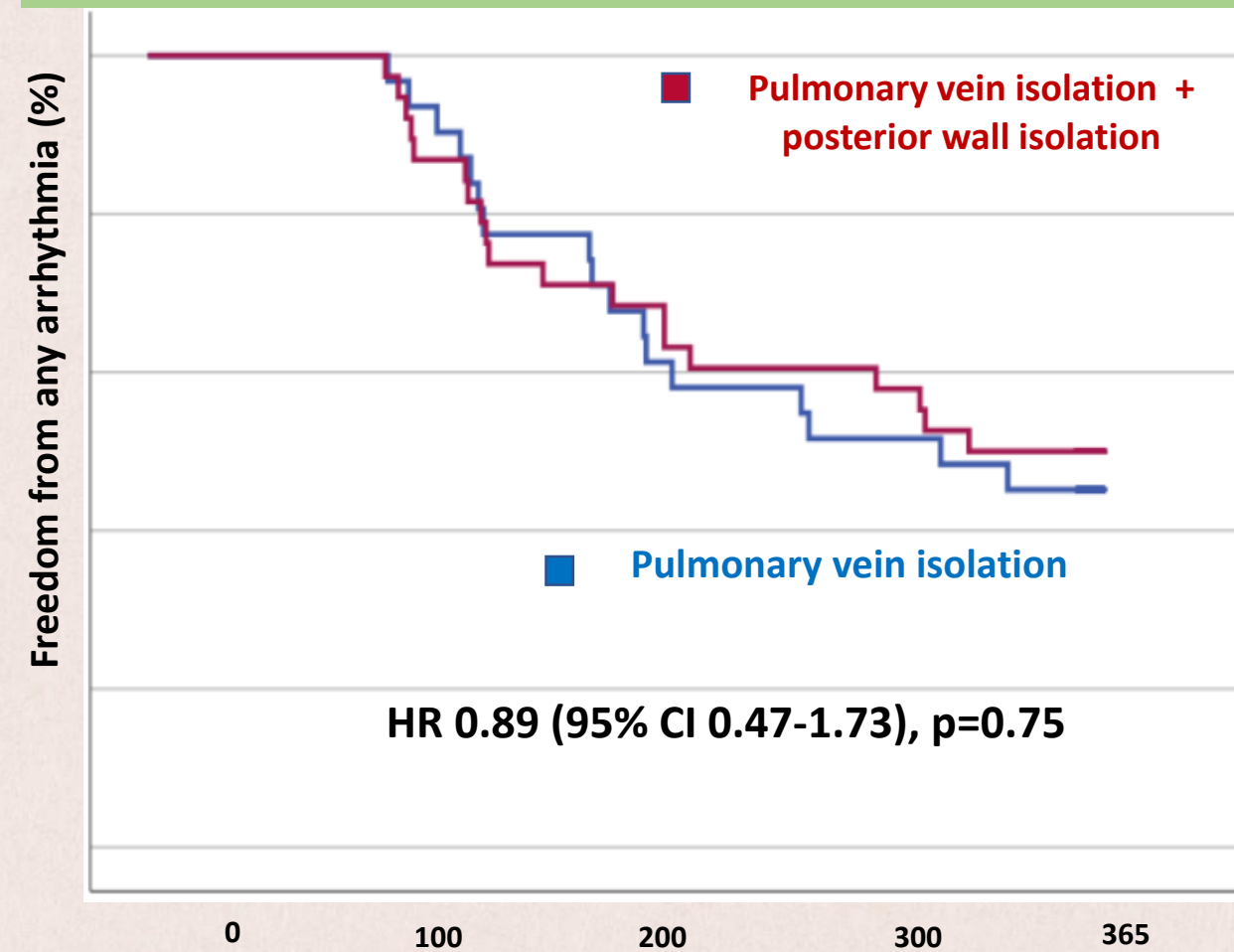


# LVA on posterior left atrial wall and $\geq 1$ other LA segment



No. at risk		0	100	200	300	365 (days)
	PVI alone	20	19	10	8	7
	PVI + PWI	25	23	16	12	11

# Multiple ablation procedures in patients with posterior LVA

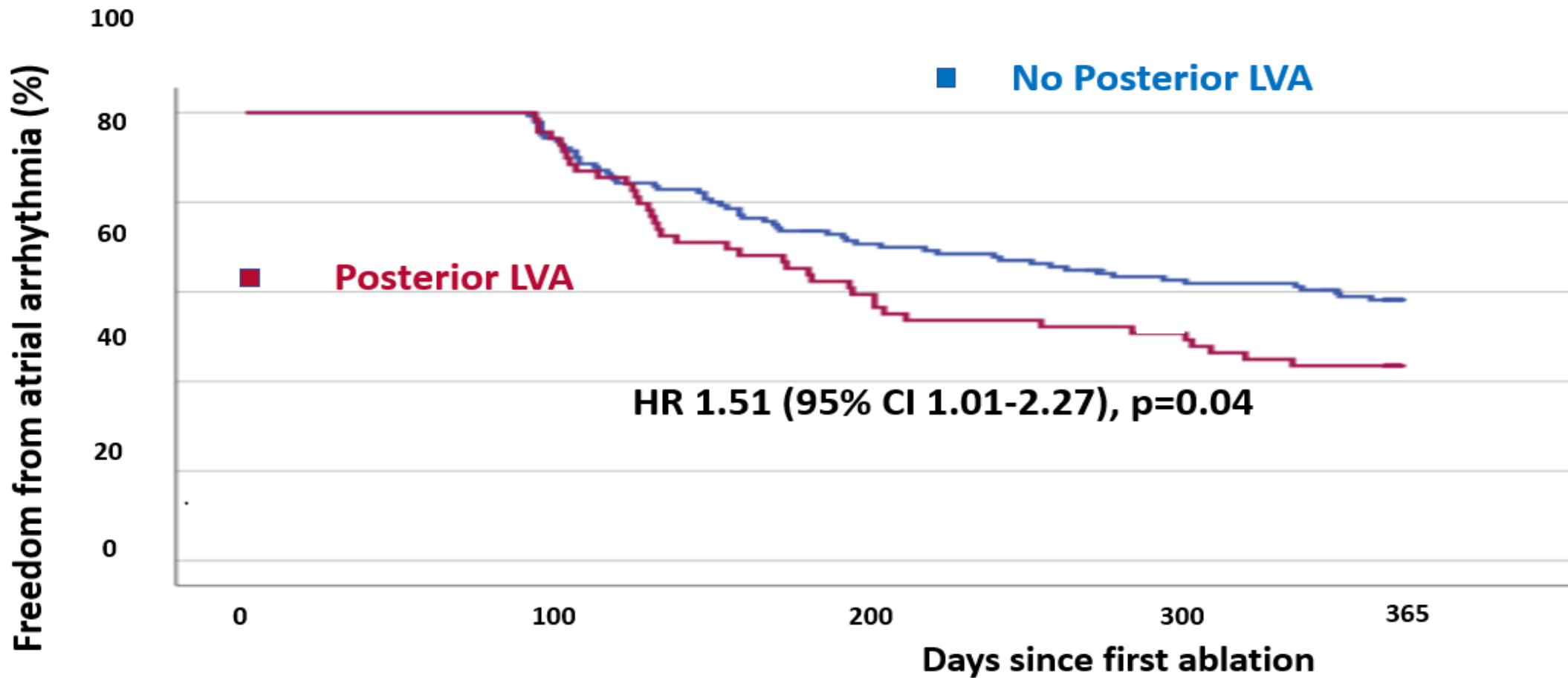


No. at risk		0	100	200	300	365 (days)
	PVI alone	31	30	19	16	14
	PVI + PWI	38	36	26	21	19



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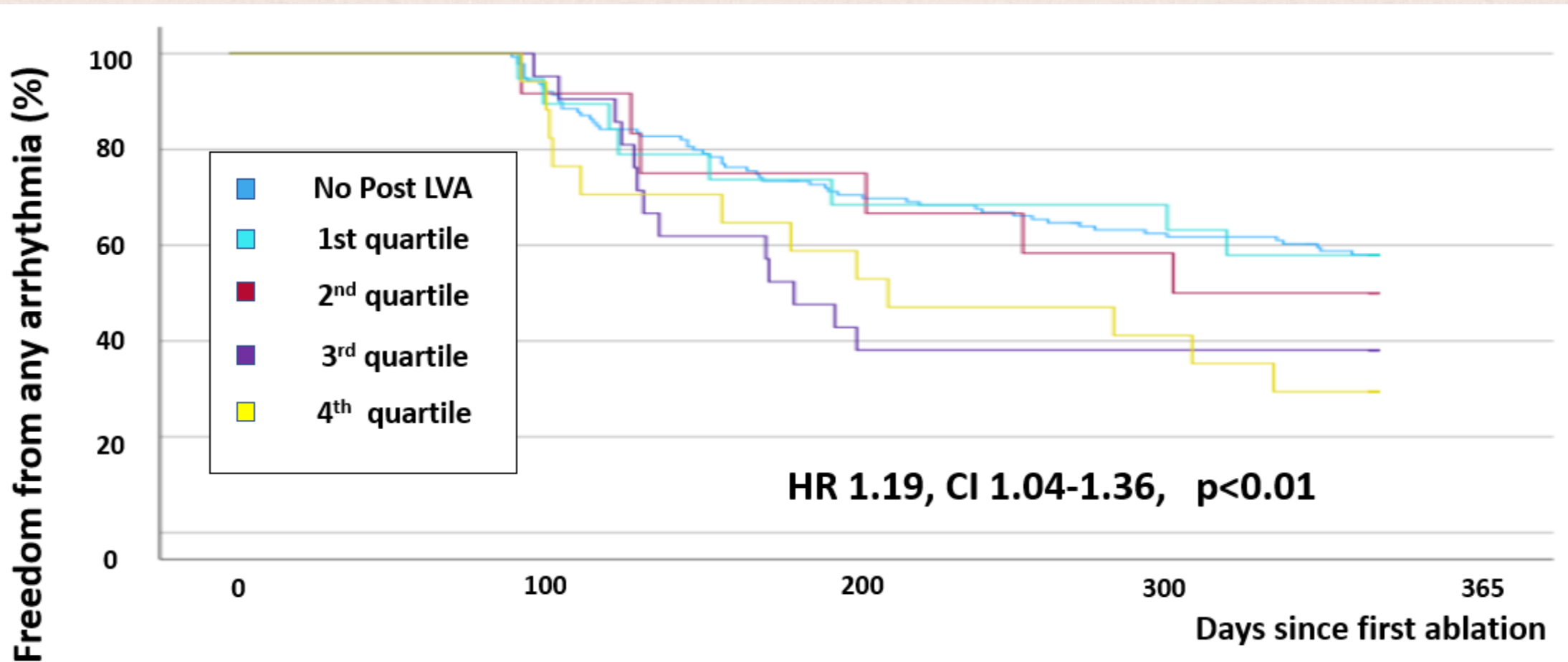
# Posterior LVA vs No Posterior LVA



**Presence of posterior LVA was associated with higher risk of arrhythmia recurrence**



## Posterior LVA (Quartiles)



Increasing burden of posterior LVA was associated with progressively higher risk of arrhythmia recurrence



## Limitations

- 38% of original cohort - excluded
  - In particular early AF recurrence following cardioversion
- Low voltage on endocardial mapping
  - ? Adipose
  - Affected by the direction of activation of the wavefront
    - Dynamic atrial substrate when pacing from different atrial sites (Wong et al JACC Clin Electrophysiol 2018)

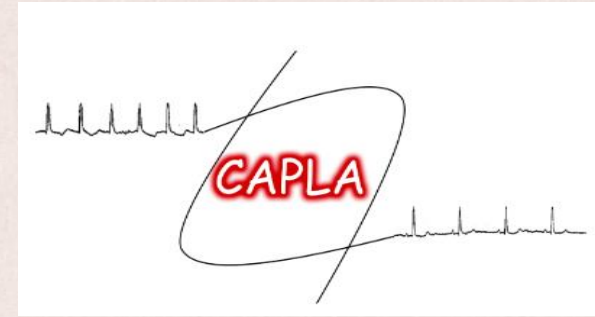


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## **Conclusions**

- 1) In patients with PsAF undergoing catheter ablation, the presence of posterior LVA was associated with a significant increase in atrial arrhythmia recurrence**
- 2) However, the addition of PWI in those with posterior LVA did not result in a significant improvement in atrial arrhythmia recurrence outcomes.**

# Acknowledgements



**Co-authors:** Peter M Kistler, Hariharan Sugumar, Liang-Han Ling, Sandeep Prabhu, Aleksandr Voskoboinik, Ahmed Al-Kaisey, Ramanathan Parameswaran, Robert D Anderson, Joshua Hawson, Louise Segan, Sue Finch, Geoffrey Wong, Joseph B Morton, Bhupesh Pathik, Alex J McLellan, Geoffrey Lee, Michael Wong, Rajeev K Pathak, Deep Chandh Raja, Laurence Sterns, Matthew Ginks, Christopher M Reid, Prashanthan Sanders and Jonathan M Kalman

