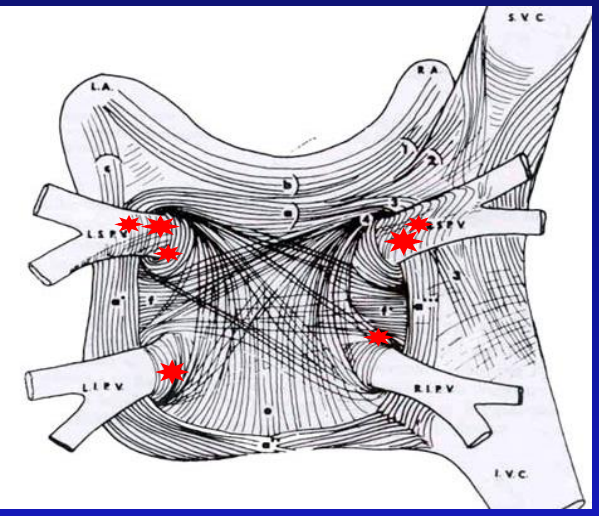
Sleep apnea ed ablazione FA: chi vince?

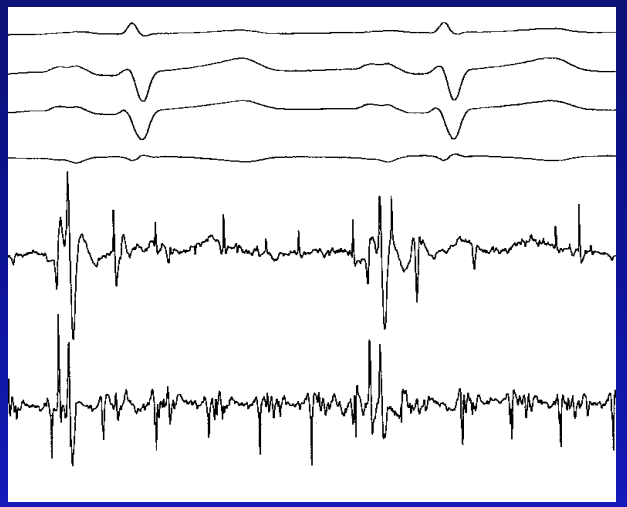
Giampiero Maglia, MD, FESC
Catanzaro

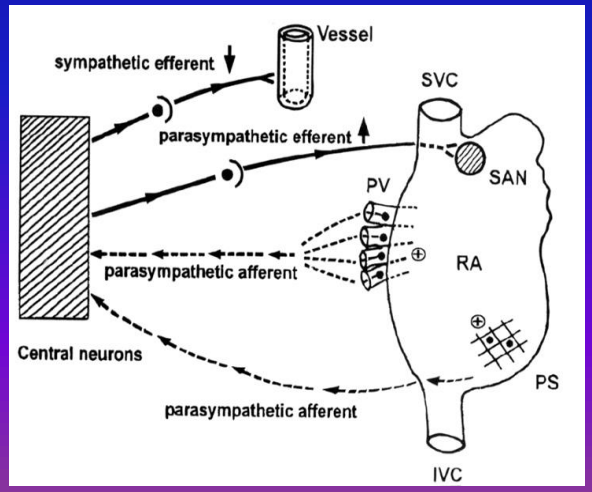
Atrial Fibrillation Mechanisms

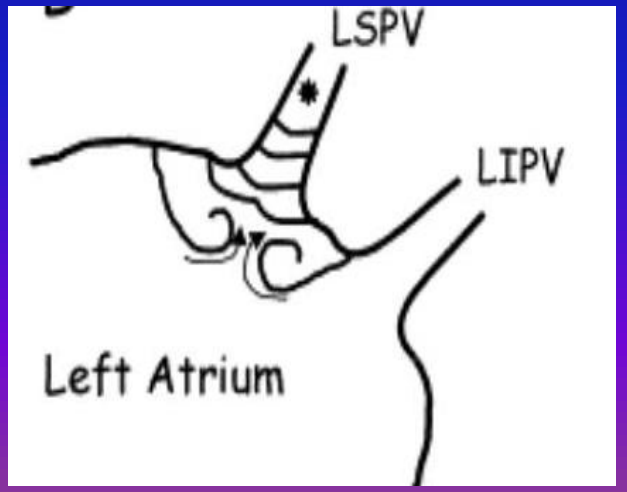
How does it work?



- ***PVs as TRIGGER*** and ***PERPETUATORS***
- ***SUBSTRATE*** with ***CRITICAL MASS***
- ***GANGLIONIC PLEXI*** affecting vagal innervation
- ***ROTOR*** sites critical to the maintenance of reentry

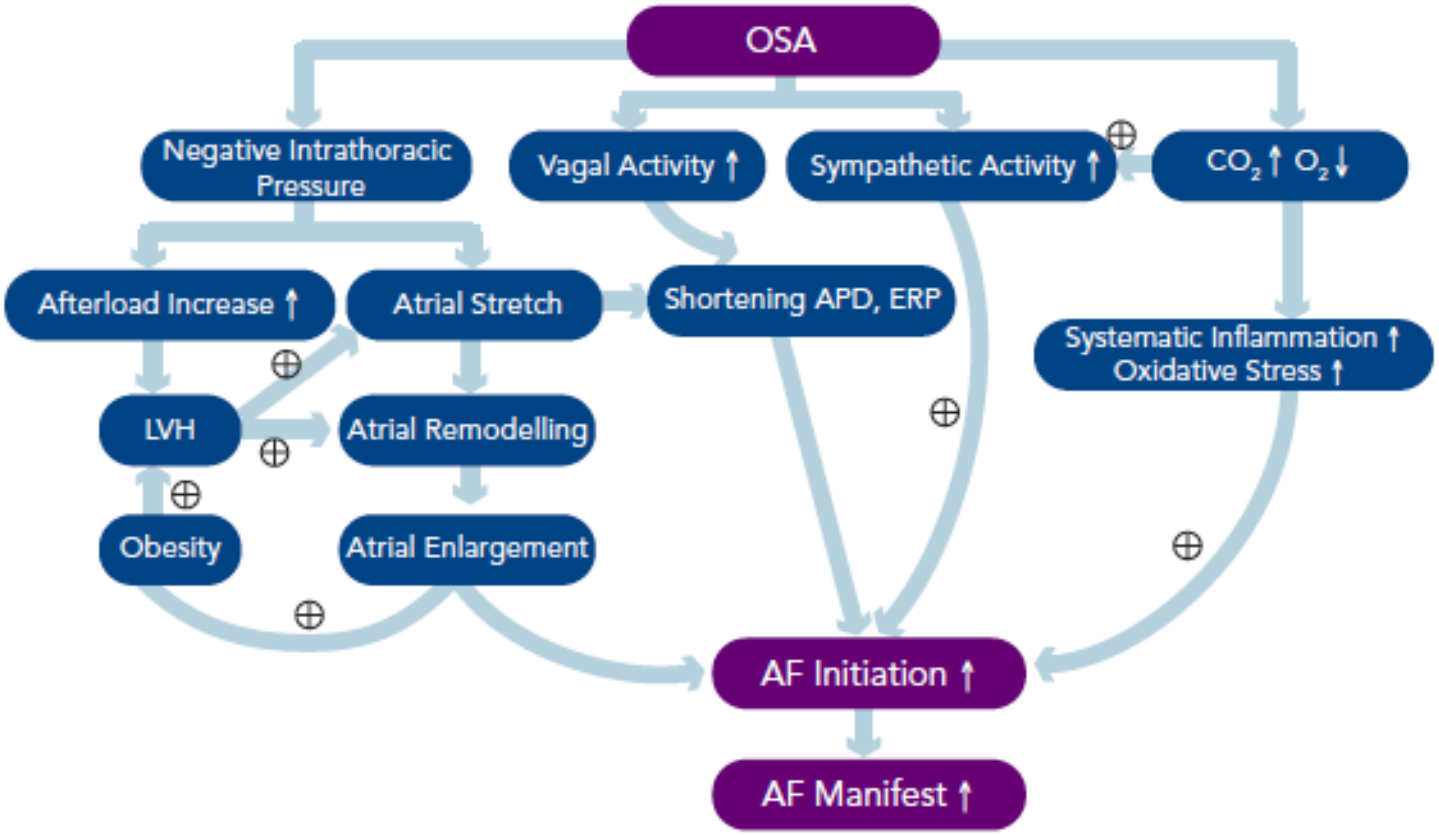






AF ablation and comorbidity

OSA and AF



AF = atrial fibrillation; APD = action potential duration; ERP = effective refractory period; LVH = left ventricular hypertrophy; OSA = obstructive sleep apnoea.

GOLD AF Registry

GOLD AF Registry

GOLD AF REGISTRY

Study Design: (NCT: 02433613)

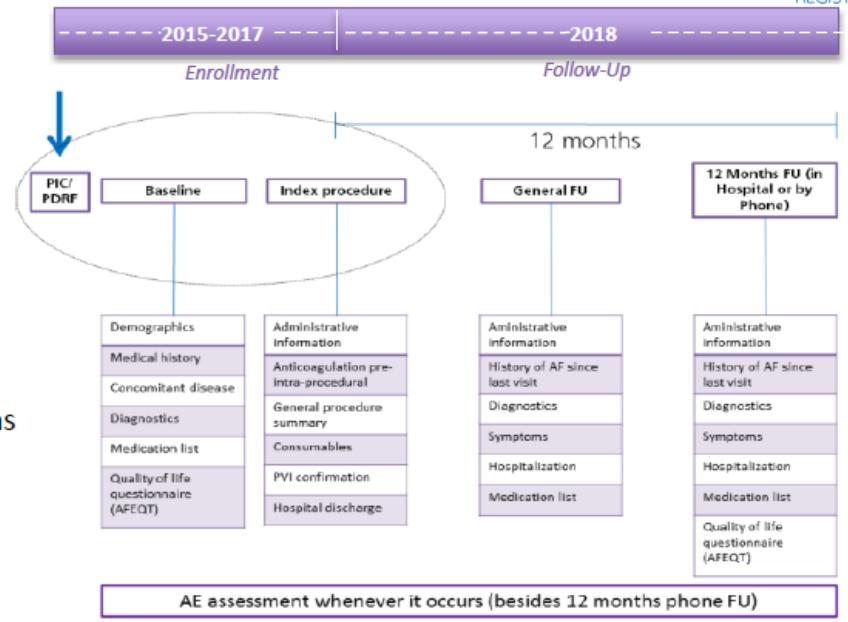
- Prospective, multi-center, observational and longitudinal study
- 40 sites in 14 countries in Europe/Asia (CH, DE, ES, FR, GE, GR, IL, IT, KOR, NL, PL, PT, UK)

Population:

- Patients ≥18 years of age
- PAF, PersAF, LS PersAF
- Treated with Phased RFA

Primary Objective:

- Freedom from AF Recurrence from 3-12 Months
  - Failure: Cardioversion, ≥30 sec of AF, ≤30 sec of AF with symptoms, reablations
- Clinical FU and Arrhythmia monitoring as per standard of care in each center
- Symptoms and QoL assessed at 12 Months

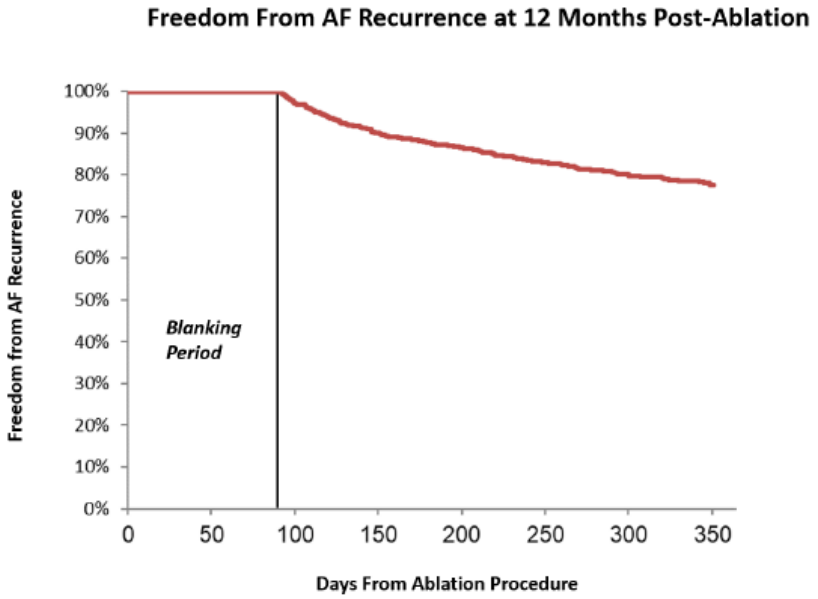


GOLD AF Registry

Freedom from AF Recurrence at 12 Months

GOLD AF REGISTRY

- 1,054 Patients with Ablation
- Freedom from AF Recurrence
  - 77.7%
- Mean Time to Recurrence
  - 185.1 ± 76.6 Days
- AFL Reported in 0.4% of Patients
- AT Reported in 0.2% of Patients



GOLD AF Registry

Procedural Safety ≤ 30 days

GOLD AF REGISTRY

- Procedure-related events occurred in 26/1054 (2.5%)
  - Mean Time to First Event: 2.3 ± 3.3 days
- No esophageal fistulae, no deaths
- Low rate of Stroke 0.3%

All events adjudicated by an independent adverse event review committee for relatedness to Phased RFA

Procedural Complications	
Access Site Complications	18 (1.7%)
Ischemic Stroke	**3 (0.3%)**
Pericardial Effusion	2 (0.2%)
Transient ST Segment Elevation	2 (0.2%)
Phrenic Nerve Injury (Palsy)	1 (0.1%)
Total	**26 (2.5%)**

GOLD AF Registry

Patient Characteristics (n=1054)

GOLD AF REGISTRY

Demographics	
Gender (male,%)	67.6 % (713)
Age (years)	**60.6 ± 10.9**
BMI	27.8 ± 4.5
LVEF (%)	59.4 ± 7.6
LA Volume (ml)	**49.0 ± 27.4**
LA Diameter (mm)	**42.0 ± 8.1**
Indications for Phased RFA	
Paroxysmal	70.2 % (740)
Persistent	26.5 % (279)
Long Standing Persistent	3.3 % (35)
Symptomatic	95.5% (1007)
Asymptomatic	4.5% (47)
Anticoagulation	
VKA	23.2 % (245)
NOAC	63.5% (669)
Rivaroxaban	43.9 % (294)
Dabigatran	21.2 % (142)
Apixaban	29.7 % (199)
Edoxaban	5.1 % (34)

Medical History	
Myocardial Infarction	4.3 % (45)
Coronary PCI / Stent	6.5 % (68)
Heart Failure	3.8 % (40)
Thrombo-embolic Event	6.4 % (67)
Obesity	**27.1% (286)**
Diabetes	9.7 % (102)
Hypertension	**53.2 % (561)**
Dyslipidemia	28.8 % (304)
Respiratory Disease	9.2% (97)
CHA_2DS_2 -VASc score	**1.8 ± 1.4**
HAS-BLED score	**1.0 ± 0.8**
AF History	
First Diagnosed AF Episode (years)	4.3 ± 5.2
Index AF Ablation	**94.3 % (993)**
Cardioversions (last 12 months)	**38.4 % (405)**
AF Hospitalization (last 12 months)	**31.5 % (332)**
Patient Failed AAD	**80.3 % (846)**

Patient Characteristics

Demographics	Italy	Sites Outside of Italy	p-value
Gender (male,%)	124 (69.7 %)	587 (67.4 %)	0.55529
Age (years)	58.6 ± 11.9	61.1 ± 10.6	0.04825
Years from First Diagnosis	4.3 ± 4.5	4.3 ± 5.3	0.22988
Previously Failed AAD	71 (97.3%)	770 (78.9%)	0.00015
BMI	26.0 ± 3.8	27.9 ± 4.1	<.00001
LAD (mm)	41.3 ± 7.2	42.2 ± 8.4	0.09896
LVEF (%)	58.9 ± 7.2	58.4 ± 6.9	0.07164
LA Volume (mL)	42.3 ± 31.5	49.8 ± 27.0	0.04006
Typical PV Anatomy (n, %)	168 (94.4 %)	719 (82.5 %)	0.00007
CVs for AF < 12 Months (n, %)	62 (34.8 %)	343 (39.4 %)	0.25603
AF Hospitalization < 12 Months (n, %)	34 (19.1 %)	295 (33.9 %)	0.00011
Indications for Phased RFA	**Italy**	**Sites Outside of Italy**	**p-value**
Paroxysmal (n, %)	140 (78.7 %)	596 (68.4 %)	0.00570
Persistent (n, %)	35 (19.7 %)	243 (27.9 %)	
Symptomatic (n, %)	161 (90.4 %)	841 (96.6 %)	0.00033
Asymptomatic (n, %)	17 (9.6 %)	30 (3.4 %)	

Patient Characteristics

Medical History	Italy	Sites Outside of Italy	p-value
Myocardial Infarction (n, %)	7 (3.9 %)	38 (4.4 %)	0.79631
Coronary PCI / Stent (n, %)	7 (3.9 %)	61 (7.0 %)	0.12945
Heart Failure (n, %)	1 (0.6 %)	39 (4.5%)	0.01293
Thrombo-embolic Event (n, %)	8 (4.5 %)	59 (6.8 %)	0.25709
Obesity (n, %)	26 (14.6 %)	259 (29.8 %)	< 0.0001
Diabetes (n, %)	9 (5.1 %)	92 (10.6 %)	0.02324
Hypertension (n, %)	88 (49.4 %)	471 (54.1 %)	0.25846
Dyslipidemia (n, %)	30 (16.9 %)	272 (31.2)	0.00011
Respiratory Disease (n, %)	5 (2.8 %)	91 (10.4 %)	0.00128
CHA_2DS_2 -VASc score	1.48 ± 1.23	1.85 ± 1.47	0.00505
HAS-BLED score	0.90 ± 0.82	1.07 ± 0.89	0.02775
Anticoagulation	**Italy**	**Sites Outside of Italy**	**p-value**
VKA (n, %)	31 (18.0 %)	211 (24.2 %)	0.07181
NOAC (n, %)	95 (53.4 %)	572 (65.7 %)	0.00189
Rivaroxaban (n, %)	29 (30.5 %)	264 (46.2 %)	0.00448
Dabigatran (n, %)	36 (37.9 %)	106 (18.5 %)	0.00002
Apixaban (n, %)	28 (29.5 %)	170 (29.7 %)	0.96114
Edoxaban (n, %)	2 (2.1 %)	32 (5.6 %)	0.15218

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Short communication

Prevalence and clinical characteristics of obstructive- and central-dominant sleep apnea in candidates of catheter ablation for atrial fibrillation in Japan

Takashi Kohno [a,*,1], Takehiro Kimura [a,1], Koichi Fukunaga [b], Wakako Yamasawa [b,c], Taishi Fujisawa [a], Ryoma Fukuoka [a], Kazuaki Nakajima [a], Shin Kashimura [a], Akira Kunitomi [a], Yoshinori Katsumata [a], Takahiko Nishiyama [a], Nobuhiro Nishiyama [a], Yoshiyasu Aizawa [a], Keiichi Fukuda [a], Seiji Takatsuki [a]

Table 1
Comparison of the severity of sleep apnea.

	AHI <10 n = 62	AHI ≥10 n = 135	P value	OR	95% CI
$CHADS_2$	0.6 ± 0.9 (62)	0.7 ± 0.9 (135)	0.175	N/A	N/A
CHA_2DS_2-VASc	1.0 ± 1.1 (62)	1.2 ± 1.1 (135)	0.230	N/A	N/A
BMI	23.7 ± 2.4 (62)	25.5 ± 3.0 (135)	<0.001*	N/A	N/A
Age	59.0 ± 10.3 (62)	60.5 ± 8.4 (135)	0.411	N/A	N/A
BNP (pg/ml)	71.1 ± 67.1 (56)	102.5 ± 84.9 (116)	0.011*	N/A	N/A
LVEF (%)	58.3 ± 8.1 (53)	55.6 ± 11.0 (121)	0.212	N/A	N/A
LA (cm)	3.8 ± 0.6 (53)	4.1 ± 0.6 (121)	0.011*	N/A	N/A
AF duration (M)	44.2 ± 47.0 (22)	35.3 ± 36.8 (52)	0.523	N/A	N/A
ESS	4.1 ± 2.7 (50)	5.2 ± 3.1 (87)	0.048	N/A	N/A
Heart failure	3 (4.8%)	9 (6.6%)	0.444	1.405	0.367–5.379
Hypertension	15 (24.1%)	61 (45.2%)	0.005	2.583	1.318–5.062
Age > 65	22 (35.4%)	55 (40.7%)	0.483	1.250	0.670–2.331
Age > 75	3 (4.8%)	1 (0.7%)	0.093	0.147	0.015–1.440
Diabetes	10 (16.1%)	18 (13.3%)	0.602	0.800	0.346–1.852
Stroke	3 (4.8%)	5 (3.7%)	0.708	0.756	0.175–3.270
Female	4 (6.5%)	6 (4.4%)	0.389	0.674	0.183–2.481
Vascular disease	1 (1.6%)	3 (2.2%)	0.626	1.386	0.141–13.601
Persistent AF	23 (37.0%)	63 (46.6%)	0.208	1.484	0.801–2.748

The values are expressed as mean ± standard deviation (n) or n (%).
AF: atrial fibrillation, AHI: apnea-hypopnea index, BMI: body mass index, BNP: brain natriuretic peptide, ESS: Epworth sleepiness scale, LA: left atrial size measured using transthoracic echocardiography, LVEF: left ventricular ejection fraction, OR: odds ratio, 95% CI: 95% confidence interval.
* P value < 0.05

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Treatment of Obstructive Sleep Apnea Reduces the Risk of Atrial Fibrillation Recurrence After Catheter Ablation

Adam S. Fein, MD, Alexei Shvilkin, MD, PHD, Dhaval Shah, MD, Charles I. Haffajee, MD, Saumya Das, MD, Kapil Kumar, MD, Daniel B. Kramer, MD, Peter J. Zimetbaum, MD, Alfred E. Buxton, MD, Mark E. Josephson, MD, Elad Anter, MD

Boston, Massachusetts

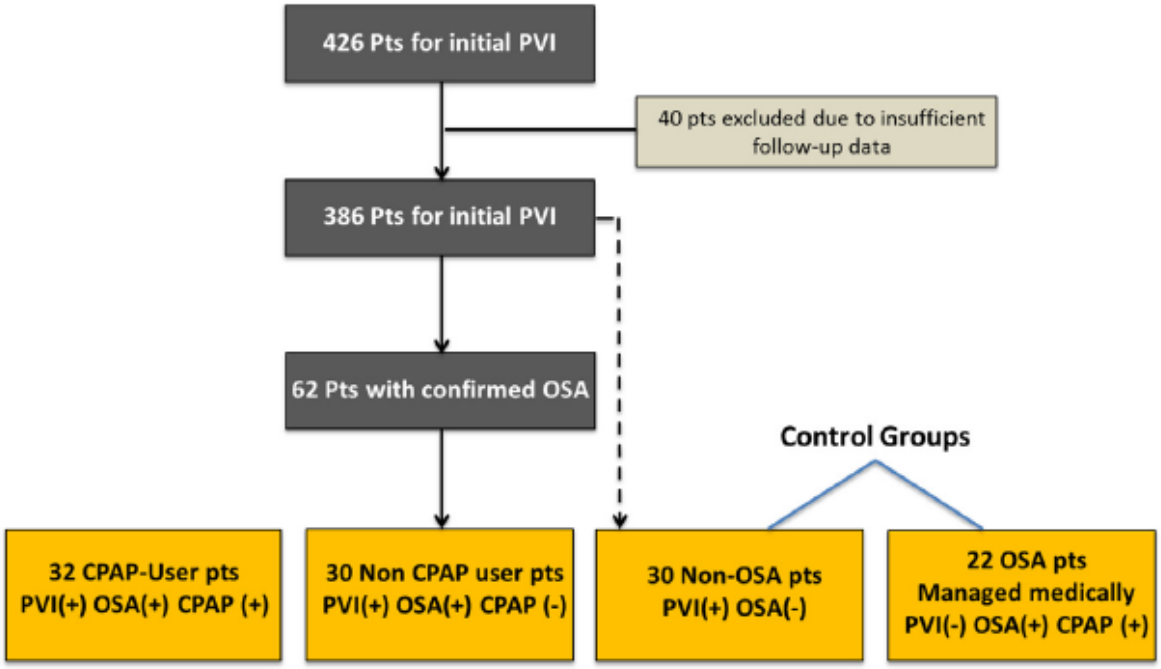

Figure 1 **Study Cohort: Flowchart**

Flow diagram showing the establishment of the study cohort and division into treatment groups (shown in **dark gray** and control groups in **light gray**). CPAP = continuous positive airway pressure; OSA = obstructive sleep apnea; pts = patients; PVI = pulmonary vein isolation.

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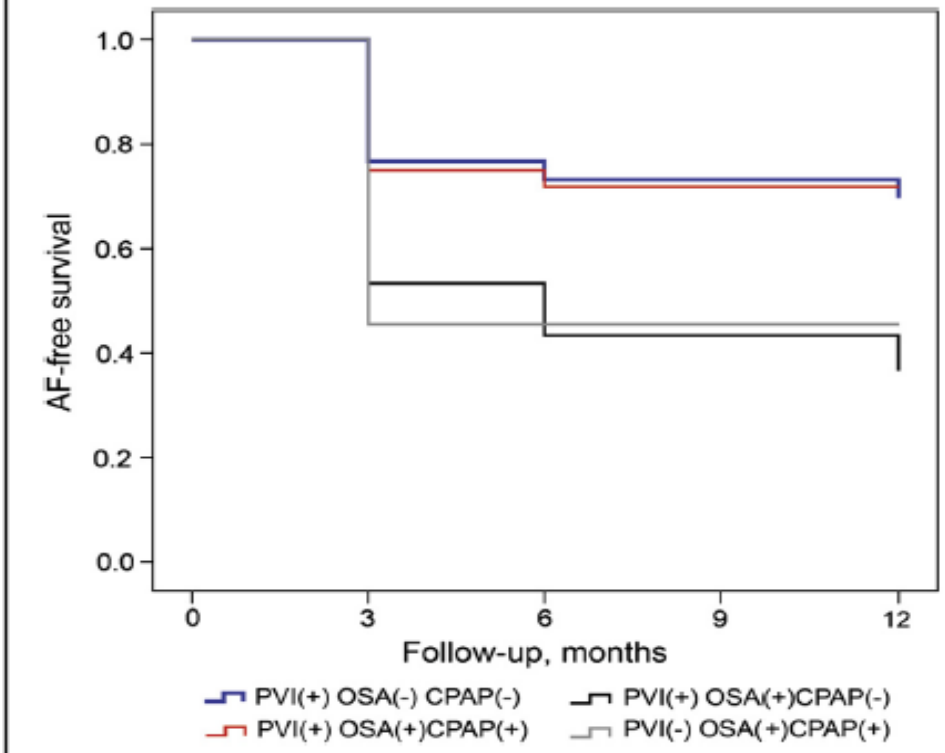

Figure 2 Kaplan-Meier Survival Curves According to Treatment Group

Log-rank p = 0.02. AF = atrial fibrillation; other abbreviations as in Figure 1.

Concomitant obstructive sleep apnea increases the recurrence of atrial fibrillation following radiofrequency catheter ablation of atrial fibrillation: Clinical impact of continuous positive airway pressure therapy

Yoshihisa Naruse, MD,* Hiroshi Tada, MD, FHRS,* Makoto Satoh, MD,† Mariko Yanagihara, MD,† Hidekazu Tsuneoka, MD,* Yumi Hirata, PhD,† Yoko Ito, MD,* Kenji Kuroki, MD,* Takeshi Machino, MD,* Hiro Yamasaki, MD,* Miyako Igarashi, MD,* Yukio Sekiguchi, MD,* Akira Sato, MD,* Kazutaka Aonuma, MD*

*From the *Cardiovascular Division Faculty of Medicine and †Sleep Medicine Division, Faculty of Medicine, University of Tsukuba, Tsukuba, Ibaraki, Japan.*

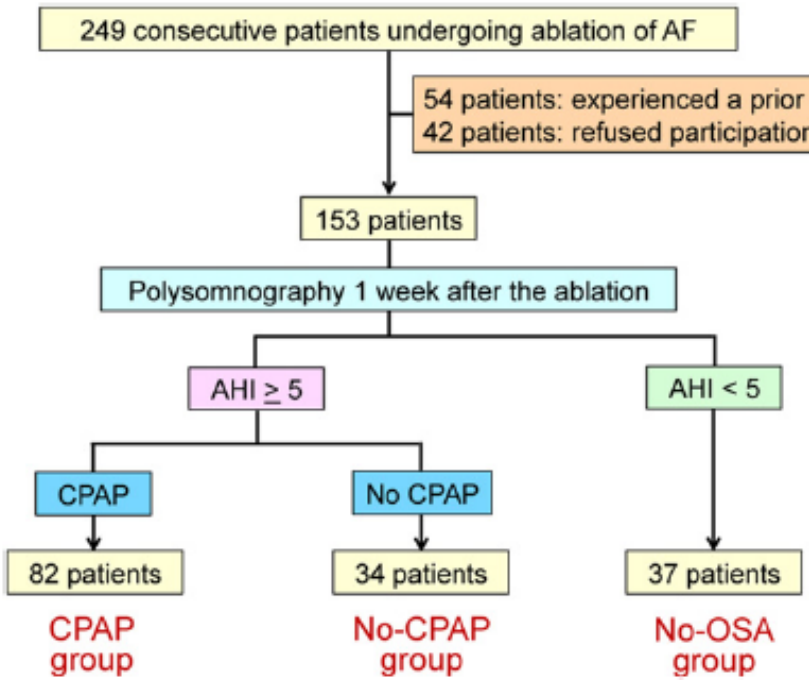

Figure 1 Patient flowchart. AF = atrial fibrillation; AHI = apnea-hypopnea index; CPAP = continuous positive airway pressure; OSA = obstructive sleep apnea.

Concomitant obstructive sleep apnea increases the recurrence of atrial fibrillation following radiofrequency catheter ablation of atrial fibrillation: Clinical impact of continuous positive airway pressure therapy

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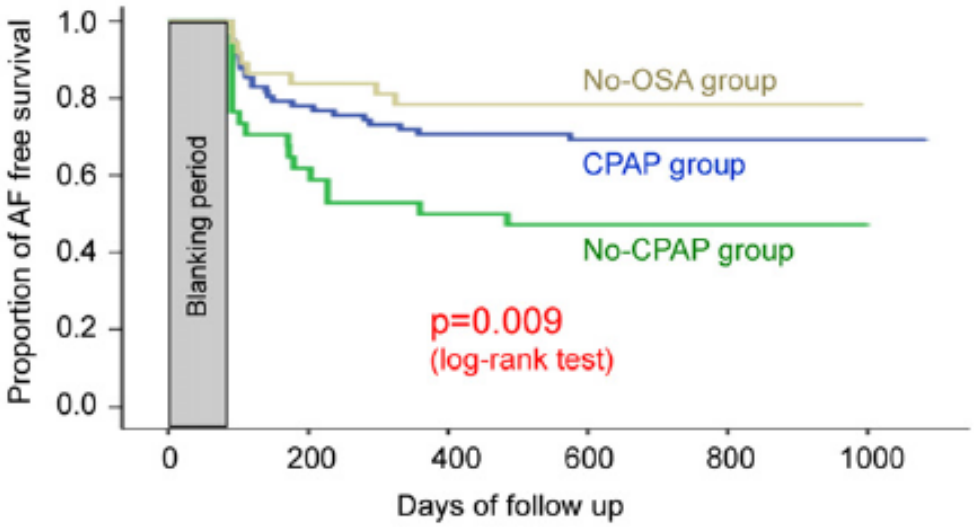

Patients at risk

No-OSA	37	34	31	30	29	29	26	16	10	6	0
No-CPAP	34	26	21	18	17	16	14	11	10	4	1
CPAP	82	75	64	60	58	57	48	41	23	9	1

Clinical implication

The present study demonstrated that patients with untreated OSA have a higher recurrence of AF after RFCA and the CPAP treatment can attenuate the risk of AF recurrence after RFCA. We suggest that our study provides the basis for a randomized trial to determine whether CPAP reduces the risk of recurrent AF after ablation therapy in patients with an AHI >5.

Efficacy of catheter ablation of atrial fibrillation in patients with obstructive sleep apnoea with and without continuous positive airway pressure treatment: a meta-analysis of observational studies

Li Li[1]*, Zeng-wu Wang[2], Jie Li[1], Xing Ge[1], Li-zhu Guo[1], Ying Wang[1], Wei-hua Guo[1], Chen-xi Jiang[3], and Chang-sheng Ma[1,3]*

[1]Cardiovascular Center, Beijing Tong Ren Hospital, Capital Medical University, Beijing, China; [2]State Key Laboratory of Cardiovascular Disease, Fu Wai Hospital, National Center for Cardiovascular Disease, CAMC and PUMC, Beijing, China; and [3]Cardiology Department, Atrial Fibrillation Center, Beijing An Zhen Hospital, Capital Medical University, Beijing, China

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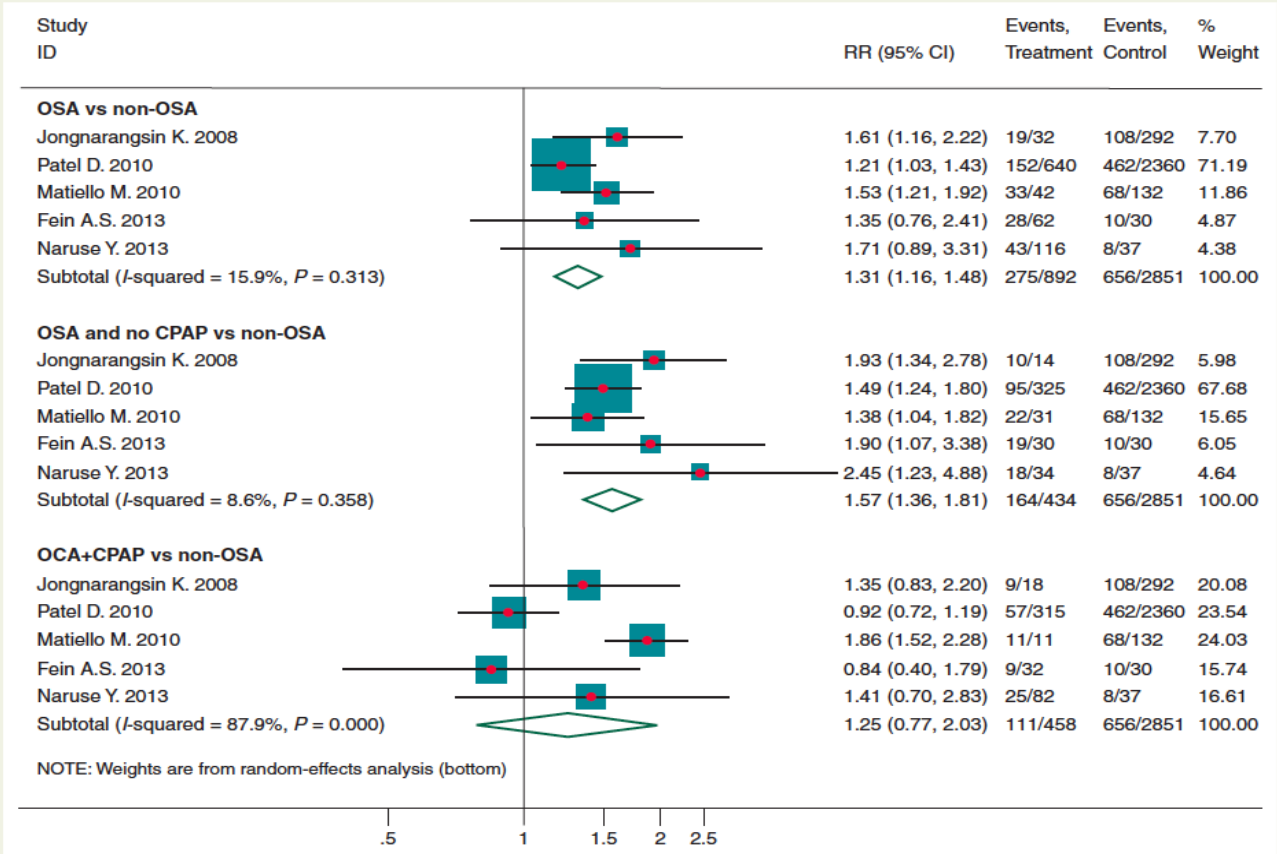


Figure 2 Forest plot in the comparison of AF recurrence after catheter ablation in patients with OSA and non-OSA (top), OSA and no CPAP vs non-OSA (middle), OSA + CPAP and non-OSA (bottom).

ESC European Society of Cardiology
Europace (2018) 20, f337–f342
doi:10.1093/europace/eux248

CLINICAL RESEARCH
Associated conditions and quality of life

Obstructive sleep apnea is associated with increased rotor burden in patients undergoing focal impulse and rotor modification guided atrial fibrillation ablation

Daniel J. Friedman[1,2], Peter Liu[1,2], Adam S. Barnett[1], Kristen Bova Campbell[1], Kevin P. Jackson[1], Tristram D. Bahnson[1], James P. Daubert[1], and Jonathan P. Piccini[1,2]*

[1]Duke Center for Atrial Fibrillation, Duke University Hospital, Durham, NC 27710, USA; and [2]Electrophysiology Section, Duke Clinical Research Institute, 2400 Pratt Street, Durham, NC 27705, USA

Table 2 Intraprocedural findings and outcomes

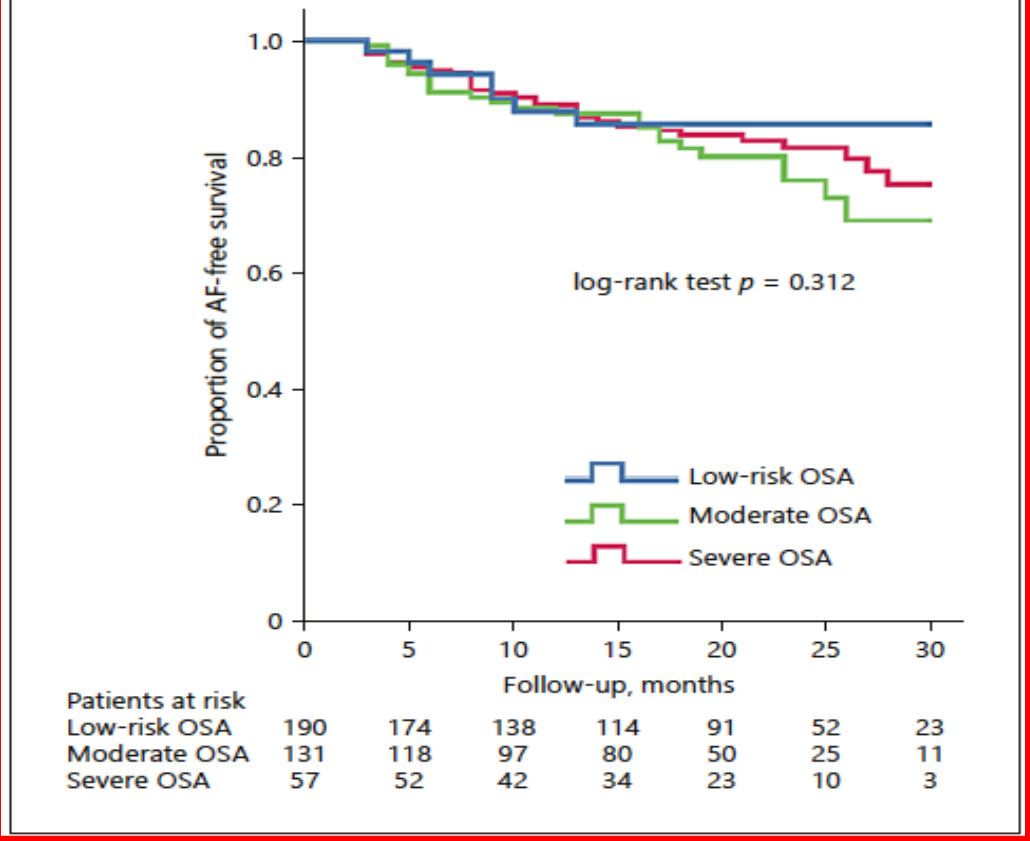
	All ($n = 33$)	OSA ($n = 12$)	No OSA ($n = 21$)	*P*-value
Mean RA pressure (mmHg)	8 (5)	11 (5)	7 (5)	0.03
Mean LA pressure (mmHg)	14 (5)	16 (6)	14 (5)	0.14
LA V wave (mmHg)	19 (7)	22 (6)	18 (7)	0.13
Total # of rotors	2.2 (1.0)	2.6 (0.9)	2.0 (1.0)	0.03
#RA rotors	0.70 (0.73)	1.0 (0.7)	0.5 (0.7)	0.04
#LA rotors	1.48 (0.76)	1.7 (0.8)	1.4 (0.7)	0.15
Acute procedural success composite (%)	39 (12)	36 (4)	47 (8)	0.44
AF to SR with FIRM, *n*	5	2	3	
AF to AT/AFL, *n*	2	0	2	
10% AF CL slowing with FIRM[a], *n*	5	2	3	
Procedure time (min)	350 (101)	298 (92)	380 (96)	0.97
Radiofrequency time (min)	58 (27)	52 (28)	62 (27)	0.69
Fluoroscopy time (min)	33 (15)	29 (13)	36 (15)	0.77
Radiation dose				
mGy	542 (656)	762 (992)	431 (389)	0.17
mGy-cm^2	85 078 (79 607)	99 407 (108 120)	76 890 (59 300)	0.26

AF, atrial fibrillation; AFL, atrial flutter; CL, cycle length; FIRM, focal impulse and rotor modification; LA, left atrium; OSA, obstructive sleep apnea; RA, right atrium; SR, sinus rhythm.
[a]Unable to assess for two patients with missing paired pre- and post-rotor ablation electrograms.

Original Paper

Obstructive Sleep Apnea Is Closely Related to Cardiovascular Risk Factors, but Not to Clinical Recurrence of Atrial Fibrillation after Catheter Ablation: An Analysis of Atrial Fibrillation Patients

Chan Joo Lee[a] Tae-Hoon Kim[b] Sungha Park[b] Hui-Nam Pak[b]



Sleep Breath (2015) 19:849–856
DOI 10.1007/s11325-014-1102-x

ORIGINAL ARTICLE

Presence and severity of obstructive sleep apnea and remote outcomes of atrial fibrillation ablations — a long-term prospective, cross-sectional cohort study

Filip M. Szymanski · Krzysztof J. Filipiak · Anna E. Platek · Anna Hrynkiewicz-Szymanska · Marcin Kotkowski · Edward Kozluk · Marek Kiliszek · Janusz Sierdzinski · Grzegorz Opolski

Table 2 Comparison of patients with and without obstructive sleep apnea (OSA)

Parameter; mean±SD or *n* (%)	OSA+ (*n*=115)	OSA– (*n*=136)	*p* value
AHI (per hour)	15.4±12.2	1.9±1.4	–
Lowest SpO_2 (%)	81.8±6.5	86.5±5.0	**<0.0001**
Time in desaturation (min)	26.8±43.1	12.3±36.2	**<0.0001**
Percent time in desaturation (%)	5.8±10.0	3.2±9.9	**<0.0001**
Oxygen desaturation events (per hour)	15.9±13.0	3.1±3.3	**<0.0001**
Snoring percent time	12.4±19.7	10.6±18.6	0.11
AF recurrence	75 (65.2 %)	62 (45.6 %)	**0.003**
Male sex; *n* (%)	80 (69.6 %)	83 (61.0 %)	0.20
Age (years)	59.7±7.8	55.7±11.3	**0.01**
Height (cm)	172.0±9.9	172.0±10.7	0.97
Weight (kg)	91.1±17.0	84.6±15.3	**0.002**
Body mass index (kg/m^2)	30.8±5.3	28.5±4.1	**0.0002**
Neck circumference (cm)	41.2±3.8	39.3±3.3	**0.0001**
Waist circumference (cm)	108.6±12.6	107.6±88.1	**<0.0001**
SBP (mm Hg)	132.9±16.7	130.3±16.3	0.23
DBP (mm Hg)	82.0±11.5	79.4±10.7	**0.06**
HR (beats per min)	76.5±17.4	73.3±13.6	0.13
Prior MI	9 (7.8 %)	11 (8.1 %)	0.87
Diabetes mellitus	12 (10.4 %)	9 (6.6 %)	0.39
Hypertension	91 (79.1 %)	92 (67.6 %)	**0.06**
Gout	11 (9.6 %)	6 (4.4 %)	0.17
Smoking	10 (8.7 %)	18 (13.2 %)	0.35
Alcohol consumption	13 (11.2 %)	10 (7.4 %)	0.39
Prior stroke	13 (11.3 %)	8 (5.9 %)	0.19
Dyslipidemia	74 (64.3 %)	84 (61.8 %)	0.77
Family history of CVD	41 (35.7 %)	59 (43.4 %)	0.39
Paroxysmal AF	73 (63.5 %)	103 (75.7 %)	0.05

Desaturation=blood O_2 saturation <90 %

SD standard deviation, *OSA* obstructive sleep apnea, *Lowest SpO_2* lowest registered blood oxygen saturation, *SBP* systolic blood pressure, *DBP* diastolic blood pressure, *HR* heart rate, *MI* myocardial infarction, *CVD* cardiovascular disease, *AF* atrial fibrillation

Values in bold indicate statistical significance

Impact of a Nurse-Led Limited Risk Factor Modification Program on Arrhythmia Outcomes in Patients with Atrial Fibrillation Undergoing Catheter Ablation

Yaeger: *Nurse-led risk factor modification program*

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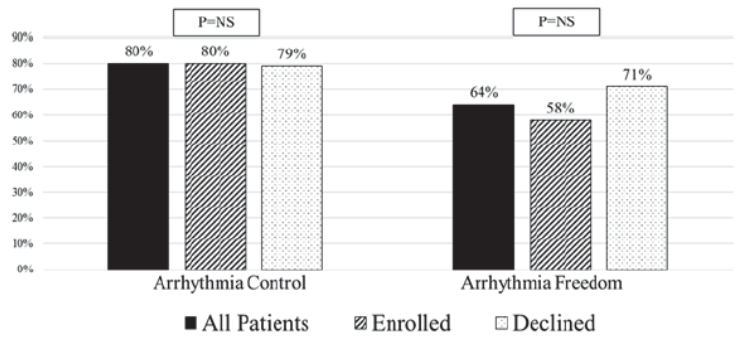

Conclusion

Our pragmatic, nurse-led limited RFM program achieved significant weight loss and improved OSA care among AF patients. Over 1 year, improved QoL and arrhythmia symptoms were also noted among participants. Despite these favorable observations, patients enrolled in PENN AF Care who underwent catheter ablation did not experience better arrhythmia outcomes at 1 year than those who declined participation.

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EDITORIAL COMMENT

Continuous Positive Airway Pressure After Circumferential Pulmonary Vein Isolation

The Recipe for Improving the Success Rate of Ablation in Patients With Obstructive Sleep Apnea and Atrial Fibrillation?*

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1. Since ablation is increasingly offered to AF patients, those with associated OSA should not be discouraged to undergo the procedure, just because a higher rate of AF recurrence is expected after ablation. Instead they must be offered this therapeutic option and encouraged to adhere strictly to CPAP therapy following AF ablation.
2. Taking in account the high prevalence of OSA in patients with refractory AF after repeated ablation procedures (10), one should recommend the systematic monitoring of these patients for OSA. In those patients in whom OSA is diagnosed, CPAP therapy rather than repeat ablation may be a better initial choice.
3. Factors aggravating OSA and frequently present in AF patients are well known: obesity, alcohol consumption, diabetes, and smoking. The fact that CPAP has been shown to decrease AF recurrence after ablation in patients with OSA suggests that the treatment of any of these factors might also indirectly improve patients outcome after AF ablation.