

**Debate: Sinus Node Dysfunction vs. Atrial Fibrillation**

Debate 1:

65 y.o, Paroxysmal AF with Tachy-Brady Syndrome,

CHADS2 Score 4, EF 48%:

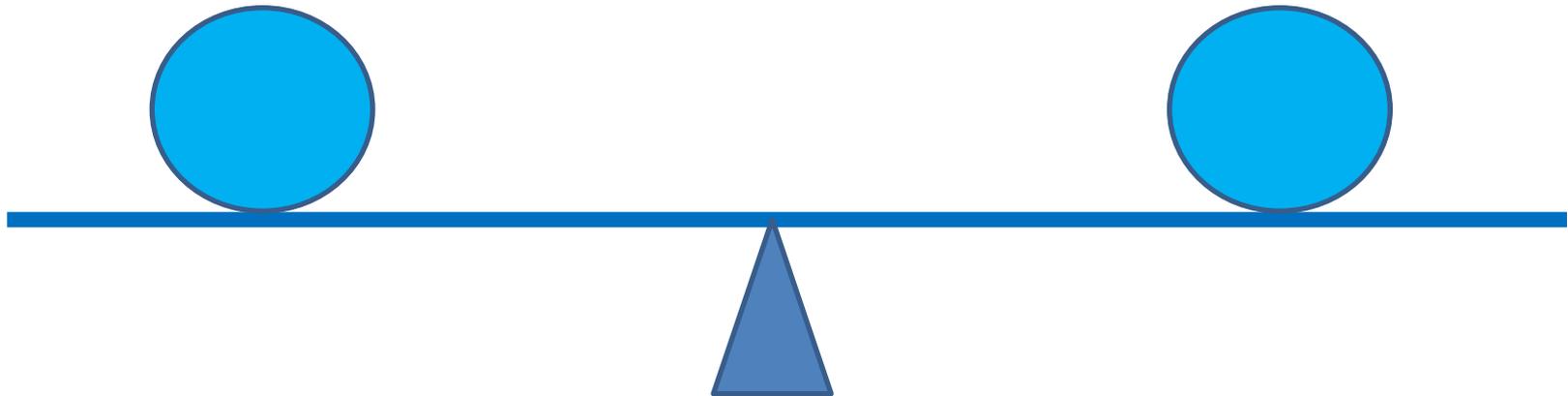
Pacemaker or Catheter Ablation? Pacemaker, First

**RF ablation**

**Pacemaker**

**Avoid PM**  
**Prevent AF-related CHF**  
**Prevent stroke**

**Procedure-related Cx**  
**Recurrent pause/syncope**  
**Traumatic injury**



**도자 절제술 후 인공심장박동기를**

**삽입하지 않아도 안전한가 ?**

# Longterm outcome of catheter ablation for pAF

## Lessons From a 5-Year Follow-Up

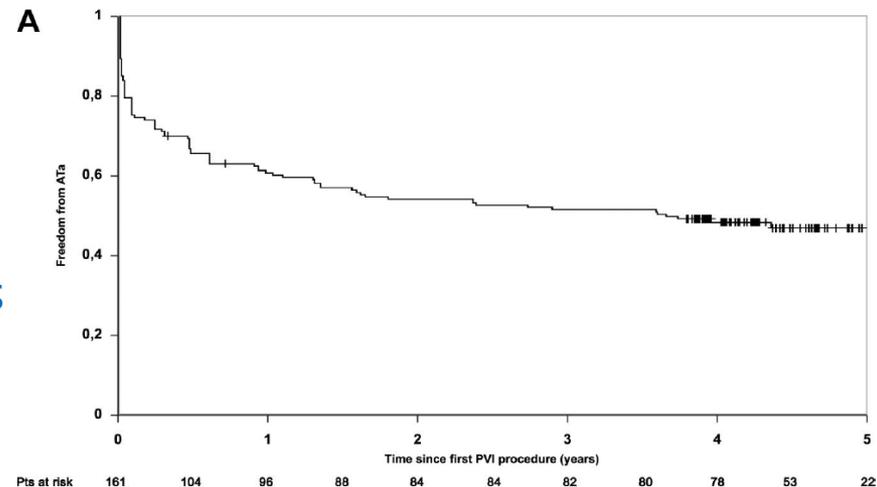
Feifan Ouyang, MD\*; Roland Tilz, MD\*; Julian Chun, MD; Boris Schmidt, MD;  
Erik Wissner, MD; Thomas Zerm, MD; Kars Neven, MD; Bulent Köktürk, MD;  
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Alexander Fuernkranz, MD; Karl-Heinz Kuck, MD

**Background**—Paroxysmal atrial fibrillation (AF) naturally progresses toward chronic AF at an estimated rate of 15% to 30% over a 1- to 3-year period. Pulmonary vein (PV) isolation is increasingly performed for the treatment of drug-refractory paroxysmal AF. The long-term data on clinical outcome after circumferential PV isolation are limited.

**Methods and Results**—From 2003 to late 2004, 161 patients (121 men; age,  $59.8 \pm 9.7$  years) with symptomatic paroxysmal AF and normal left ventricular function underwent circumferential PV isolation guided by 3-dimensional mapping and double Lasso technique. Right-sided and left-sided continuous circular lesions encircling the ipsilateral PVs were placed with irrigated radiofrequency energy. The procedure end point was the absence of all PV spikes for at least 30 minutes after PV isolation verified by 2 Lasso catheters placed within the ipsilateral PVs. Sinus rhythm was present in 75 patients (46.6%) after the initial procedure during a median follow-up period of 4.8 years (0.33 to 5.5 years). A second procedure was performed in 66 and a third procedure in 12 patients. Recovered PV isolation conduction was observed in 62 of 66 patients (94.0%) during the second and in 8 of 12 patients (66.7%) during the third procedure. After a median of 1 (1 to 3) procedure, stable sinus rhythm was achieved in 128 of 161 patients (79.5%), whereas clinical improvement occurred in an additional 21 of 161 patients (13.0%) during a median follow-up of 4.6 years (0.33 to 5.5 years). Four patients in stable sinus rhythm died during follow-up. Progression toward chronic AF was observed in 4 patients (2.4%); however, only 2 patients reported symptoms.

**Conclusion**—In patients with paroxysmal AF and normal left ventricular function, circumferential PV isolation results in stable sinus rhythm in the majority of patients, and low incidence of chronic AF was observed to 5 years of follow-up. (*Circulation*. 2010;122:2368-2377.)

46.6% after single procedure  
79.5% after multiple procedures  
5 year follow-up



# Pulmonary Vein Antral Isolation for Paroxysmal Atrial Fibrillation: Results from Long-Term Follow-Up

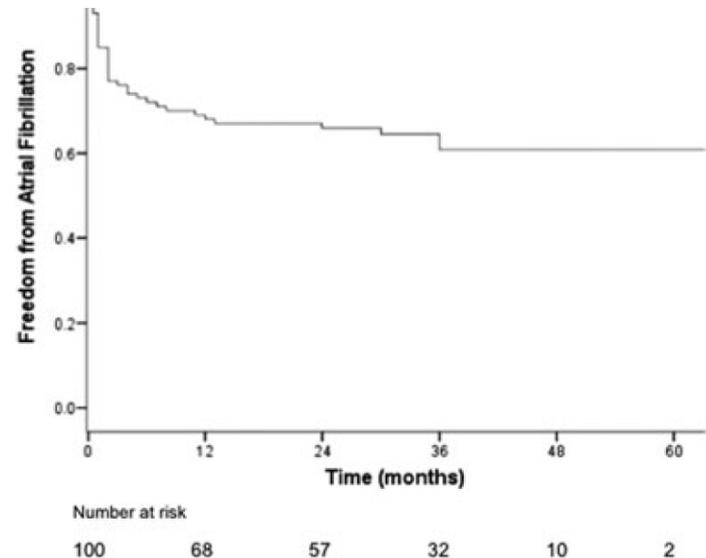
C. MEDI, B.MED.,\*,† P.B. SPARKS, M.B.B.S., PH.D.,\*,† J.B. MORTON, M.B.B.S., PH.D.,\*,† P.M. KISTLER, M.B.B.S., PH.D.,\*,† K. HALLORAN, R.N.,\*,† R. ROSSO, M.B.B.S., PH.D.,\*,† J.K. VOHRA, M.B.B.S., PH.D.,\*,† S. KUMAR, M.B.B.S.,\*,† and J.M. KALMAN, M.B.B.S., PH.D.,\*,†

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**Results:** Isolation of all 4 veins was successful in 97% patients with  $3.9 \pm 0.3$  veins isolated/patient. Follow-up after the last RF procedure was at a mean of  $39 \pm 10$  months (range 21–66 months). After a single procedure, sinus rhythm was maintained at long-term follow-up in 49% patients without use of antiarrhythmic drugs (AADs). After repeat procedure, sinus rhythm was maintained in 57% patients without the use of AADs, and in 82% patients including patients with AADs. A total of 18 of 100 patients had 2 procedures and 4 of 100 patients had 3 procedures for recurrent AF/AT. Most (86%) AF/AT recurrences occurred  $\leq 1$  year after the first procedure. Mean time to recurrence was  $6 \pm 10$  months. Kaplan–Meier analysis on antiarrhythmics showed AF free rate of 87% at 1 year and 80% at 4 years. There were no major complications.

**Conclusion:** PVAI is an effective strategy for the prevention of AF in the majority of patients with PAF. Maintenance of SR requires repeat procedure or continuation of AADs in a significant proportion of patients. After maintenance of sinus rhythm 1-year post-PVAI, a minority of patients will subsequently develop late recurrence of AF. (*J Cardiovasc Electrophysiol*, Vol. 22, pp. 137-141, February 2011)

49% after single procedure  
57% after repeat procedure  
39+/-10 months follow-up

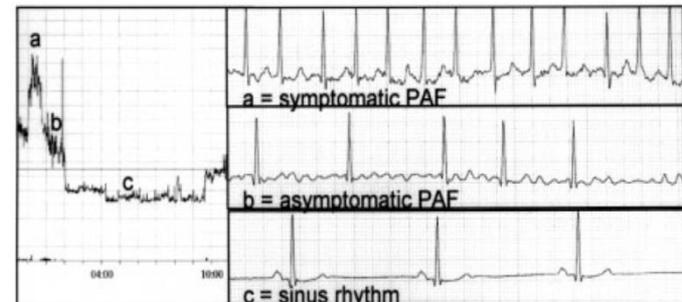
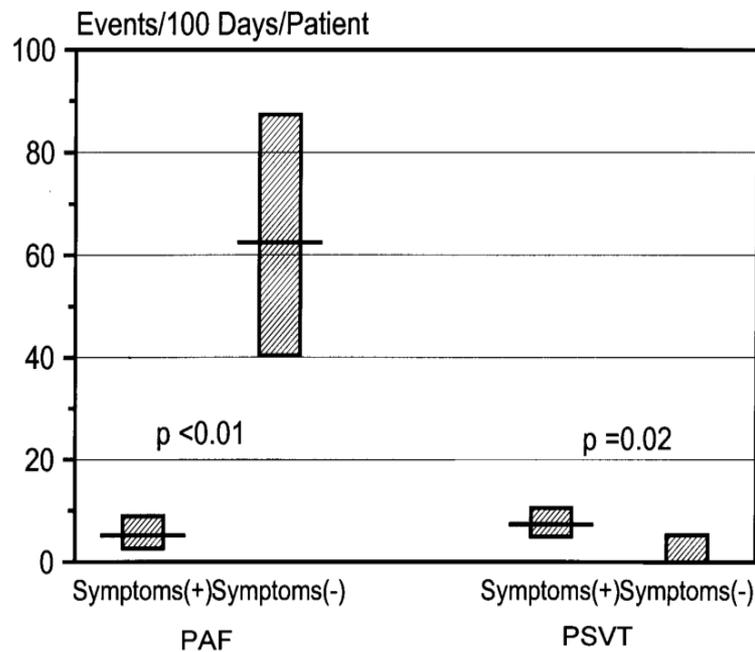
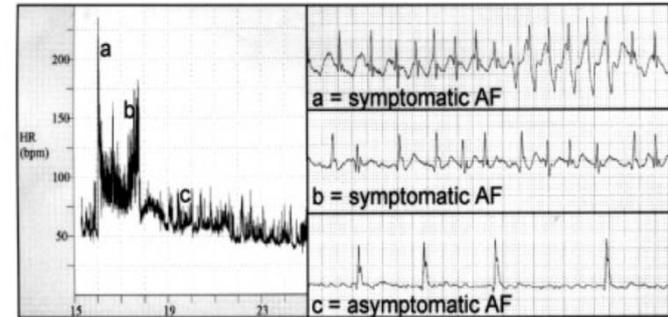
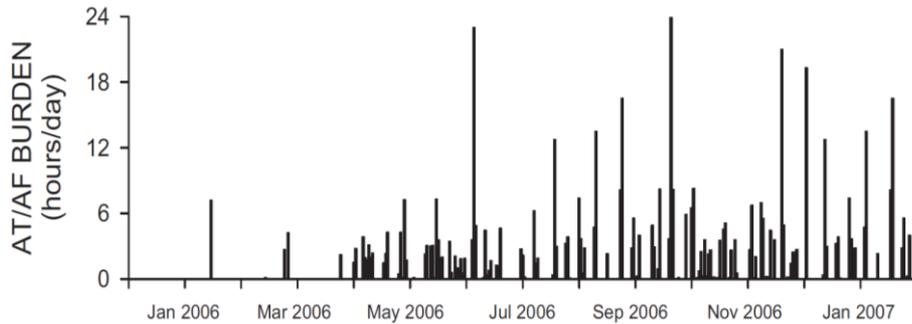


1. 첫회 시술로 50% 이상 재발, 재시술 여러 번 시행하여도 60-70%에서만 성공.  
(blanking period)
2. 재발 확인위한 follow-up방법이 대부분 심전도나 24시간 홀터 검사.

#### **Post-ablation Follow-Up**

12-lead surface ECG, and a 24-hour Holter monitor after 1, 3, 6, and 12 months.

# Silent (asymptomatic) AF



# Silent (asymptomatic) AF

## The incidence and prognostic significance of new-onset atrial fibrillation in patients with acute myocardial infarction and left ventricular systolic dysfunction: A CARISMA substudy

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**BACKGROUND:** The incidence and risk associated with new-onset atrial fibrillation (AF) occurring after discharge in patients with acute myocardial infarction (MI) remains unknown.

**OBJECTIVE:** This study sought to describe the incidence and clinical risk associated with postdischarge new-onset AF in post-MI patients with left ventricular systolic dysfunction.

**METHODS:** The population included 271 post-MI patients with left ventricular ejection fraction  $\leq 40\%$  and no history of previous AF from the Cardiac Arrhythmias and Risk Stratification after Acute Myocardial Infarction (CARISMA) study. All patients were implanted with an implantable cardiac monitor and followed up every 3 months for 2 years. Major cardiovascular events were defined as reinfarction, stroke, hospitalization for heart failure, or death.

**RESULTS:** The risk of new-onset AF is highest during the first 2 months after the acute MI (16% event rate) and decreases until month 12 post-MI, after which the risk for new-onset AF is stable. The risk of major cardiovascular events was increased in patients with AF events  $\geq 30$  seconds (hazard ratio [95% CI] = 2.73 [1.35 to 5.50],  $P = .005$ ), but not in patients with AF events lasting

$< 30$  seconds (hazard ratio [95% CI] = 1.17 [0.35 to 3.92],  $P = .80$ ). More than 90% of all recorded AF events were asymptomatic.

**CONCLUSION:** Using an implantable cardiac monitor, the incidence of new-onset AF was found to be 4-fold higher than earlier reported. In the study population, in which treatment with beta-blockers was optimized, the vast majority of AF events were asymptomatic, emphasizing the importance of using continuous monitoring for studies concerning AF in heart failure patients. A duration of 30 seconds or more identified clinically important AF episodes documented by an implantable cardiac monitor.

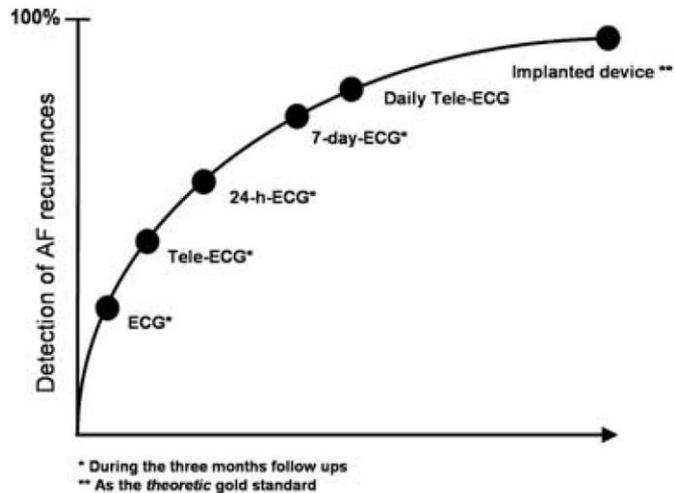
**KEYWORDS** Atrial fibrillation; Acute myocardial infarction; Cardiovascular risk; Heart failure; Implantable cardiac monitor

**ABBREVIATIONS:** AF = atrial fibrillation; AMI = acute myocardial infarction; ECG = electrocardiogram; HR = hazard ratio; ICD = implantable cardioverter-defibrillator; ICM = implantable cardiac monitor; LVEF = left ventricular ejection fraction

(Heart Rhythm 2011;8:342-348) © 2011 Published by Elsevier Inc. on behalf of Heart Rhythm Society.

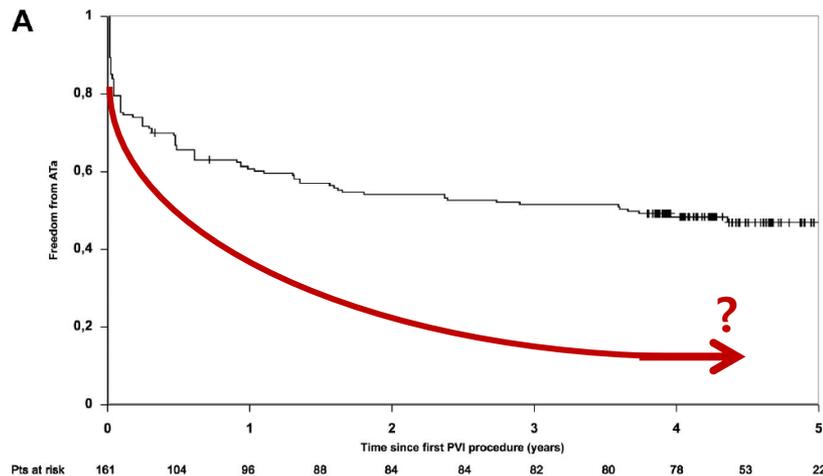
1. 다빈도  
2. 무증상

# Influence of the duration of Holter monitoring on the detection of arrhythmia recurrences after RFCA of AF



PACE 30:458, 2007

## Detection of AF after catheter ablation



1. 다빈도
2. 무증상



Original Full Length Article

## Prediction of survival, second fracture, and functional recovery following the first hip fracture surgery in elderly patients

### ARTICLE INFO

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Functional recovery

### ABSTRACT

This study was designed to investigate predictable factors of mortality, second fracture, and functional recovery within 24 months of hip fracture surgery in elderly patients. In addition, the authors sought to identify differences in survival and functional outcomes according to fracture type. Four hundred and fifteen patients with acute, first-time and lower-energy trauma hip fractures were enrolled into this prospective cohort study and followed for a minimum of 24 months. The potential risk factors of mortality and functional outcomes considered were; (1) age, gender, body mass index, previous fracture history, preoperative ambulatory ability and residency type; (2) 8 comorbidity items, cognitive impairment, smoking, and American Society of Anesthesiologists' classification; and (3) delay prior to surgery, fracture type, operation time, operation method, and postoperative fall history. Multivariate logistic regression and Cox regression models were used for analysis. One-year and 2-year mortality rates after hip fracture surgery were 14.7% and 24.3%, respectively. The 2-year second fracture rate was 9.2% and the 2-year functional recovery rate was 38.6%. Advanced age, cancer, a prior fracture history, and a solitary life were found to be significantly associated with the risk of increased 2-year mortality. A fall within 1 year of surgery and a solitary life were found to be closely associated with the risk of a second fracture, and malignancy and cognitive impairment with a poor functional outcome. Operation time and the 2-year second fracture rate differed significantly between the two fracture groups. An understanding of the incidences and risk factors of mortality and postoperative outcomes following hip fracture surgery in elderly patients provides a valuable basis to improve in health care of geriatric population.

# **Incidence of intracranial hemorrhage in patients with atrial fibrillation who are prone to fall.**

**Despite their low use of warfarin (33.5%), patients at high risk for falls suffered 2.8 intracranial hemorrhages per 100 patient-years, more than twice the 1.1 intracranial hemorrhage rate of other participants and more than 5 times the 0.5 rate of trial-like participants. The increased risk of intracranial hemorrhage in patients at high risk for falls was due to their increased incidence of traumatic intracranial hemorrhage, which was increased four-fold compared to other patients, even after adjusting for the covariates. The 30-day mortality after an intracranial hemorrhage was significantly greater in patients who had been prescribed warfarin after the baseline hospitalization (51.8%) than in patients who had not been prescribed warfarin (33.6%). These observations highlight the substantial risk and mortality of intracranial hemorrhage in populations who are older and frailer than carefully selected trial participants.**

**도자 절제술 후 좌심기능의 회복을  
기대할 수 있는가?**

# Catheter ablation of paroxysmal atrial fibrillation improves cardiac function: a prospective study on the impact of atrial fibrillation ablation on left ventricular function assessed by magnetic resonance imaging

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## KEYWORDS

Atrial fibrillation;  
Catheter ablation;  
Pulmonary vein isolation;  
Congestive heart failure;  
Cardiac magnetic resonance  
imaging

**Aims** Beneficial effects of atrial fibrillation (AF) ablation have been demonstrated in patients with congestive heart failure (CHF) and significantly impaired left ventricular ejection fraction (LVEF). However, the impact of pulmonary vein isolation (PVI) on cardiac function in patients with paroxysmal AF and impaired LVEF remains under discussion. This study aimed to evaluate the impact of PVI for paroxysmal AF on cardiac function in patients with impaired LVEF using cardiac magnetic resonance imaging (CMRI).

**Methods and results** A total number of 70 patients with paroxysmal AF and episodes  $\leq 24$  h were scanned on a 1.5-T-CMRI before and 6 months after PVI during sinus rhythm. End-diastolic volume, end-systolic volume, and LVEF were determined by epicardial and endocardial measurements. Patients were categorized into two groups regarding cardiac function as assessed by CMRI: group 1 patients ( $n = 18$ ) with an LVEF  $< 50\%$  and patients with an LVEF  $> 50\%$  (group 2,  $n = 52$ ). Group 1 patients demonstrated a significant lower success rate than patients of group 2 after a follow-up of  $152 \pm 40$  days (50 vs. 73%,  $P < 0.05$ ). Cardiac magnetic resonance imaging in group 1 patients demonstrated a significant improvement in cardiac function after AF ablation ( $41 \pm 6$  vs.  $51 \pm 12\%$ ,  $P = 0.004$ ), whereas group 2 patients did not show significant differences ( $60 \pm 6$  vs.  $59 \pm 9\%$ ,  $P = 0.22$ ) after a 6 months follow-up. **Conclusion** Pulmonary vein isolation improves cardiac function in patients with paroxysmal AF and impaired LVEF. These data suggest that an impaired LV function can be partially attributed to AF with short-lasting paroxysms.

Table 2 Heart rate, AF burden, and recurrence rate before and after ablation of patients with impaired and those with normal left ventricular ejection fraction

	Group 1 (LVEF < 50%) (n = 18)		Group 2 (LVEF ≥ 50%) (n = 52)	
	Before	6 months FU	Before	6 months FU
Heart rate (bpm)	75 ± 12	77 ± 14	76 ± 11	77 ± 12
AF Burden (%)	13.2 ± 4.5	5.8 ± 3.4	12.5 ± 4.5	4.9 ± 3.7
Recurrence rate (%)	50%*		73%*	

\* $P < 0.05$ .

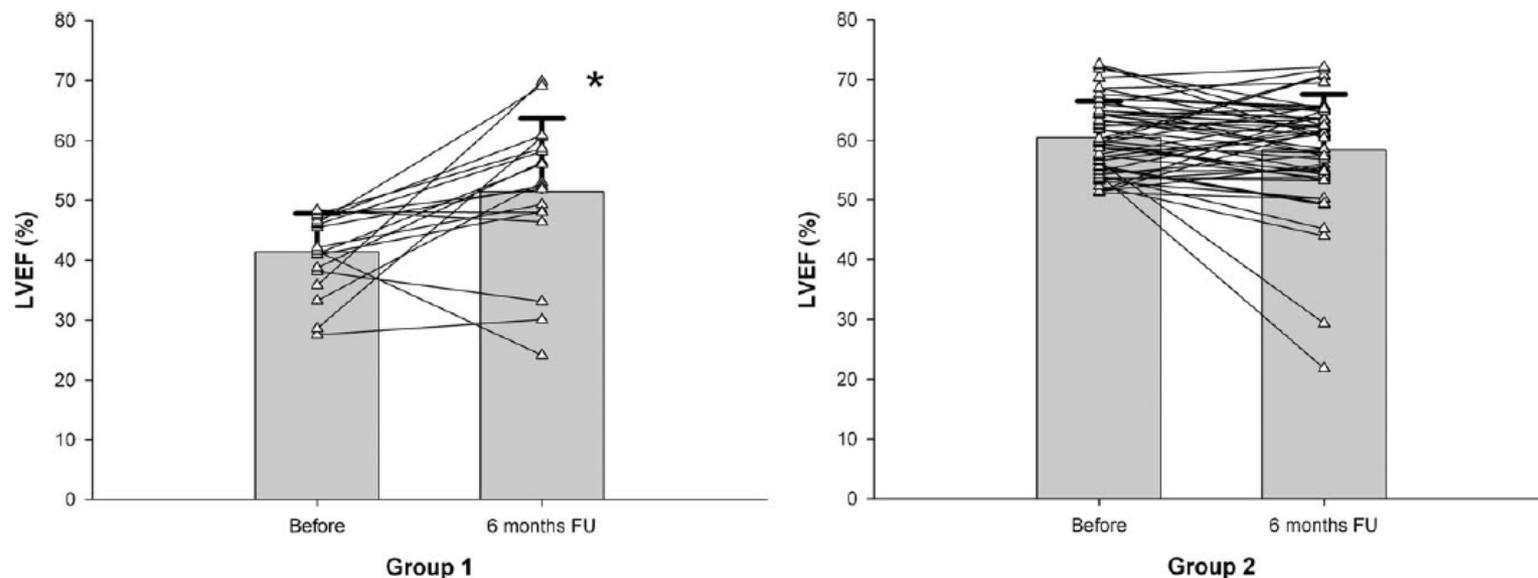


Figure 3 Left ventricular function (LVEF) before and 6 months after PVI (\* $P = 0.004$ ). Of note, all group 2 patients with an LVEF reduction after the ablation ( $n = 6$ ) and one patient of group 1 who experienced significant decrease of LV function following PVI demonstrated AF recurrences.

**도자절제술로 뇌졸중 위험을 줄일 수 있거나  
항응고 치료를 중단할 수 있는가?**

# Could we stop anticoagulation after RFCA?

**Table 7** CHADS<sub>2</sub> score and stroke rate

CHADS <sub>2</sub> score	Patients (n=1733)	Adjusted stroke rate (%/year) <sup>a</sup> (95% confidence interval)
0	120	1.9 (1.2–3.0)
1	463	2.8 (2.0–3.8)
2	523	4.0 (3.1–5.1)
3	337	5.9 (4.6–7.3)
4	220	8.5 (6.3–11.1)
5	65	12.5 (8.2–17.5)
6	5	18.2 (10.5–27.4)

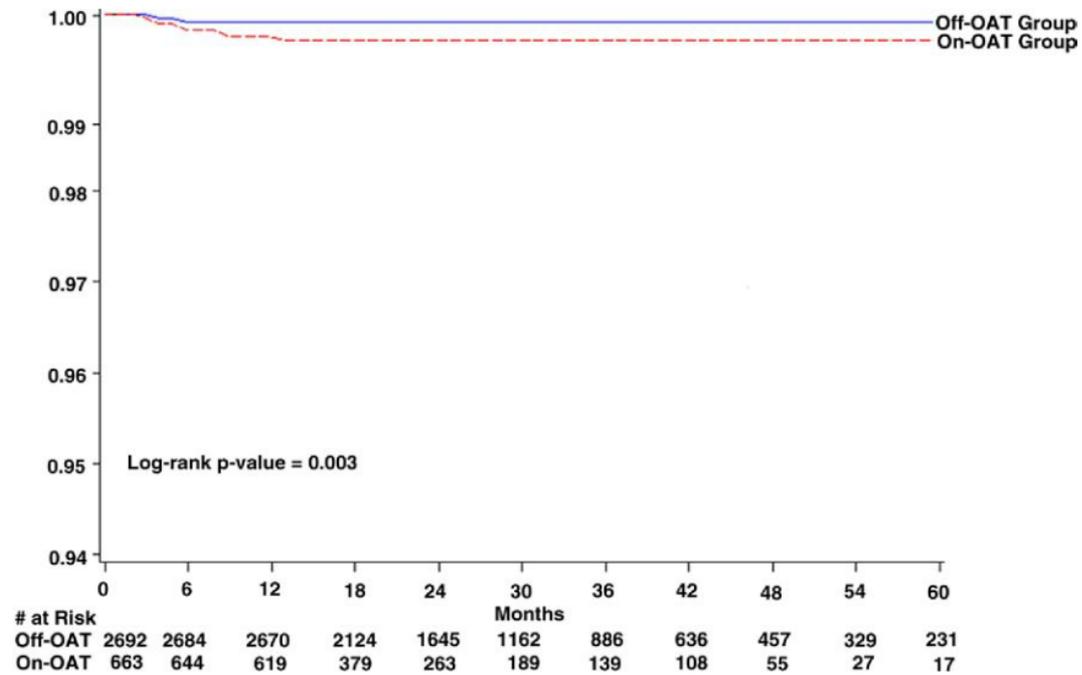
CHA <sub>2</sub> DS <sub>2</sub> -VASc score	Patients (n=7329)	Adjusted stroke rate (%/year) <sup>b</sup>
0	1	0%
1	422	1.3%
2	1230	2.2%
3	1730	3.2%
4	1718	4.0%
5	1159	6.7%
6	679	9.8%
7	294	9.6%
8	82	6.7%
9	14	15.2%

# The Risk of Thromboembolism and Need for Oral Anticoagulation After Successful Atrial Fibrillation Ablation

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<b>Objectives</b>	The aim of this multicenter study was to evaluate the safety of discontinuing oral anticoagulation therapy (OAT) after apparently successful pulmonary vein isolation.
<b>Background</b>	Atrial fibrillation (AF) is associated with an increased risk of thromboembolic events (TE) and often requires OAT. Pulmonary vein isolation is considered an effective treatment for AF.
<b>Methods</b>	We studied 3,355 patients, of whom 2,692 (79% male, mean age $57 \pm 11$ years) discontinued OAT 3 to 6 months after ablation (Off-OAT group) and 663 (70% male, mean age $59 \pm 11$ years) remained on OAT after this period (On-OAT group). CHADS <sub>2</sub> (congestive heart failure, hypertension, age [75 years and older], diabetes mellitus, and a history of stroke or transient ischemic attack) risk scores of 1 and $\geq 2$ were recorded in 723 (27%) and 347 (13%) Off-OAT group patients and in 261 (39%) and 247 (37%) On-OAT group patients, respectively.
<b>Results</b>	During follow-up (mean $28 \pm 13$ months vs. $24 \pm 15$ months), 2 (0.07%) Off-OAT group patients and 3 (0.45%) On-OAT group patients had an ischemic stroke ( $p = 0.06$ ). No other thromboembolic events occurred. No Off-OAT group patient with a CHADS <sub>2</sub> risk score of $\geq 2$ had an ischemic stroke. A major hemorrhage was observed in 1 (0.04%) Off-OAT group patient and 13 (2%) On-OAT group patients ( $p < 0.0001$ ).
<b>Conclusions</b>	In this nonrandomized study, the risk-benefit ratio favored the suspension of OAT after successful AF ablation even in patients at moderate-high risk of TE. This conclusion needs to be confirmed by future large randomized trials. (J Am Coll Cardiol 2010;55:735-43) © 2010 by the American College of Cardiology Foundation



**Figure 1**

**Kaplan-Meier Event-Free Survival Estimates for Freedom From Post-Ablation Thromboembolic and Hemorrhagic Strokes in the Off- and On-OAT Groups**

Data have been truncated at 5 years. OAT = oral anticoagulation therapy.

**Table 4**

**Incidence of Thromboembolic Events and Major Hemorrhage According to CHADS<sub>2</sub> Score in Off- and On-OAT Groups**

	CHADS <sub>2</sub> = 0		CHADS <sub>2</sub> = 1		CHADS <sub>2</sub> ≥2	
	Off-OAT	On-OAT	Off-OAT	On-OAT	Off-OAT	On-OAT
Patients, n	1,622	155	723	261	347	247
TE, n (%)	1 (0.06)	0	1 (0.14)	1 (0.38)	0	2 (0.81)
Major hemorrhage, n (%)	0	1 (0.64)	1 (0.14)	2 (0.8)	0	10 (4)

OAT = oral anticoagulation; TE = thromboembolic events.

# Radiofrequency Catheter Ablation of Atrial Fibrillation: A Cause of Silent Thromboembolism?

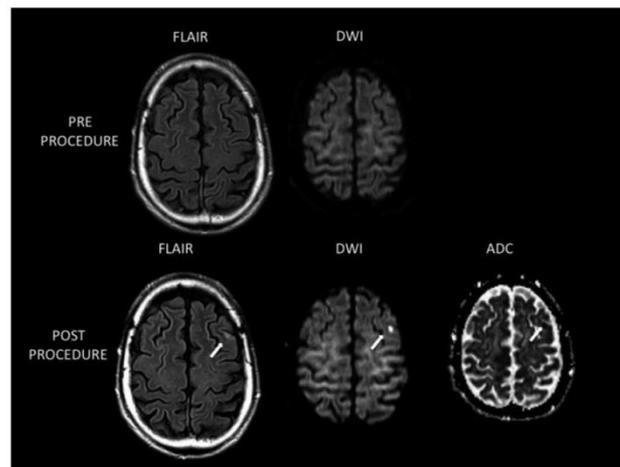
## Magnetic Resonance Imaging Assessment of Cerebral Thromboembolism in Patients Undergoing Ablation of Atrial Fibrillation

Fiorenzo Gaita, MD; Domenico Caponi, MD; Martina Pianelli, MD; Marco Scaglione, MD; Elisabetta Toso, MD; Federico Cesarani, MD; Carlo Boffano, MD; Giovanni Gandini, MD; Maria Consuelo Valentini, MD; Roberto De Ponti, MD; Franck Halimi, MD; Jean François Leclercq, MD

**Methods and Results**—A total of 232 consecutive patients with paroxysmal or persistent atrial fibrillation who were candidates for radiofrequency left atrial catheter ablation were included in the study. Pulmonary vein isolation or pulmonary vein isolation plus linear lesions plus atrial defragmentation with the use of irrigated-tip ablation catheters was performed. All of the patients underwent preprocedural and postablation cerebral magnetic resonance imaging. A periprocedural symptomatic cerebrovascular accident occurred in 1 patient (0.4%). Postprocedural cerebral magnetic resonance imaging was positive for new embolic lesions in 33 patients (14%). No clinical parameters such as age, hypertension, diabetes mellitus, previous history of stroke, type of atrial fibrillation, and preablation antithrombotic treatment showed significant correlation with ischemic cerebral embolism. Procedural parameters such as activated clotting time value and, in particular, electric or pharmacological cardioversion to sinus rhythm correlated with an increased incidence of cerebral embolism. Cardioversion was also associated with an increased risk of 2.75 (95% confidence interval, 1.29 to 5.89;  $P=0.009$ ).

**Conclusions**—Radiofrequency left atrial catheter ablation carries a low risk of symptomatic cerebral ischemia but is associated with a substantial risk of silent cerebral ischemia detected on magnetic resonance imaging. Independent risk factors for cerebral thromboembolism are the level of activated clotting time and, in particular, the electric or pharmacological cardioversion to sinus rhythm during the procedure. (*Circulation*. 2010;122:1667-1673.)

**Key Words:** ablation ■ arrhythmia ■ fibrillation ■ magnetic resonance imaging ■ stroke



**Table 1. Left Atrial Catheter Ablation-Associated Periprocedural Stroke Risk According to Recent Registries and Cohort Studies Using Almost Exclusively Radiofrequency Ablation**

Reference, Year	Stroke	TIA	Σ Stroke	N	Follow-Up	Anticoagulation‡
46, 2009	0.10%	0%	0.10%	3052	1 d	ACT 350–450 s + INR ≥1.8
38, 2010	†	†	0.60%	6454	2 d	ACT ≥350 s ± INR ≥2
19, 2010	0.82%	0.03%	0.85%	3060	2 d	ACT 250–450 s*
17, 2008	†	†	1.09%	641	1 d	ACT 300–400 s*
18, 2007	0.40%	0.10%	0.50%	1011	1–2 d	ACT 300–400 s*
20, 2009	†	†	1.39%	721	6 d	ACT 300–400 s*
16, 2009	0.30%	0.10%	0.40%	1000	8 d	ACT target of 300 s*
13, 2010	0.23%	0.71%	0.94%	20 825	†	ACT 200–350 s (79.4%)†

ACT indicates activated clotting time; INR, international normalized ratio; TIA, transient ischemic attack.

\*Oral anticoagulants were withdrawn before ablation.

†Not reported in detail.

‡During left atrial catheter ablation.

**Table 2. Silent Stroke Rate Detected by 1.5-T Magnetic Resonance Imaging Within Days After Left Atrial Catheter Ablation According to Cohort Studies**

Reference, Year	Silent Stroke	N	Follow-Up (d)	Age (y)	Male	AF Type	Heart Disease	LACA	ACT† (s)
22, 2010	11.3%	53	1	53±12 mean±SD	85%	89% paroxysmal; 11% persistent	6%	RF	>250
23, 2010	14.2%	232	1	58±10 mean±SD	78%	59% paroxysmal; 41% persistent	13%	RF	250–300
24, 2011	7.9%	89	1	46–63 range	63%	81% paroxysmal; 19% persistent	16%	49% RF, 51% cryoenergy	>300
25, 2011	9.5%	21	2–4	54±9 mean±SD	57%	“Recurrent”*	4.3%	RF,* cryoenergy*	≥300
26, 2011	14.9%	74	*	61±9 mean±SD	68%	62% paroxysmal	*	36% RF, 31% cryoenergy, 32% PVAC	>300
27, 2011	17.8%	108	1	56±9 mean±SD	67%	Paroxysmal	...	33% RF, 33% PVAC, 33% cryoenergy	>300

ACT indicates activated clotting time; LACA, left atrium catheter ablation; PVAC, pulmonary vein ablation catheter; RF, radiofrequency; SD, standard deviation.

\*Not reported in detail.

†During LACA.

# 결론

1. 도자절제술 후의 높은 재발률을 고려할 때, 시술 후 동정지/실신의 발생을 장기적으로 안전하게 예방할 수 있다고 보기 어렵다.
2. 좌심기능의 호전을 기대할 수 있으나, 약물치료로 만으로도 소기의 목적을 달성할 가능성이 있으며, 또한 좌심기능 부전의 정도가 경미하여 회복 정도가 클 것으로 기대되지 않는다.
3. 혈전/색전증의 위험인자가 많아서 (CHADS 4) 항응고 치료를 중단하는 것은 위험하며, 또한 시술자체로 인한 뇌졸중/무증상 뇌경색 등의 위험을 무시할 수 없다.