

Does AF Ablation Lower Stroke Risk ?



Hugh Calkins MD
Professor of Medicine
Director of Electrophysiology
Johns Hopkins Medical Institutions

Relationships

- Consultant: Medtronic, St Jude, Atricure, Boherringer Ingleheim
- Research support: St Jude Medical, Boston Scientific

We Do Not Know

Mechanisms By Which AF Ablation May Reduce Stroke Risk

- **AF ablation lowers AF burden and may eliminate AF.**
- **Reduction or elimination of AF may reduce stroke risk.**

Mechanisms By Which AF Ablation May Increase Stroke Risk

- **Strokes, TIA, and ACE are known acute risks of AF ablation.**
- **Ablation causes fibrosis which may increase stroke risk.**
- **Ablation may impair LA function which may increase stroke risk.**
- **Ablation increases asymptomatic AF which may result in patient noncompliance with anticoagulation.**

The Topic I Would Like to Address Today

- If stroke risk in patients with AF is linked to the presence or absence of AF, then elimination of AF with catheter ablation reduce stroke risk and possibly allow discontinuation of anticoagulation.
- What data exists to tell us this is true or false?
- What do the guidelines tell us?
- What should we do now and what further research is needed?

Is There Data to Suggest That Reduction of AF Burden Or Elimination Of AF Reduces Stroke Risk?

The Relationship Between Daily Atrial Tachyarrhythmia Burden From Implantable Device Diagnostics and Stroke Risk

The TRENDS Study

Taya V. Glotzer, MD; Emile G. Daoud, MD; D. George Wyse, MD, PhD; Daniel E. Singer, MD; Michael D. Ezekowitz, MD, PhD; Christopher Hilker, MS; Clayton Miller, BS; Dongfeng Qi, PhD; Paul D. Ziegler, MS

Table 3. Hazard Ratios for Thromboembolic Events Associated With AT/AF Burden Adjusted for Stroke Risk Factors and Antithrombotic Therapy

Category	Variable	Hazard Ratio (95% CI)*	P Value
AT/AF burden	Low burden vs zero burden	0.98 (0.34, 2.82)	0.97
	High burden vs zero burden	2.20 (0.96, 5.05)	0.06

High and low burden are separated by the median value of 30-day windows having nonzero AT/AF burden; that is, high corresponds to a burden of ≥ 5.5 hours, low corresponds to a burden of 20 seconds to < 5.5 hours.

Outcomes of apixaban vs. warfarin by type and duration of atrial fibrillation: results from the ARISTOTLE trial

Sana M. Al-Khatib^{1*}, Laine Thomas¹, Lars Wallentin², Renato D. Lopes¹, Bernard Gersh³, David Garcia⁴, Justin Ezekowitz⁵, Marco Alings⁶, Hongqui Yang¹, John H. Alexander¹, Gregory Flaker⁷, Michael Hanna⁸, and Christopher B. Granger¹

¹Duke Clinical Research Institute, Duke University Medical Center, PO Box 17969, Durham, NC 27715 USA; ²Uppsala Clinical Research Center, Uppsala University, Uppsala, Sweden; ³Mayo Clinic College of Medicine, Rochester, MN, USA; ⁴University of New Mexico, Albuquerque, NM, USA; ⁵University of Alberta, Edmonton, Canada; ⁶Amphia Ziekenhuis, Breda and WCN, Utrecht, Netherlands; ⁷University of Missouri School of Medicine, Columbia, MO, USA; and ⁸Bristol-Myers Squibb, Princeton, NJ, USA

Received 7 November 2012; revised 14 March 2013; accepted 28 March 2013; online publish-ahead-of-print 17 April 2013

Table 2 Outcomes by type of atrial fibrillation

Outcome	No. of patients	Paroxysmal AF No. of events (%/100 patient-years)	Persistent or permanent AF No. of events (%/100 patient-years)	Unadjusted HR (95% CI)	Unadjusted P-value
Stroke or systemic embolism	18 198	51 (0.98)	426 (1.52)	0.65 (0.48, 0.87)	0.003
All-cause mortality	18 198	149 (2.81)	1123 (3.90)	0.72 (0.61, 0.853)	0.0002
Major bleeding	18 137	104 (2.22)	685 (2.68)	0.83 (0.68, 1.02)	0.078
Composite of stroke or systemic embolism, all-cause mortality, major bleeding	18 198	272 (5.31)	1905 (6.91)	0.77 (0.68, 0.87)	<0.0001

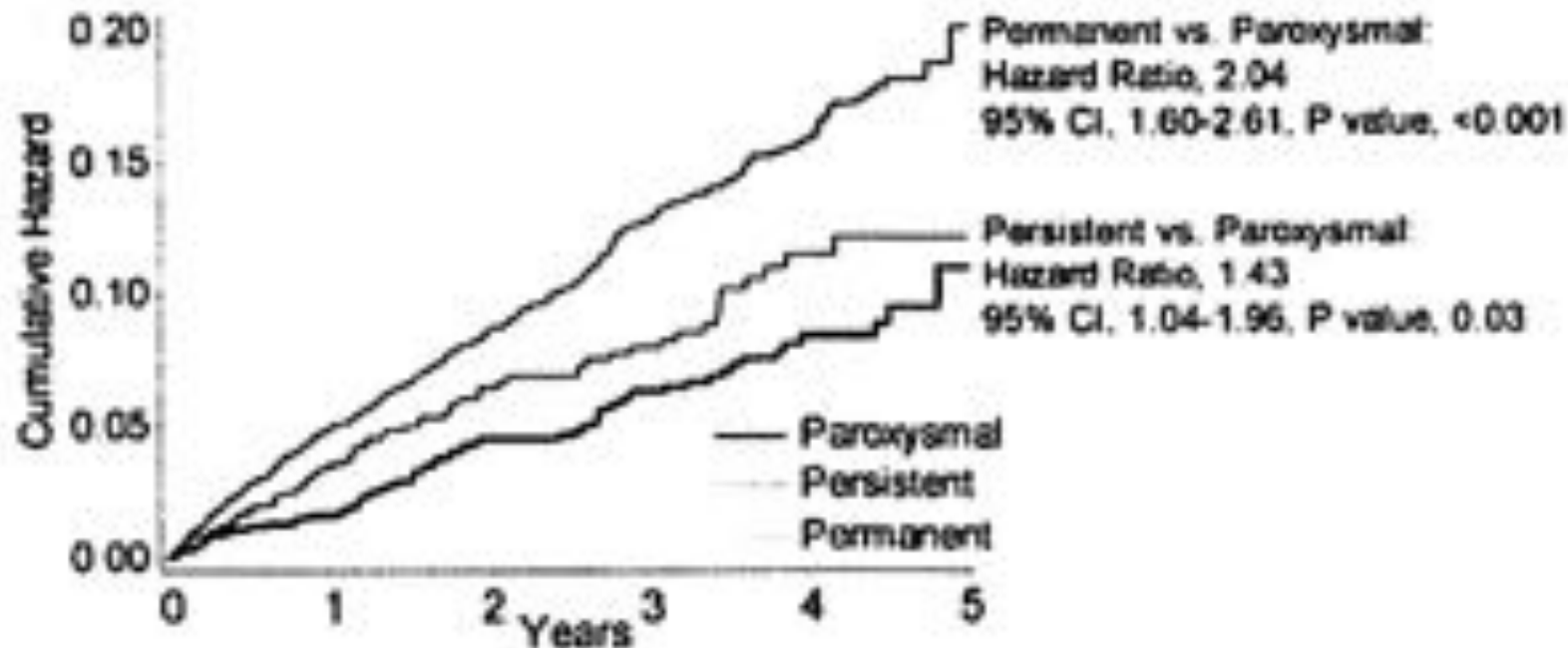
Risk of ischemic stroke or systemic embolism in aspirin-treated patients according to clinical presentation of atrial fibrillation: analysis of 6563 aspirin-treated patients in ACTIVE or AVERROES

Authors:

T. Vanassche¹, M. Alings², A. Avezum³, S.H. Hohnloser⁴, S.J. Connolly¹, ¹McMaster University - Hamilton - Canada, ²Amphia Ziekenhuis, Department of Cardiology and Electrophysiology - Breda - Netherlands, ³Institute Dante Pazzanese of Cardiology - Sao Paulo - Brazil, ⁴JW Goethe University, Department of Cardiology, Div Clinical Electrophysiology - Frankfurt am Main - Germany,

Methods: We analyzed the rates of stroke and systemic embolism in 6563 aspirin-treated patients with AF from the ACTIVE-A/AVERROES database according to AF presentation. All embolic events were adjudicated. Multivariable analyses were performed with adjustment for known risk factors for stroke.

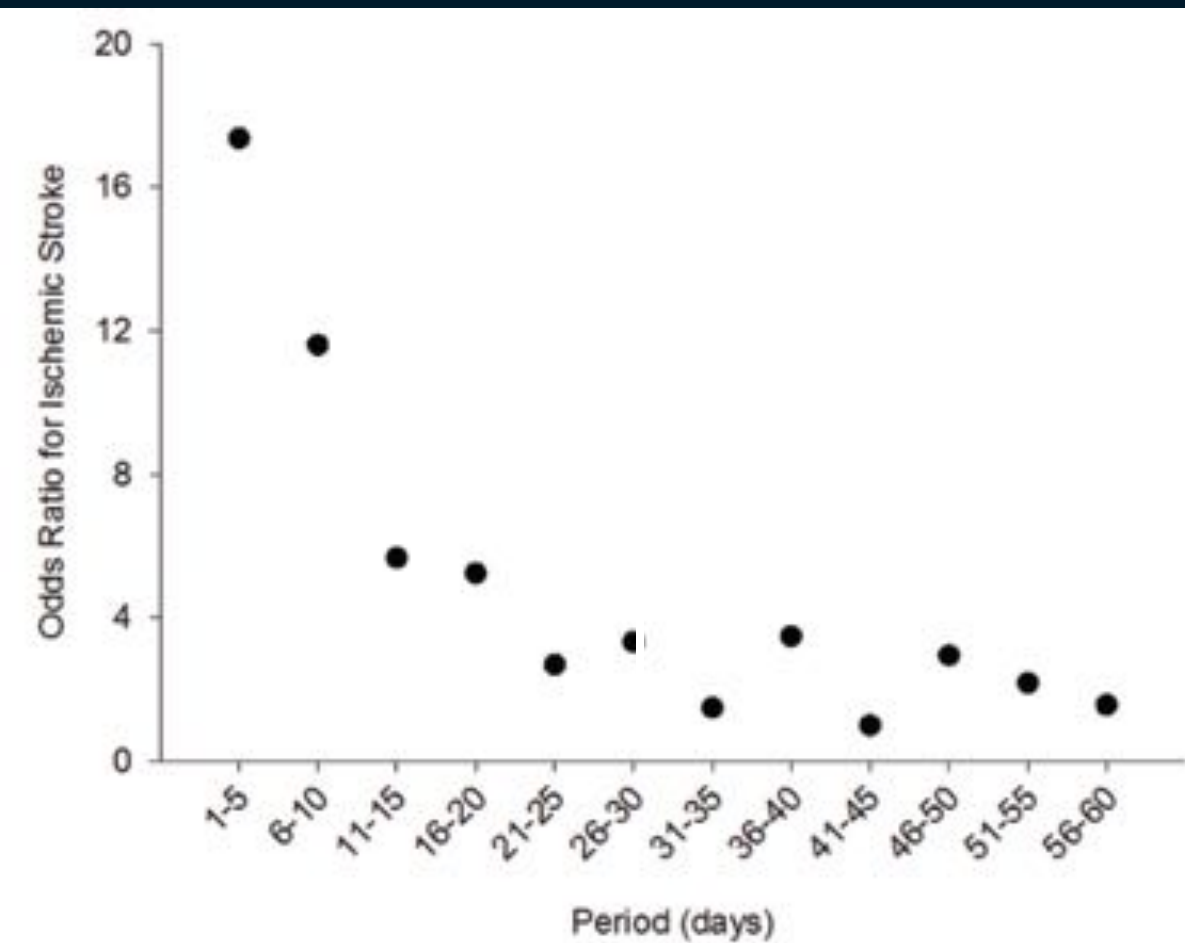
Conclusion: In a large contemporary population of non-anticoagulated AF patients, the clinical presentation of AF was a strong independent predictor of stroke risk. Therefore, the clinical presentation of AF may be helpful to assess the risk/benefit of anticoagulant therapy, especially in low risk patients.



Atrial Fibrillation Burden and Short-Term Risk of Stroke

Case-Crossover Analysis of Continuously Recorded Heart Rhythm From Cardiac Electronic Implanted Devices

Mintu P. Turakhia, MD, MAS; Paul D. Ziegler, MS; Susan K. Schmitt, PhD; Yuchiao Chang, PhD; Jun Fan, MS; Claire T. Than, MPH; Edmund K. Keung, MD; Daniel E. Singer, MD



N=9,850 (187 stroke events)

Stroke risk is temporally related to AF and is increased in the 30 days post an AF episode.

Is There Data to Suggest That AF Ablation Reduces Stroke Risk and/or Anticoagulation Can Be Discontinued Post AF Ablation ?

Risk of Thromboembolic Events After Percutaneous Left Atrial Radiofrequency Ablation of Atrial Fibrillation

Hakan Oral, MD; Aman Chugh, MD; Mehmet Özyaydin, MD; Eric Good, DO; Jackie Fortino, RN; Sundar Sankaran, MD; Scott Reich, MD; Petar Igić, MD; Darryl Elmouchi, MD; David Tschopp, MD; Alan Wimmer, MD; Sujoya Dey, MD; Thomas Crawford, MD; Frank Pelosi, Jr, MD; Krit Jongnarangsin, MD; Frank Bogun, MD; Fred Morady, MD

Background—In patients with atrial fibrillation (AF), the risk of thromboembolic events (TEs) is variable and is influenced by the presence and number of comorbid conditions. The effect of percutaneous left atrial radiofrequency ablation (LARFA) of AF on the risk of TEs is unclear.

Methods and Results—LARFA was performed in 755 consecutive patients with paroxysmal ($n=490$) or chronic ($n=265$) AF. Four hundred eleven patients (56%) had ≥ 1 risk factor for stroke. All patients were anticoagulated with warfarin for ≥ 3 months after LARFA. A TE occurred in 7 patients (0.9%) within 2 weeks of LARFA. A late TE occurred 6 to 10 months after ablation in 2 patients (0.25%), 1 of whom still had AF, despite therapeutic anticoagulation in both. Among 522 patients who remained in sinus rhythm after LARFA, warfarin was discontinued in 79% of 256 patients without risk factors and in 68% of 266 patients with ≥ 1 risk factor. Patients older than 65 years or with a history of stroke were more likely to remain anticoagulated despite a successful outcome from LARFA. None of the patients in whom anticoagulation was discontinued had a TE during 25 ± 8 months of follow-up.

Conclusions—The risk of a TE after LARFA is 1.1%, with most events occurring within 2 weeks after the procedure. Discontinuation of anticoagulant therapy appears to be safe after successful LARFA, both in patients without risk factors for stroke and in patients with risk factors other than age >65 years and history of stroke. Sufficient safety data are as yet unavailable to support discontinuation of anticoagulation in patients older than 65 years or with a history of stroke. (Circulation. 2006;114:759-765.)

Baseline Patient Characteristics

- 755 patients post AF ablation 2003-2005
- 55±11 yrs
- 577 men
- If no stroke risk factors anticoag was stopped at 3 months.
- In other patients it was their physicians decision.

Clinical Characteristics of Patients Without and With Baseline Risk Factors for Stroke

TABLE 1. Clinical Characteristics of Patients Without and With Baseline Risk Factors for Stroke

Characteristic	No Risk Factor (n=344)	≥1 Risk Factor (n=411)	<i>P</i>
Age, y	51±9	58±10	<0.001
Gender (male/female), n	273/71	304/107	0.09
Paroxysmal AF/chronic AF, n	239/105	251/160	0.01
Duration of AF, y	6±6	5±5	0.04
Left atrial diameter, mm	42±8	44±8	<0.001
Left ventricular ejection fraction	0.57±0.06	0.55±0.09	<0.001
Congestive heart failure, n (%)	...	32 (4)	...
Hypertension, n (%)	...	325 (43)	...
Age >65 y, n (%)	...	126 (17)	...
Diabetes, n (%)	...	55 (7)	...
Prior stroke/transient ischemic attack, n (%)	...	34 (5)	...
Risk factors, n (%)			
0	344 (46)	0	...
1	0	273 (36)	...
2	0	115 (15)	...
3	0	23 (3)	...
Mean number of risk factors	0	1.4±0.6	...

Continuous variables are expressed as mean±SD.

Clinical Characteristics of Patients with Early (N=7) and Late (N=2) Thromboembolic Events

TABLE 2. Clinical Characteristics of Patients With Early and Late Thromboembolic Events

Patient No.	AF	Age, y	Gender	LA, mm	LV EF	Risk Factors	Time to TE After LA/FA	TE	Rhythm During TE	INR During TE	LMWH During TE	Residual Symptoms	Time to Recovery After TE
1	PAF	57	M	—	0.55	0	0	Difficulty swallowing and aphasia	AF	1.1	No	None	30 d
2	PAF	67	F	42	0.60	HA	1 d	Right arm and hand weakness	AF	—	Yes	Yes	6 mo
3	PAF	58	M	40	0.55	0	1 d	Left arm paresth	SR	—	Yes	None	10 h
4	PAF	51	M	49	0.60	H	5 d	Anaurosis fugax	AF	1.0	Yes	None	1 h
5	PAF	57	M	48	0.58	H	10 d	Transient visual field change	AF	1.7	No	None	2 h
6	PAF	66	M	46	0.55	A	14 d	Left hemiparesis	AF	1.4	No	None	1 d
7	CAF	66	M	51	0.55	HA	14 d	Right hemiparesis and dysarthria	SR	2.0	No	Mild weakness	2 wk
8	CAF	55	M	54	0.60	HD	190 d	Left hemiparesis	AF	3.2	No	Residual weakness	3 mo
9	CAF	40	M	42	0.60	0	300 d	Fetal infarct	SR	2.6	No	No	No clinical events

PAF indicates paroxysmal AF; CAF, chronic AF; LA, left atrial diameter; LV, left ventricular; EF, ejection fraction; C, congestive heart failure; H, hypertension; A, age; D, diabetes; S, prior stroke or transient ischemic attack; INR, international normalized ratio; LMWH, low-molecular-weight heparin; and SR, sinus rhythm.

Anticoagulation Status of Post Ablation Patients

TABLE 3. Anticoagulation Status of Patients Who Remained in Sinus Rhythm After LARFA

	Warfarin Discontinued	Warfarin Continued	<i>P</i>
Risk factors			0.003
None	203 (39)	53 (10)	
≥1	180 (34)	86 (16)	
Age			0.008
≤65 y	334 (64)	108 (21)	
>65 y	49 (9)	31 (6)	
Prior stroke/TIA			0.001
No	373 (72)	126 (24)	
Yes	10 (2)	13 (3)	
Hypertension			0.03
No	238 (46)	72 (14)	
Yes	145 (28)	67 (12)	
Diabetes mellitus			0.28
No	357 (68)	133 (26)	
Yes	26 (5)	6 (1)	
Congestive heart failure			0.19
No	371 (71)	131 (25)	
Yes	12 (2)	8 (2)	

Percentages of patients are shown in parentheses. TIA indicates transient ischemic attack.

TABLE 4. Anticoagulation Status of Patients Who Had Recurrent AF or Atrial Flutter After LARFA

	Warfarin Discontinued	Warfarin Continued	<i>P</i>
Risk factors			0.21
None	8 (4)	80 (34)	
≥1	7 (3)	138 (59)	
Age			0.20
≤65 y	10 (4)	177 (76)	
>65 y	5 (2)	41 (18)	
Prior stroke/TIA			0.22
No	15 (6)	207 (89)	
Yes	0	11 (5)	
Hypertension			0.07
No	11 (5)	109 (47)	
Yes	4 (1)	109 (47)	
Diabetes mellitus			0.65
No	14 (6)	196 (84)	
Yes	1 (0.5)	22 (9.5)	
Congestive heart failure			0.20
No	15 (7)	206 (88)	
Yes	0	12 (5)	

Percentages of patients are shown in parentheses. TIA indicates transient ischemic attack.

Among 383 patients who remained in sinus rhythm and off anticoag there were no late strokes (0/203 no risks and 0 of 180 with one or more risk factors¹⁷).

Oral et al

JACC 2006

Conclusion:

This study provides some evidence that justifies discontinuation of warfarin 3 to 6 months post AF ablation in patients without baseline risk factors for stroke and in patients with risk factors who have had an apparently successful outcome.

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

Sakis Themistoclakis, MD,* Andrea Corrado, MD,* Francis E. Marchlinski, MD,† Pierre Jais, MD,‡ Erica Zado, PAC,† Antonio Rossillo, MD,* Luigi Di Biase, MD,§ Robert A. Schweikert, MD,|| Walid I. Saliba, MD,¶ Rodney Horton, MD,§ Prasant Mohanty, MBBS, MPH,§ Dimpi Patel, DO,§ David J. Burkhardt, MD,§ Oussama M. Wazni, MD,¶ Aldo Bonso, MD,* David J. Callans, MD,† Michel Haissaguerre, MD,‡ Antonio Raviele, MD,* Andrea Natale, MD§

Mestre-Venice, Italy; Philadelphia, Pennsylvania; Bordeaux-Pessac, France; Austin, Texas; and Akron and Cleveland, Ohio

Objectives	The aim of this multicenter study was to evaluate the safety of discontinuing oral anticoagulation therapy (OAT) after apparently successful pulmonary vein isolation.
Background	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.
Methods	We studied 3,355 patients, of whom 2,692 (79% male, mean age 57 ± 11 years) discontinued OAT 3 to 6 months after ablation (Off-OAT group) and 663 (70% male, mean age 59 ± 11 years) remained on OAT after this period (On-OAT group). CHADS ₂ (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 ≥ 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.
Results	During follow-up (mean 28 ± 13 months vs. 24 ± 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 ₂ risk score of ≥ 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 ($p < 0.0001$).
Conclusions	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

Baseline Patient Characteristics

- 3355 patients post AF ablation 2001-2005
- 2692 stopped anticoagulation 3 to 6 months post ablation.
- 57 + 11 yrs
- Male (79%)
- 28 + 13 months fu

Stroke Risk Factors in Patients On and Off Anticoagulation

Table 3 Thromboembolic Risk Factors According to CHADS₂ Score in the Off- and On-OAT Groups

	CHADS ₂ Score						Total	
	0	1	2	3	4	5		6
Off-OAT group, n								
Congestive HF	0	40	70	26	8	8	2	154
Hypertension	0	644	175	72	15	8	2	916
Age ≥ 75 yrs	0	22	43	19	5	2	2	93
Diabetes mellitus	0	17	76	32	10	6	2	143
Prior stroke/TIA	0	0	63	41	11	8	2	125
Total	1,622	723	245	77	15	8	2	
On-OAT group, n								
Congestive HF	0	37	51	15	6	3	0	112
Hypertension	0	211	113	39	9	4	0	376
Age ≥ 75 yrs	0	6	29	5	5	2	0	47
Diabetes mellitus	0	7	53	15	6	3	0	84
Prior stroke/TIA	0	0	68	26	7	4	0	105
Total	155	261	191	42	10	4	0	

HF = heart failure; other abbreviations as in Table 1.

Freedom From Post Ablation Thromboembolic and Hemorrhagic Stroke

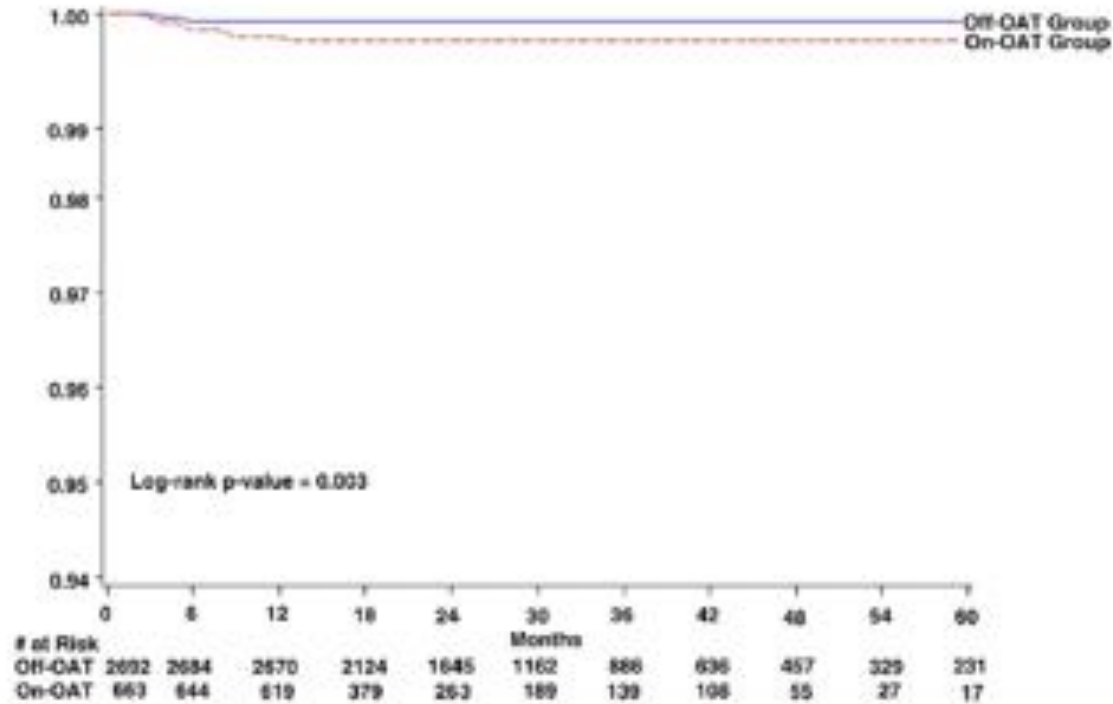


Figure 1

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.

2 off anticoag patients (0.07%) and 3 on anticoag patients (0.45%) had an isch stroke. No strokes occurred in pts with CHADs score ≥ 2 who were off anticoagulation. A major hemorrhage was seen in 1 (0.04%) off anticoag pts and in 13 (2%) on anticoag.

Thermistoclakis et al JACC 2010

Conclusion:

The present study shows that anticoag can be safely discontinued 3 to 6 months after successful AF ablation in patients without arrhythmic recurrences off antiarrhythmic drugs, without severe LA dysfunction or pulmonary stenosis.

The risk benefit in this study favored discontinuation of oral anticoagulation even in patients with medium to high stroke risk.

Patients Treated with Catheter Ablation for Atrial Fibrillation Have Long-Term Rates of Death, Stroke, and Dementia Similar to Patients Without Atrial Fibrillation

T. JARED BUNCH, M.D.,^{*,†} BRIAN G. CRANDALL, M.D.,^{*,†} J. PETER WEISS,^{*,†}
HEIDI T. MAY, Ph.D., M.S.P.H.,[†] TAMI L. BAIR,[†] JEFFREY S. OSBORN, M.D.,^{*,†}
JEFFREY L. ANDERSON, M.D.,[†] JOSEPH B. MUHLESTEIN, M.D.,[†]
BENJAMIN D. HORNE, Ph.D., M.P.H.,[†] DONALD L. LAPPE, M.D.,[†] and JOHN D. DAY, M.D.,^{*,†}

From the ^{*}Intermountain Heart Rhythm Specialists, and [†]Department of Cardiology, Intermountain Medical Center, Murray, Utah, USA

Outcomes in Patients With AF. *Introduction:* Atrial fibrillation (AF) adversely impacts mortality, stroke, heart failure, and dementia. AF ablation eliminates AF in most patients. We evaluated the long-term impact of AF ablation on mortality, heart failure (HF), stroke, and dementia in a large system-wide patient population.

Methods: A total of 4,212 consecutive patients who underwent AF ablation were compared (1:4) to 16,848 age/gender matched controls with AF (no ablation) and 16,848 age/gender matched controls without AF. Patients were enrolled from the large ongoing prospective Intermountain AF study and were followed for at least 3 years.

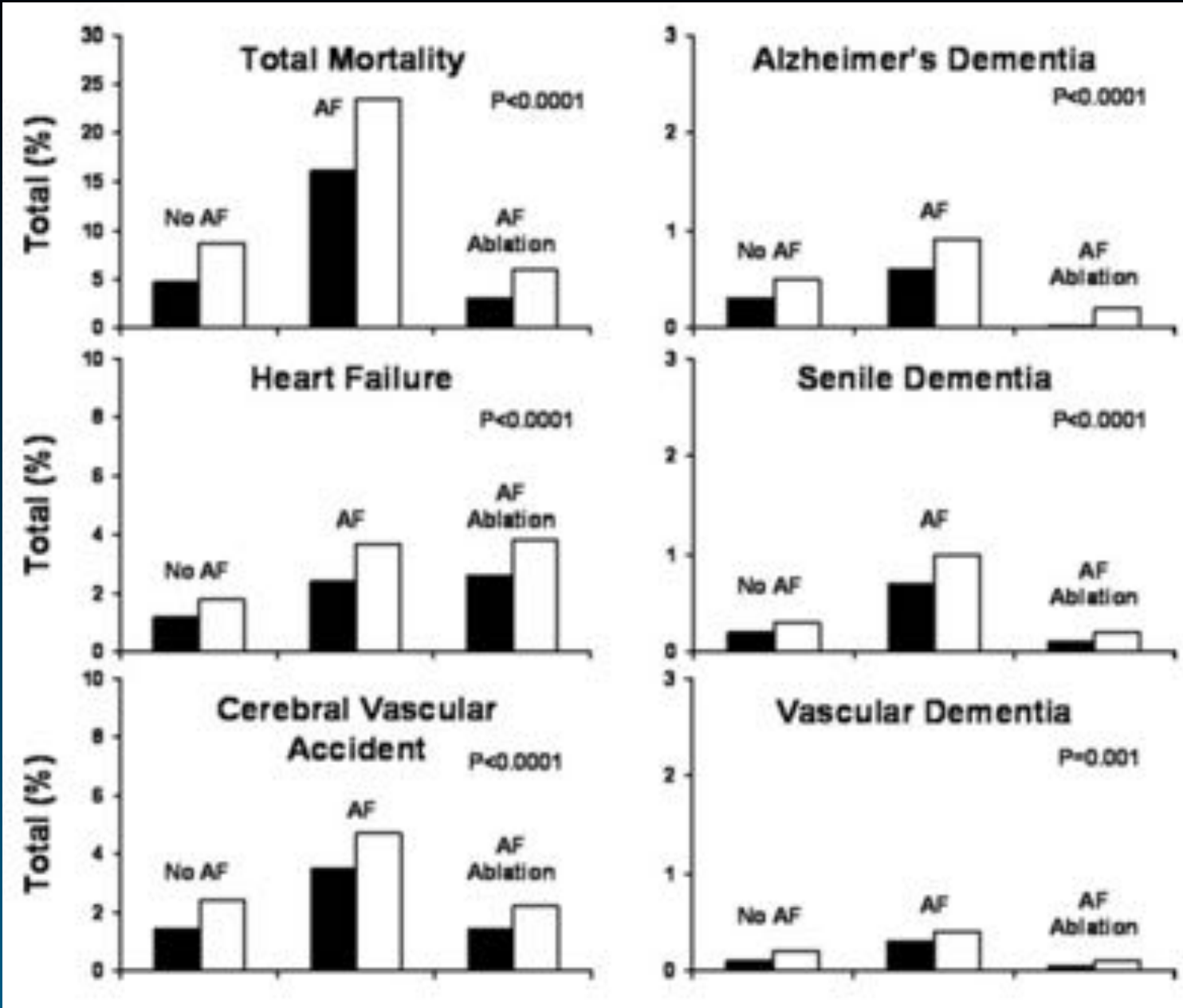
Results: Of the 37,908 patients, mean age 65.0 ± 13 years, 5,667 (14.9%) died, 1,296 (3.4%) had a stroke, and 1,096 (2.9%) were hospitalized for HF over >3 years of follow-up. AF ablation patients were less likely to have diabetes, but were more likely to have hypertension, HF, and significant valvular heart disease. AF ablation patients had a lower risk of death and stroke in comparison to AF patients without ablation. Alzheimer's dementia occurred in 0.2% of the AF ablation patients compared to 0.9% of the AF no ablation patients and 0.5% of the no AF patients ($P < 0.0001$). Other forms of dementia were also reduced significantly in those treated with ablation. Compared to patients with no AF, AF ablation patients had similar long-term rates of death, dementia, and stroke.

Conclusions: AF ablation patients have a significantly lower risk of death, stroke, and dementia in comparison to AF patients without ablation. AF ablation may eliminate the increased risk of death and stroke associated with AF. (*J Cardiovasc Electrophysiol*, Vol. 22, pp. 839-845, August 2011)

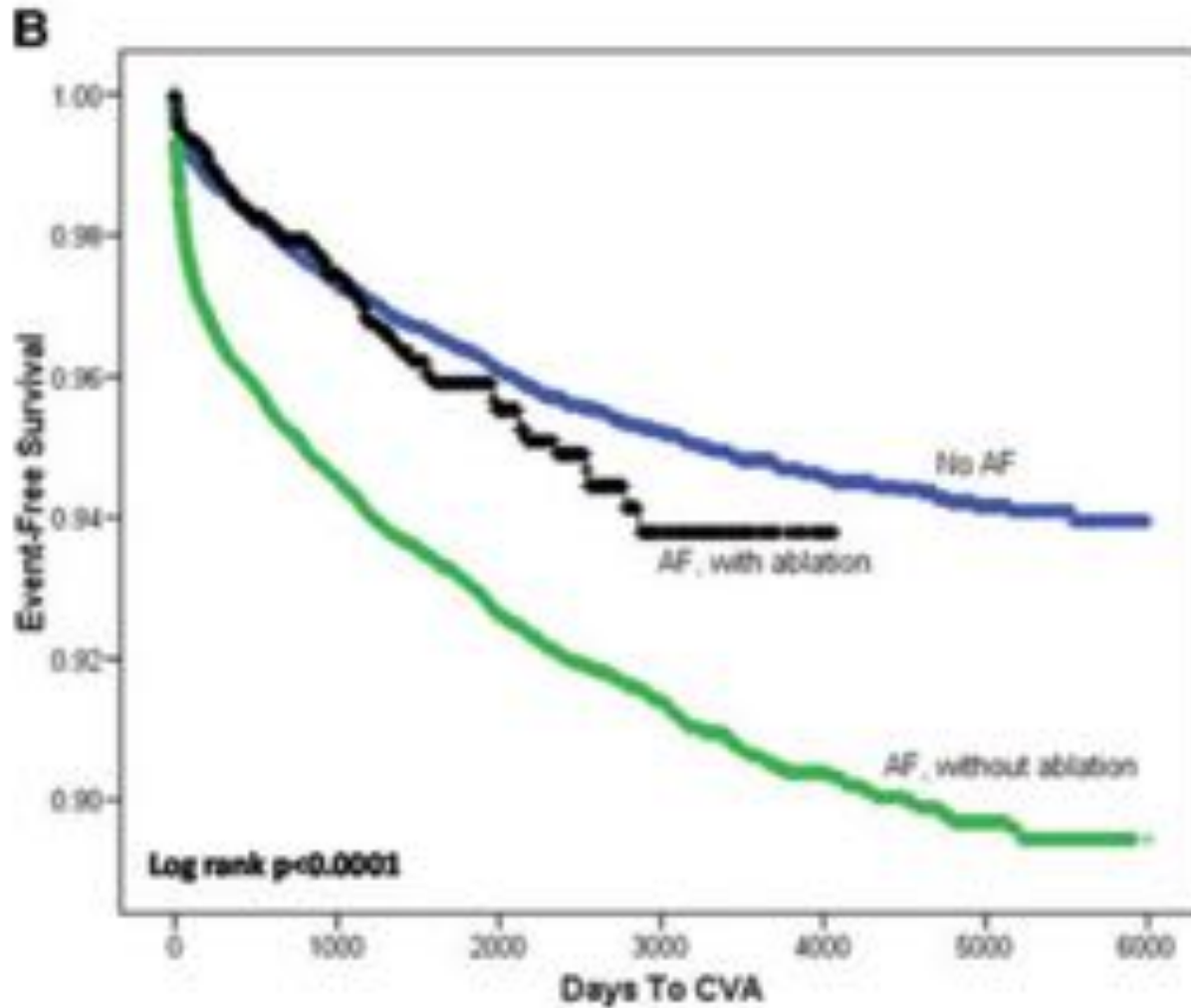
Baseline Patient Characteristics and Results

- 4212 patients who underwent AF ablation
- 16,848 age/gender matched controls with AF (no ablation)
- 16848 age/gender matched controls without AF
- 65+ 13 yrs
- AF abl patients had a lower risk of death and stroke compared with AF pts without ablation
- AF ablation pts had a lower risk of dementia
- AF abl pts had a similar risk of death, dementia, and stroke as patients without AF

Long Term Outcomes at One and Three Years



Stroke Free Survival



Bunch et al

JCVEP 2011

Conclusion:

- AF ablation patients have a significantly lower risk of death, stroke, and dementia in comparison to AF patients without ablation.
- AF ablation may eliminate the increased risk of death and stroke associated with AF.

AF Guidelines



Europace (2012) 14, 528–606
doi:10.1093/europace/eus027

HRS/EHRA/ECAS EXPERT
CONSENSUS STATEMENT



Europace (2012)

2012 HRS/EHRA/ECAS Expert Consensus Statement on Catheter and Surgical Ablation of Atrial Fibrillation: Recommendations



American
Heart



European Heart Journal
doi:10.1093/eurheartj/ehs253

ESC GUIDELINES

Accepted Manuscript

2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation

Craig T. January, MD, PhD, FACC L. Samuel Wann, MD, MACC, FAHA Joseph S. Alpert, MD, FACC, FAHA Hugh Calkins, MD, FACC, FAHA, FHRS Joseph C. Cleveland Jr., MD, FACC Joaquin E. Cigarroa, MD, FACC Jamie B. Conti, MD, FACC, FHRS Patrick T. Ellinor, MD, PhD, FAHA Michael D. Ezekowitz, MB, ChB, FACC, FAHA Michael E. Field, MD, FACC, FHRS Katherine T. Murray, MD, FACC, FAHA, FHRS Ralph L. Sacco, MD, FAHA William G. Stevenson, MD, FACC, FAHA, FHRS Patrick J. Tchou, MD, FACC Cynthia M. Tracy, MD, FACC, FAHA Clyde W. Yancy, MD, FACC, FAHA



Gregory T.N. Lip (UK), Raffaele De Caterina (Italy), Irene Savareeva (UK),
Dan Atar (Norway), Stefan H. Hohnloser (Germany), Gerhard Hindricks (Germany),
Paulus Kirchhof (UK)

HRS Consensus Document -2012-

- Systemic anticoagulation with warfarin or a direct thrombin or Factor Xa inhibitor is recommended for at least two months following an AF ablation procedure.
- Decisions regarding the continuation of systemic anticoagulation agents more than two months following ablation should be based on the patient's risk factors for stroke and not on the presence or type of AF.
- Discontinuation of systemic anticoagulation therapy post ablation is not recommended in patients who are at high risk of stroke as estimated by currently recommended schemes (CHADS₂ or CHA₂DS₂VASc)³
- Patients in whom discontinuation of systemic anticoagulation is being considered should consider undergoing continuous ECG monitoring to screen for asymptomatic AF/AFL/ AT.

ESC AF Guidelines -2010 -

Follow-up considerations

Anticoagulation. Initially post-ablation, LMWH or i.v. UFH should be used as a bridge to resumption of systemic anticoagulation, which should be continued for a minimum of 3 months,¹³⁶ although some centres do not interrupt anticoagulation for the ablation procedure. Thereafter, the individual stroke risk (see Section 4.1) of the patient should determine whether oral anticoagulation should be continued. Discontinuation of warfarin therapy post-ablation is generally not recommended in patients at risk for stroke (see Section 4.1), as AF is a chronically progressing arrhythmia, especially in patients at risk for stroke (see Section 3).

Continuation of OAC therapy post-ablation is recommended in patients with 1 'major' ('definitive') or ≥ 2 'clinically relevant non-major' risk factors (i.e. CHA₂DS₂-VASc score ≥ 2).

IIa

B

136

ACC/AHA/HRS AF Guidelines 2014

January, CT et al.

2014 AHA/ACC/HRS Atrial Fibrillation Guideline

Class III: Harm

1. AF catheter ablation should not be performed in patients who cannot be treated with anticoagulant therapy during and following the procedure. *(Level of Evidence: C)*
2. AF catheter ablation to restore sinus rhythm should not be performed with the sole intent of obviating the need for anticoagulation. *(Level of Evidence: C)*

The role of catheter ablation in the management of AF continues to evolve rapidly, with improvements in the efficacy and safety of the procedure (29). The efficacy of radiofrequency catheter ablation for maintaining sinus rhythm is superior to current antiarrhythmic drug therapy for maintenance of sinus rhythm in selected patient populations. A number of systematic reviews of the efficacy of AF catheter ablation versus antiarrhythmic drug therapy have been performed (356, 386-389, 399, 400). Cryoballoon ablation is an alternative to point-by-point radiofrequency ablation to achieve pulmonary vein isolation (401). The evidence supporting the efficacy of catheter ablation is strongest for paroxysmal AF in younger patients with little to no structural heart disease (402) and in procedures performed in highly experienced centers. Studies have demonstrated a reduction of AF-related symptoms in these contexts (403). Evidence is insufficient to determine whether AF catheter ablation reduces all-cause mortality, stroke, and HF (8). Ongoing clinical trials (CABANA [Catheter Ablation Versus Antiarrhythmic Drug Therapy for Atrial Fibrillation] and EAST [Early Therapy of Atrial Fibrillation for Stroke Prevention Trial]) should provide new information for assessing whether AF catheter ablation is superior to standard therapy with either rate- or rhythm-control drugs for reducing total mortality and other secondary outcome measures, and whether early application of a rhythm-control therapy involving ablation, antiarrhythmic drugs, or both, can impact endpoints of stroke, cardiovascular death, or HF compared with usual care. These important trials will help to address whether catheter ablation provides benefit beyond improvements in quality of life.

Why Do the Guidelines Not Advise Discontinuation of Anticoagulation ?

- No prospective randomized studies have been done to address this question.
- AF recurs post AF ablation in many patients.
And recurrent AF is more likely to be asymptomatic than prior to ablation.
- Over time patients pick up stroke risk factors.
AF related strokes are large and are life altering.
- Stroke risk in AF patients is not linked to the presence or absence of AF.

Temporal relationship of atrial tachyarrhythmias, cerebrovascular events, and systemic emboli based on stored device data: A subgroup analysis of TRENDS

Emile G. Daoud, MD,* Taya V. Glotzer, MD,[†] D. George Wyse, MD, PhD, FHRS,[‡] Michael D. Ezekowitz, MD, PhD,[§] Christopher Hilker, MS,[§] Jodi Koehler, MS,[§] Paul D. Ziegler, MS[§]; TRENDS Investigators

From *Ohio State University Medical Center, Ross Heart Hospital, Columbus, Ohio, [†]Hackensack University Medical Center, Hackensack, New Jersey, [‡]Libin Cardiovascular Institute of Alberta, Calgary, Alberta, Canada, and [§]Lankenau Institute for Medical Research, Philadelphia, PA; [§]Medtronic Inc., Minneapolis, Minnesota.

BACKGROUND The temporal relationship between atrial tachyarrhythmias (atrial tachycardia [AT] and atrial fibrillation [AF]) and cerebrovascular events/systemic emboli (CVE/SE) is unknown.

OBJECTIVE The purpose of this study was to evaluate this relationship using stored AT/AF diagnostic data from implanted devices in patients with and those without AF.

METHODS The TRENDS study enrolled 2,486 patients with an indication for an implantable device, at least one stroke risk factor, and available device data. The current study includes the subgroup of 40 (1.6%) patients enrolled in TRENDS who experienced CVE/SE.

RESULTS AT/AF was detected prior to CVE/SE in 20 (50%) of 40 patients. Other than average and maximum daily AT/AF burden and duration of device monitoring prior to CVE/SE, no statistically significant differences were found between patients with and those without AT/AF prior to CVE/SE. For the 20 patients with AT/AF detected prior to CVE/SE, 9 (45%) did not have any AT/AF in the 30 days prior to CVE/SE. Therefore, 29 (73%) of 40 patients

with CVE/SE had zero AT/AF burden within 30 days prior to CVE/SE. Fourteen (70%) of the 20 patients with AT/AF detected prior to CVE/SE were not in AT/AF at diagnosis of CVE/SE. The last episode of AT/AF in these 14 patients was 168 ± 199 days (range 3–642 days) before CVE/SE.

CONCLUSION The majority of CVE/SE in this population did not occur proximal to recent AT/AF episodes. These data imply that the mechanisms of CVE/SE in patients with implantable devices may importantly involve mechanisms other than cardioembolism due to atrial tachyarrhythmias.

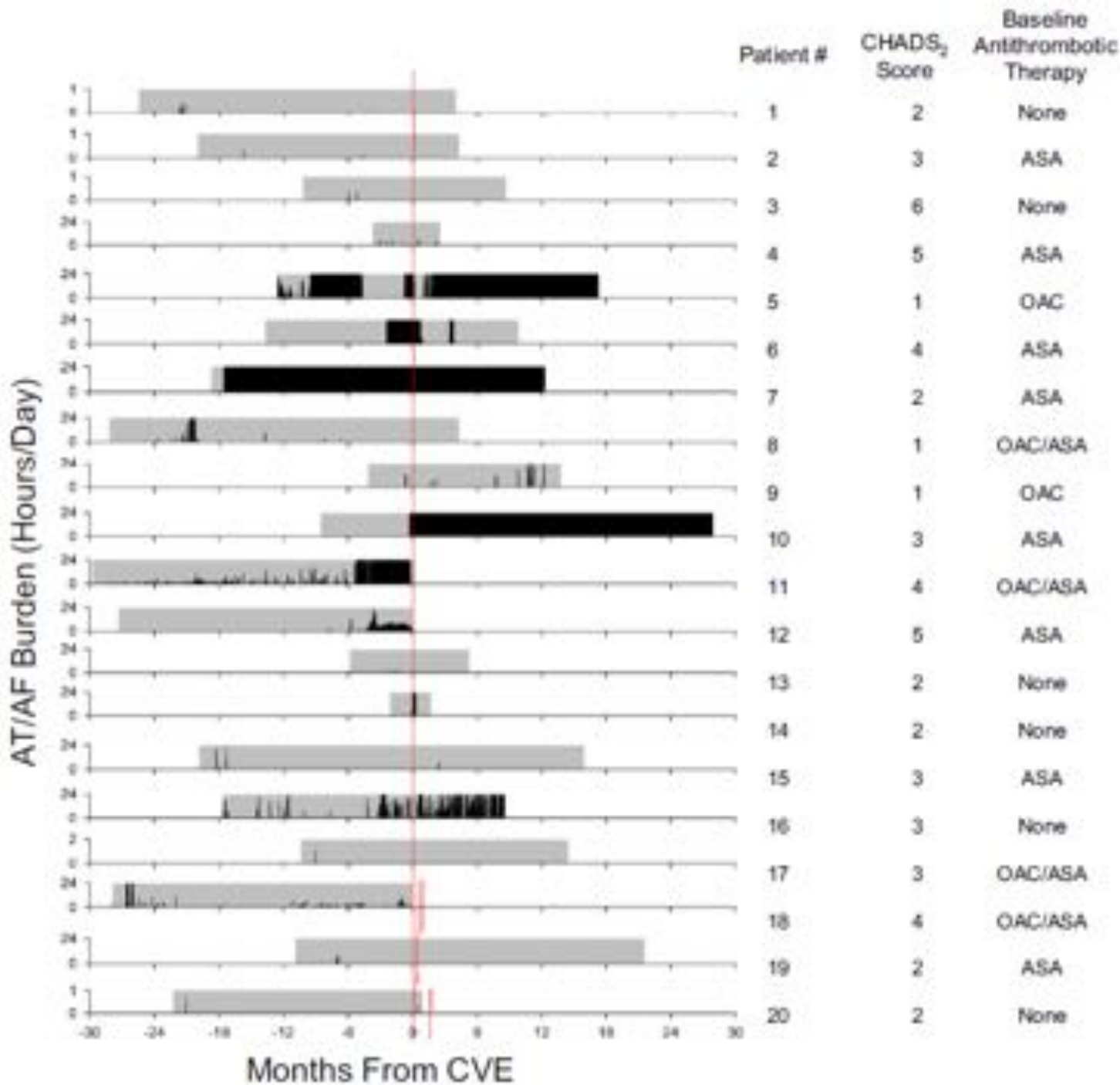
KEYWORDS Atrial fibrillation; Atrial tachyarrhythmia; Implantable cardiac device; Stroke

ABBREVIATIONS AF = atrial fibrillation; AT = atrial tachycardia; CVE = cerebrovascular event; SE = systemic embolus; TIA = transient ischemic attack

(Heart Rhythm 2011;8:1416–1423) © 2011 Heart Rhythm Society. All rights reserved.

Methods and Results

- 40 patients in TRENDS study who experienced a stroke
- AT/AF was detected prior to stroke in 50% of patients.
- 29 (73%) of 40 patients with stroke had 0 AF burden in the 30 days prior to stroke.
- 14 (70%) of 20 patients with AT/AF detected prior to stroke were not in AF at the time of stroke.



Mortality and cerebrovascular events after radiofrequency catheter ablation of atrial fibrillation



Hamid Ghanbari, MD, MPH, Kazım Başer, MD, Krit Jongnarangsin, MD, Aman Chugh, MD, FHRS, Brahmajee K. Nallamothu, MD, MPH, Brenda W. Gillespie, PhD, Hatice Duygu Başer, MD, Arisara Swangasool, MD, Thomas Crawford, MD, Rakesh Latchamsetty, MD, Eric Good, DO, FHRS, Frank Pelosi Jr, MD, FHRS, Frank Bogun, MD, Fred Morady, MD, Hakan Oral, MD, FHRS

From the Division of Cardiovascular Medicine, University of Michigan, Ann Arbor, Michigan.

BACKGROUND Atrial fibrillation (AF) is associated with a significant increase in the risk of stroke and mortality. It is unclear whether maintaining sinus rhythm (SR) after radiofrequency ablation (RFA) is associated with an improvement in stroke risk and survival.

OBJECTIVE The purpose of this study was to determine whether SR after RFA of AF is associated with an improvement in the risk of cerebrovascular events (CVEs) and mortality during an extended 10-year follow-up.

METHODS RFA was performed in 3058 patients (age 58 ± 10 years) with paroxysmal ($n = 1888$) or persistent AF ($n = 1170$). The effects of time-dependent rhythm status on CVEs and cardiac and all-cause mortality were assessed using multivariable Cox models adjusted for baseline and time-dependent variables during 11,347 patient-years of follow-up.

RESULTS Independent predictors of a higher arrhythmia burden after RFA were age (estimated beta coefficient [β] = 0.017 per 10 years, 95% confidence interval [CI] 0.006–0.029, $P = .003$), left atrial (LA) diameter ($\beta = 0.044$ per 5-mm increase in LA diameter, 95% CI 0.034–0.055, $P < .0001$), and persistent AF ($\beta = 0.174$,

95% CI 0.147–0.201, $P < .0001$). CVEs and cardiac and all-cause mortality occurred in 71 (2.3%), 33 (1.1%), and 111 (3.6%), respectively. SR after RFA was associated with a significantly lower risk of cardiac mortality (hazard ratio [HR] 0.41, 95% CI 0.20–0.84, $P = .015$). There was not a significant reduction in all-cause mortality (HR 0.86, 95% CI 0.58–1.29, $P = .48$) or CVEs (HR 0.79, 95% CI 0.48–1.29, $P = .34$) in patients who remained in SR after RFA.

CONCLUSION Maintenance of SR after RFA is associated with a reduction in cardiovascular mortality in patients with AF.

KEYWORDS Atrial fibrillation; Catheter ablation; Mortality; Cerebrovascular events; Outcomes

ABBREVIATIONS AF = atrial fibrillation; CI = confidence interval; CVE = cerebrovascular event; HR = hazard ratio; LA = left atrium; LVEF = left ventricular ejection fraction; OSA = obstructive sleep apnea; RFA = radiofrequency ablation; SR = sinus rhythm

(Heart Rhythm 2014;11:1503–1511) © 2014 Heart Rhythm Society. Published by Elsevier Inc. All rights reserved.

Baseline Patient Characteristics

- 3058 patients post AF ablation 2001-2011
- Paroxysmal AF in 1888 patients (62%)
- 58 \pm 10 yrs
- 2261 men (74%)
- Fu 3.43 years
- At last fu 78% of paroxysmal AF pts were in sinus rhythm (30% on AA drug) and 59% of persistent patients (35% on drug)..

Stroke Risk During Follow-up

- There were 71 thromboembolic and CVEs in 3058 patients (2.3%).
- The prevalence of thromboembolic events was similar among patients with paroxysmal and persistent AF.
- Maintenance of sinus rhythm after ablation was not associated with a significant reduction in strokes irrespective of anticoagulant use.

Conclusion

- There currently is insufficient data to support the proposal that AF ablation lowers stroke risk and allows discontinuation of anticoagulation in patients who have undergone AF ablation and have an elevated stroke risk.
- Despite this, there is emerging evidence to suggest that stroke risk related to AF type and possible AF burden.
- There is also preliminary evidence that AF ablation may reduce stroke risk and allow discontinuation of anticoagulation. stroke risk.

Conclusion

- Until more definitive data is available I advise that the current recommendations made in the HRS consensus document be followed and that decisions regarding continuation of anticoagulation must be based on a patients stroke risk profile and not the perceived presence or absence of AF.
- Further research is needed to address the critical link between AF, AF burden, and stroke risk.

THANK YOU!

