Catheter Ablation of Atrial Fibrillation: Are the Results Different in the Elderly ?

Hugh Calkins MD

### **Disclosures:**

### **Consultant, Research Support, or Honoraria**

St Jude Medical, Medtronic, Atricure, Boerringer Ingleheim, Boston Scientific



- Introduction
- The Published Literature
- My Own Experience
- The Guidelines
- Conclusion

## Initiation of AF from Pulmonary Vein Focus



Haissaguerre et al, NEJM 1998; 339:659-666

1998



### What Do We Know About AF Ablation?

- How to perform it.
- How to avoid PV stenosis and phrenic nerve injury.
- How to avoid esophageal injury.
- Results in elimination of symptomatic AF in most patients.
- Improves quality of life.
- More effective than antiarrhythmic drug therapy.
- Associated with a moderate risk of complications.

Worldwide Survey on the Methods, Efficacy, and Safety of Catheter Ablation for Human Atrial Fibrillation Riccardo Cappato, Hugh Calkins, Shih-Ann Chen, Wyn Davies, Yoshito Iesaka, Jonathan Kalman, You-Ho Kim, George Klein, Douglas Packer, Allan Skanes Circulation 2005

- 100 centers with AF ablation programs
- 8745 patients, 27% > 1 procedure
- 100 centers with AF ablation programs
- 52% asx off AA drugs
- 24% asx with AA drug
- 6% major complication rate
  - 4 deaths (0.05)
  - 107 tamponade (1.22)
  - 20 strokes (.28)
  - 47 TIA (0.66)
  - 94 PV stenosis (1.3)

Complications of Catheter Ablation for Atrial Fibrillation: Incidence and Predictors

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J Cardiovasc Electrophys 2008

- 517 patients, 641 procedures
- 32 major complications (5%)
- 7 CVA (1.1%)
- 8 cardiac tamponade (1.2%)
- 1 PV occlusion (.15%)
- 11 vascular injury (1.7%)
- no deaths
- no esophageal injury
- complication rate 9% 1<sup>st</sup> 100 patients, then 4%
- predictors of complications: female gender, age > 70 yrs

#### Treatment of Atrial Fibrillation With Antiarrhythmic Drugs or Radiofrequency Ablation Two Systematic Literature Reviews and Meta-Analyses

Hugh Calkins, MD; Matthew R. Reynolds, MD, MSc; Peter Spector, MD; Manu Sondhi, MD, MBA; Yingxin Xu, PhD; Amber Martin, BS; Catherine J. Williams, MPH; Isabella Sledge, MD, MPH

Circ Arrhythmia Electrophysiol 2009; 2: 349-371

- Two systematic meta- analyses
- Of the 63 eligible studies in the ablation data set in 6936 patients:
  - 9 were randomized controlled trials
  - 18 were prospective comparative studies
  - 31 were prospective single arm trials
  - 12 were retrospective studies

 Of the 34 eligible AAD studies in 6589 patients, 24 were randomized controlled trials

### **Baseline Patient Characteristics**

Baseline	Catheter	Ablation	Antiarrhythmic Drug Therapy		
Total Patients	Ν	Mean (Range)	Ν	Mean (Range)	
Mean Age (years)	6.936	55 5 (41-67)	6 589	61 6 (38-70)	
Mean Number Drugs Refractory	5 206	26(1.5)	535	1.7(0.3)	
Mean Duration of Arrhythmia (years)	5,200	2.0(1-3)	1 901	1.7(0-3)	
Mean LA Size (mm)	5,090	(1-9)	1,071	3.1(0-11)	
Mean LX Size (mm)	5,899	41.6 (35–30)	3,423	43.7 (33-49)	
Mean LV Ejection Fraction (%)	4,055	57.7 (49–71)	3,510	49.0 (25–67)	
	n/N	%	n/N	%	
Gender					
Male	4,553/6,321	72.0%	3,58/5,662	64.6%	
Female	1,768/6,321	28.0%	2,004/5,662	35.4%	
Type of Atrial Fibrillation					
Paroxysmal	5,189/7,437	69.8%	2,529/4,481	56.4%	
Persistent	970/6,494	14.9%	1,572/4,475	35.1%	
Permanent (long-standing)	843/6,085	13.9%	376/5,011	7.5%	
Comorbid Conditions					
Previous Ablation	120/2,888	4.2%			
Ischemic Heart Disease	326/3,247	10.0%	846/4,660	18.2%	
Non-ischemic Heart Disease	12/272	4.4%	0/200	0.0%	
Valvular Heart Disease	130/2,327	5.6%	485/3,022	16.0%	
Structural Heart Disease	1,341/4,381	30.6%	522/1,055	49.5%	
Cardiomyopathy	39/254	15.4%	88/2,361	3.7%	
Dilated Cardiomyopathy	218/1,576	13.8%	96/1,607	6.0%	
ARVC/D	18/323	5.6%			
CHF	34/216	15.7%	207/843	24.6%	
Congenital Heart Disease	6/198	3.0%			
Hypertrophic Cardiomyopathy	52/1,419	3.7%	0/127	0.0%	
ICD	-	-	22/665	3.3%	
Prior Cardiac Surgery (PCI/CABG)	0/767	0.0%	72/173	41.6%	
Stroke	24/725	3.3%			
Diabetes	60/1.253	4.8%	214/1.772	12.1%	
Hypertension	937/3 094	30.3%	1 888/4 912	38.4%	
Medication History	20110,021	20.270	1,000, 1,712	20.170	
Anti-arrhythmics	3,406/3,585	95.0%	321/884	36.3%	
Anti-coagulants	45/45	100.0%	806/806	100.0%	

#### Efficacy of Anti-arrhythmic Drugs and Catheter Ablation in Patients with Atrial Fibrillation



### Catheter Ablation of Atrial Fibrillation Meta-Analysis of Four Randomized Clinical Trials



ARCHIVES OF

INTERNAL MEDICINE

Noheria, A. et al. Arch Intern Med 2008;168:581-586.



### • Introduction

## The Published Literature

### The Guidelines

-Conclusion-

#### Long-Term Clinical Efficacy and Risk of Catheter Ablation for Atrial Fibrillation in the Elderly

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Atrial Fibrillation Ablation in the Elderly. *Introduction:* The number of elderly patients with atrial fibrillation (AF) is increasing rapidly, and the safety and efficacy of catheter ablation in this demographic group has not been established.

Methods: Over a 7-year period we studied 1,165 consecutive patients undergoing 1,506 AF ablation procedures using a consistent ablation protocol that included proximal ostial pulmonary vein (PV) isolation and focal ablation of non-PV AF triggers. Outcome was analyzed for three distinct age groups: <65 years (group 1; n = 948 patients), 65–74 years (group 2; n = 185 patients), and  $\geq$ 75 years (group 3; n = 32 patients) based on the age at the initial procedure.

Results: There was no significant difference in AF control (89% in group 1, 84% in group 2, and 86% in group 3, P = NS) during a mean follow-up of 27 months. Major complication rates were also comparable (1.6% in group 1, 1.7% in group 2, 2.9% in group 3, P = NS) between the three groups. There was no difference in the left atrial size, percentage with left ventricular ejection fraction <50%, or percentage with paroxysmal versus more persistent forms of atrial fibrillation. However, older patients were more likely to be women (20% in group 1, 34% in group 2, and 56% in group 3, P < 0.001) and have hypertension and/or structural heart disease (56% in group 1 vs 68% in group 2 vs 88% in group 3; P < 0.001). There was a strong trend demonstrating that older patients were less likely to undergo repeat ablation (26% vs 27% vs 9%) to achieve AF control and more likely to remain on antiarrhythmic drugs (20% vs 29% vs 37%; P < 0.05).

Conclusions: Elderly patients with AF undergoing catheter ablation therapy are represented by a higher proportion of women and have a higher incidence of hypertension/structural heart disease. To achieve a similar level of AF control, there appears to be no increased risk from the ablation procedure, but elderly patients are more likely to remain on antiarrhythmic drugs. (J Cardiovasc Electrophysiol, Vol. 19, pp. 621-626, June 2008.)



#### Radiofrequency catheter ablation of atrial fibrillation in older patients: outcomes and complications

Fred Kusumoto • Karin Prussak • Melissa Wiesinger • Tammy Pullen • Cynthia Lynady

	<65 years	65-75 years	>75 years	Statistics
Patients (n)	91	88	61	
Gender M/F	72/19	64/24	37/24	
Age	56±6.7	69±2,4	±2.4 78±2.7	
Atrial fibrillation	10 March 19			
Paroxysmal	76%	66%	34%	P<0.01
Persistent	24%	34%	66%	
CHADS score	$0.6 \pm 0.6$	$1.0 \pm 0.7$	$1.8 \pm 0.5$	P<0.01



### Long-Term Clinical Efficacy and Risk of Catheter Ablation for Atrial Fibrillation in Octogenarians

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Background: Radiofrequency ablation is an effective treatment for atrial fibrillation (AF). With improved safety, the therapy has been offered to increasingly older populations. Arrhythmia mechanisms, medical comorbidities, and safety may vary in the very elderly population.

Methods: Patients presenting for AF ablation were divided into two groups [ $\geq$ 80 years (n = 35), <80 years (n = 717)]. AF ablation consisted of pulmonary vein antral isolation with or without additional linear lesions. A successful outcome was defined as no further AF and off all antiarrhythmic medications >3 months following 1 + ablation procedures.

Results: The type of AF was similar in both groups (paroxysmal: 46% in the older group vs 54% in the younger, P = 0.33). Older patients were more likely to have a higher GHADS2 score, coronary artery disease, and less likely to have had a prior ablation. The hospital stay on average was longer in the older cohort (2.9 ± 7.7 vs 2.1 ± 1.1 days, P = 0.001). There was no increased risk of peri-procedural complications. One-year survival free of AF or flutter was 78% in those >80 and 75% in those younger (P = 0.78). There was no difference between groups if the AF was paroxysmal (P = 0.44) or persistent/chronic (P = 0.74). Over a 3-year follow-up period, five patients died and four strokes occurred all in the younger cohort.

Conclusion: Octogenarian patients, despite more coexistent cardiovascular diseases, have favorable outcomes after AF ablation measured by successful rhythm management. On an average their hospital stay is longer, but no significant increase in short- or long-term complications was observed. These data support AF ablation in select octogenarians. (PACE 2010; 33:146–152)



Adverse Events at 1 Year after Radiofrequency Ablation for Atrial Fibrillation Compared by Anticoagulation Strategy

Characteristic	<80 Years (N = 717)	≥80 Years (N = 35)	P-Value	
Death	0.7 (5)	0.0 (0)	0.99	
Myocardial Infarction	0(0)	O (O)	-	
Cerebrovascular event				
Stroke	0.6 (4)	0 (0)	0.99	
Transient ischemic attack	0.3 (2)	0 (0)	0.99	
Perforation with tamponade	1.3 (9)	2.8 (1)	0.08	
Pulmonary vein stenosis	0.1 (1)	0 (0)	-	
Deep venous thrombosis	0(0)	2.8 (1)	0.05	
Esophageal Injury	0 (0)	0 (0)	-	
Vascular injury	0.1 (1)	0 (0)	1.00	
Phrenic nerve injury	0 (0)	0 (0)	-	
Urinary tract infection	1.0 (7)	2.9 (1)	0.32	

#### Catheter Ablation of Atrial Fibrillation in Octogenarians: Safety and Outcomes

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AF Ablation in Octogenarians. Introduction: Radiofrequency catheter ablation (RFCA) is an effective treatment for atrial fibrillation (AF), although studies evaluating the role of RFCA have largely excluded elderly patients. We report the safety and outcomes of RFCA of AF in octogenarians.

Methods and Eesaits: From 2008 to 2011, out of 2,754 consecutive patients undergoing RFCA of AF, 103 (3.7%) had  $\pm$ 50 years (age 85 & 3 years, 4 with >50 years). Pubmonary voln (PV) antrum isolation was performed in paroxysmal AE. In nonparoxysmal AE, ablation was extended to the entire left strial pesterior wall and to complex fractionated electrograms. Non-PV triggers were disclosed by isoproterenol challenge at the end of the procedure and targeted for ablation. Octogenarians presented a high rate of non-PV triggers (84% vs 65%, P = 0.001), especially in patients with paroxysmal AF (62% vs 19%, P < 0.001); non-PV triggers were most commonly mapped in the coronary sizes (54%), left atrial appendage (32%), interatrial septum and superior vena cava (14%). After a mean follow-up of 18  $\pm$  6 menths, 71 (69%) octogenarians remained free from AF recurrence off antiarrhythmic drugs after a single procedure (vs 71% in patients <80 years, P = 0.05). The success rate reached 87% after 2 procedures. Total periprocedural complication rates also did not differ between the 2 age groups.

Conclusions: RFCA of AF is safe and effective in octogenarians. A high rate of non-PV triggers is present in these patients, and targeting multiple structures other than the pulmonary veloc is often necessary to achieve long-term success. (J Cardonase Electrophysici, Vol. 23, pp. 687-693, July 2012)

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A 1.01							Patients $\geq$ 80 years (n = 103)	Patients <80 years (n = 2,651)
	"E	-				Fluoroscopy time, minutes	$58\pm22$	$55\pm28$
8.75						Radiofrequency time, minutes	77 ± 31	$73 \pm 40$
				3.7		Procedure time, minutes	$157 \pm 46$	$152 \pm 86$
2				100.00		Nonpulmonary vein triggers, n (%)	87 (84)	1,829 (69)
1	10,000,000		0%e 7	140 11		Primary success rate, n (%)	71 (69)	1,881 (71)
1						Secondary success rate, n (%)	90 (87)	2,251 (85)
						Follow-up, months Complications	$17 \pm 6$	$18 \pm 8$
						Stroke/TIA, n (%)	0 (0)	0 (0)
0.004			14		18	Severe PV stenosis, n (%)	0(0)	0 (0)
		Des to	Name and Address of the			Major bleeding, n (%)	0(0)	12(0.4)
						Pericardial effusion,	1(1)	13 (0,5)

TABLE 2

Р

0.28

0.21

0.55

0.65

0.40

0.105

-

0.49 0.50

0.57

107(4)

Procedural Characteristics and Outcomes of Patients Included in the Study

Data are reported as mean ± SD or number (%) as specified.

3 (3)

TLA = transient ischemic attack; PV = pulmonary vein.

Minor bleeding, n (%)

#### The Impact of Age on 5-year Outcomes after Atrial Fibrillation Catheter Ablation

T. Jared Bunch MD, Heidi T. May PhD, MSPH, Tami L. Bair BS, Victoria Jacobs NP, Brian

G. Crandall MD, Michael Cutler DO, PhD, J. Peter Weiss MD, Charles Mallender MD,

Jeffrey S. Osborn MD, Jeffrey L. Anderson MD, John D. Day MD

Table 3. 5-year recurrence rates of atrial fibrillation and/or atrial flutter after an index AF ablation procedure separated by age groups

Age	Paroxysmal	Persistent/Longstanding Persistent	p-value	
≤ 50	52.1%	58.3%	0.62	
51-60	41.3%	66.2%	0.001	
61-70	55.2%	60.6%	0.33	
71-80	63.8%	74.4%	0.05	
>80	75.0%	71.4%	0.79	



Table 2. 5-year outcomes after index cardiac ablation for AF by age categories.

Variable	≤50 (n=74)	51-60 (n=170)	61-70 (n=328)	71-80 (n=305)	>80 (n=46)	p-value
Death	4.1%	5.9%	7.0%	14.4%	32.6%	< 0.0001
Stroke	2.7%	1.2%	5.2%	4.0%	6.5%	0.15*
Heart Failure Hospitalization	5.4%	2.9%	2.2%	3.7%	11.1%	0.05*
AF/atrial flutter	54.2%	52.7%	57.3%	69.5%	73.3%	< 0.0001
MACE	52.7%	53.8%	58.2%	71.9%	75.6%	< 0.0001

\*Fisher's exact test



### Introduction

The Published Literature

My Own Experience

Conclusion

## **My Own Experience**

- The efficacy of AF ablation is lower and the chance of complications are higher in elderly patients.
- Elderly patients do well with AF ablation assuming they are appropriately selected.
- I do not believe there should be an "age cut off" for AF ablation.



### • Introduction

The Published Literature

My Own Experience

## **The Guidelines**

Conclusion

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#### CLINICAL PRACTICE GUIDELINE: FULL TEXT

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

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society

Developed in Collaboration With the Society of Thoracic Surgeons

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"Writing committee members are required to recuse themselves from voting on sections to which their specific relationships with industry and other entities may apply; see Appendix 1 for recusal information. !ACC/AHA Representative. :Heart Rhythm Society Representative. !ACC/AHA Task Force on Performance Measures Liaison. |Society of Thoracic Surgeons Representative. **!**ACC/AHA Task Force on Practice Guidelines Liaison.



### 6.3. AF Catheter Ablation to Maintain Sinus Rhythm: Recommendations

#### CLASS I

- AF catheter ablation is useful for symptomatic paroxysmal AF refractory or intolerant to at least 1 class I or III antiarrhythmic medication when a rhythm-control strategy is desired (363,392-397). (Level of Evidence: A)
- Before consideration of AF catheter ablation, assessment of the procedural risks and outcomes relevant to the individual patient is recommended. (Level of Evidence: C)

#### CLASS IIa

- AF catheter ablation is reasonable for some patients with symptomatic persistent AF refractory or intolerant to at least 1 class I or III antiarrhythmic medication (394,398-400). (Level of Evidence: A)
- In patients with recurrent symptomatic paroxysmal AF, catheter ablation is a reasonable initial rhythm-control strategy before therapeutic trials of antiarrhythmic drug therapy, after weighing the risks and outcomes of drug and ablation therapy (401–403). (Level of Evidence: B)

#### CLASS IIb

- AF catheter ablation may be considered for symptomatic longstanding (>12 months) persistent AF refractory or intolerant to at least 1 class I or III antiarrhythmic medication when a rhythmcontrol strategy is desired (363,404). (Level of Evidence: B)
- AF catheter ablation may be considered before initiation of antiarrhythmic drug therapy with a class I or III antiarrhythmic medication for symptomatic persistent AF when a rhythm-control strategy is desired. (Level of Evidence: C)

#### CLASS III: HARM

- AF catheter ablation should not be performed in patients who cannot be treated with anticoagulant therapy during and after 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)



- Introduction
- The Published Literature
- The Guidelines

Conclusion

## Conclusion

- Catheter ablation of AF is a safe and effective treatment strategy for atrial fibrillation.
- The efficacy of ablation is lower and the complication rate higher in very elderly patients.
- Age should not be a cut off for performing AF ablation.

# Thank You