

Catheter Ablation Of Atrial Fibrillation In The Elderly: Risk Benefit Analysis

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Abstract

Over the past decade, catheter ablation has emerged as an important therapeutic option and reserved for drug refractory symptomatic paroxysmal and persistent atrial fibrillation (AF). Although elderly population constitutes the significant amount of AF patients, literature data is inadequate regarding the use of catheter ablation for elderly AF patients. Since there has been significant improvement in efficacy and safety of the AF ablation in last decade, it has become widespread across the whole world. As the life expectancy continues to grow in population and outcomes of catheter ablation for AF further improve, higher number of elderly patients are likely to undergo catheter ablation for AF. Therefore, in this paper we reviewed the published literature to date regarding the clinical efficacy and safety of catheter ablation for AF in elderly patients.

Introduction

Atrial fibrillation (AF) is known as the most common arrhythmia in clinical practice and also the most common cause of hospital admissions due to arrhythmia worldwide.^{1,2} Beginning at age 50, the prevalence AF almost doubles with each decade of life; increasing from 0.5% at age 50-59 years to 5-7% or greater in those aged 70-79 years.³ The median age of patients with AF is approximately 75 years.^{1,4} As life expectancy continues to improve and the average age of the population increases, there will be an estimated 8-10 million patients with AF in the USA by 2020, half of whom will be over the age of 80 years.⁵⁻⁷

Elderly patients are more likely to have comorbid illnesses such as congestive heart failure, coronary artery disease, hypertension and left ventricular hypertrophy which increase their risk to develop AF.^{8,9} In the elderly, more atrial fibrosis, decreased cellular connectivity and loss of atrial muscle mass have been demonstrated to cause an increase in the dispersion of atrial effective refractory periods and prolong intraatrial conduction times.¹⁰ Electrical atrial remodeling may be associated with shortening of the atrial action potential duration and with the induction of myocardial apoptosis. Aging can also increase pulmonary vein arrhythmogenesis via abnormal calcium ion regulation mediated by ryanodine receptor dysfunction.¹¹ These

factors may greatly increase the dispersion of refractory periods and further reduce conduction velocities in the atria and contribute to the perpetuation of AF, resulting in the increased propensity to AF with aging.¹⁰

Although AF itself is not a life threatening arrhythmia, it is associated with an increased long term risk of stroke, heart failure and all cause mortality.¹² Because of the considerable morbidity, mortality and economic burden associated with AF, all of them will increase with the expanding elderly population. There are also some challenges about pharmacological treatment of AF in these population. Elderly patients are more sensitive to standard drug dosages and also side effects of the medications can easily be seen. They may also have preexisting sinus node dysfunction and conduction system disease that limit drug tolerability. Altered pharmacokinetics and associated comorbidities, such as structural heart disease, renal insufficiency, sick sinus syndrome and senile changes in the atrioventricular (AV) conduction system, may lead to detrimental consequences, including proarrhythmia.¹³⁻¹⁷ AF ablation may, therefore, be an option for elderly patients, as it reduces AF occurrences and symptoms without the need for ongoing medical therapy. We will discuss the existing data and the risks and benefits of catheter ablation in elderly patients with AF.

Catheter Ablation Of AF In The Elderly

The first question that should be answered by the clinician before starting treatment of AF is whether to pursue a rhythm control or rate control strategy. The AFFIRM trial¹⁸ was the only study that was sufficiently powered to evaluate mortality and demonstrated equivalent survival in patients randomly assigned to rate control and rhythm control strategies. On treatment analysis of AFFIRM demonstrated that sinus rhythm was an independent predictor of improved survival, however the benefits of sinus rhythm might have been counterbalanced by the adverse effects of the antiarrhythmic drugs in the elderly population.

Key Words:

Atrial Fibrillation, Catheter Ablation, Elderly.

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Table 1: Clinical efficacy and complication rates of AF ablation.

Author	Patients(Age range in years)	AF type (Paroxysmal, persistent, chronic)	Mean follow-up (Months)	Clinical efficacy of ablation	Major complication	Ref.
Hsieh et al.	37 (72 ± 4)	Paroxysmal	52 ± 6	81%	0%	19
Corrado et al.	174 (77 ± 6)	Paroxysmal 55 % Persistent 45%	20 ± 14	73 – 80%	1%	27
Zado et al.	948 (<65) 185 (65-75) 32 (≥75)	Paroxysmal 65% Paroxysmal 62% Paroxysmal 53%	27 ± 13	89% 84% 86%	1.6% 1.7% 2.9%	20
Leong-Sit et al.	232 (<45) 438 (45-54) 570 (55-64) 308 (≥65)	Paroxysmal 71% Paroxysmal 62% Paroxysmal 66% Paroxysmal 63%	32 ± 20 31 ± 19 28 ± 17 28 ± 17	87% 88% 88% 82%	0 1.7% 1.4% 2.6%	21
Traub et al.	45 (<70) 15 (≥70)	Paroxysmal	19 23	80% 60%	4.4% 6.7%	22
Bunch et al.	717 (<80) 35 (≥80)	Paroxysmal 46% Paroxysmal 54%	12	75% 78%	0.7% 0	30
Santangeli et al.	2651 (<80) 103 (≥80)	Paroxysmal	18±6	71% 69%	0	25

Recently, several studies have reported the efficacy and safety of catheter ablation of AF in the elderly population (Table 1). Although there has been some inconsistency in the definitions, in most studies an age of 70 years or more was defined as elderly. Hsieh et al.¹⁹ compared the outcomes after catheter ablation of AF or AV node ablation in 71 patients >65 years old during a 4-9 year follow up. Patients who had ablation of AF were more likely to have symptomatic AF (19% vs 0%), less persistent AF (8% vs 69%), better New York Heart Association functional class and less heart failure than the patients who underwent AV node ablation. However, the prevalence of stroke, mortality and other complications were similar between the two groups. Although there were several limitations, it was the first study to raise the question of whether an initial attempt at AF ablation would be reasonable for selected elderly patients with AF.

In another retrospective analysis, 1165 patients with AF who underwent 1506 ablation procedures were grouped based on age.²⁰ There were 32 patients ≥75 years of age, 185 patients aged ≥65 and <75 years, and 948 patients aged <65 years. The proportion of patients with paroxysmal and persistent AF was similar among the three groups. Baseline left atrial size and ejection fraction were similar among the three groups. The periprocedural complication rate was low with no difference between the groups. Follow up patient monitoring consisted of both routine office follow up and surveillance transtelephonic monitoring, as well as the ability to transmit symptomatic episodes. Among the 781 patients who completed the minimum 1 year of follow up, there was no difference between the groups for ablation success. AF control rates were 89%, 84% and 87%, among those aged <65, 65-74, and ≥75, respectively. The elderly patients were less likely to undergo repeat ablation and more likely to remain on antiarrhythmic drugs (37 vs 29 vs 20%, $p = 0.02$).

In a more recent study, 1548 patients who underwent AF ablation were stratified according to age <45, 45-54, 55-64 and ≥65 years.²¹ Outcomes, defined as rare or no AF with or without antiarrhythmic drugs, were similar in all groups with an 82-88% success rate ($p = 0.06$). The older patients (aged ≥65 years) did require more antiarrhythmic therapy (47%) than the younger patients aged <45 years (24%). The authors conclude that the efficacy is lower and risk of complications is higher among patients older than 45 years. However, the risk of complications was similar among the three oldest groups.

In another study, the outcomes of catheter ablation for AF were

compared among 15 consecutive patients older than 70 years and 45 randomly selected younger patients.²² There was a trend toward a decrease in probability of maintaining sinus rhythm in the elderly (60 vs 80%; $p = 0.17$). The complication rates were similar. Antiarrhythmic therapy was used more frequent in the elderly (33 vs 8%; $p < 0.005$).

On point of interest that emerged from review of the literature to date is the trend toward more elderly patients remaining on antiarrhythmic drugs after ablation, even in the absence of recurrence. A potential explanation for this finding is that one of the goals of AF ablation in a younger population is to negate the need for long term drug therapy. But in the elderly symptom relief with the control of AF is the major end point of treatment. Aging is also associated with electrical and structural atrial remodeling including changes in action potential shape and duration, enhanced dispersion of repolarization and increased atrial fibrosis.²³ Pulmonary vein isolation may not sufficiently eliminate the triggers for AF in an elderly compared to a younger population, so it may be an explanation of use of antiarrhythmic drugs in the elderly after ablation.

Complications And Thromboembolic Risk

The reported prevalence of complications related to catheter ablation of AF has been variable in trials and may include vascular access complications such as hematoma, retroperitoneal bleeding, pseudoaneurysm, arteriovenous fistula; myocardial perforation and pericardial tamponade; pulmonary vein stenosis; phrenic nerve palsy; thromboembolic events including transient ischaemic attacks and stroke; arterioesophageal fistula and death. A recent analysis reported a major complication rate of 0.8% in 500 consecutive AF ablation patients.²⁴ In another study Santangeli et al.²⁵ reported only three episodes of minor bleeding, one pericardial effusion and no major complications such as thromboembolism in 103 patients older than 80 years. This was not significantly different than the younger cohort of 2651 patients.

AF is an independent risk factor for stroke and significantly increases all-cause mortality in most age groups. In the Framingham study, the annual risk of stroke attributable to AF increased from 1.5% in patients in the age group of 50-59 years to 23.5% in patients in the age range of 80-89 years.²⁶ Therefore, one of the main therapeutic objectives in treating AF is to minimize the risk of thromboembolic events, mainly stroke, even in asymptomatic patients.

Two studies reported the possibility of discontinuation of antico-

agulation if sinus rhythm is maintained at 3–6 months after successful AF ablation.^{27,28} However, in both studies, warfarin was not discontinued in the higher risk patients. In another study, the prevalence of thromboembolic events after AF ablation was examined in patients who were <65 years old and those ≥65 years old with or without AF.²⁹ All patients were treated with therapeutic anticoagulation for 3 months after the procedure. There was no significant difference in cerebrovascular events during 1 month after the procedure. Among the patients ≥65 years old who remained in sinus rhythm after the procedure, warfarin was discontinued in 60 and 56% of the patients with a CHADS₂ score of 0 and ≥1 respectively. During a mean follow up of 3 ± 2 years, a late cerebrovascular events occurred significantly higher in elderly group (3 vs 1%, $p = 0.03$). Among patients ≥65 years old, age was the only independent predictor of late cerebrovascular events regardless of the rhythm and anticoagulation status, or the CHADS₂ score. Thus, AF ablation is not a procedure indicated for freedom from anticoagulation and anti-coagulation post “successful AF ablation” should still be determined by CHA₂DS₂-VASc score.

Conclusion:

Although ablation of AF has been widely adopted with a favorable efficacy and safety profile, there are limited data on catheter ablation of AF in the elderly. However, it appears that AF ablation can be performed safely with acceptable risks and good results in the elderly. In order to extend the indications for AF ablation we need to further studies which have the design of multicenter, randomized and prospective with a long term follow up in the elderly population.

References:

- Williams ES, Hall B, Traub D, Bahnson T, Hranitzky P, Zareba W, Daubert JP (2011) Catheter ablation of atrial fibrillation in the elderly. *Curr Opin Cardiol* 26 (1):25-29
- Fuster V, Rydén LE, Cannom DS, Crijns HJ, Curtis AB, Ellenbogen KA, Halperin JL, Le Heuzey J-Y, Kay GN, Lowe JE (2006) ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation: full text A report of the American College of Cardiology/American Heart Association Task Force on practice guidelines and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Revise the 2001 Guidelines for the Management of Patients With Atrial Fibrillation) Developed in collaboration with the European Heart Rhythm Association and the Heart Rhythm Society. *Europace* 8 (9):651-745
- Go AS, Hylek EM, Phillips KA, Chang Y, Henault LE, Selby JV, Singer DE (2001) Prevalence of diagnosed atrial fibrillation in adults: national implications for rhythm management and stroke prevention: the AnTicoagulation and Risk Factors in Atrial Fibrillation (ATRIA) Study. *JAMA* 285 (18):2370-2375
- Haegeli LM, Duru F (2011) Atrial fibrillation in the aging heart: pharmacological therapy and catheter ablation in the elderly. *Future Cardiol* 7 (3):415-423
- Fang MC, Chen J, Rich MW (2007) Atrial fibrillation in the elderly. *Am J Med* 120 (6):481-487
- Lip GY, Kakar P, Watson T (2007) Atrial fibrillation—the growing epidemic. *Heart* 93 (5):542
- Miyasaka Y, Barnes ME, Gersh BJ, Cha SS, Bailey KR, Abhayaratna WP, Seward JB, Tsang TS (2006) Secular trends in incidence of atrial fibrillation in Olmsted County, Minnesota, 1980 to 2000, and implications on the projections for future prevalence. *Circulation* 114 (2):119-125
- Berry C, Rae A, Taylor J, Brady AJ (2003) Atrial fibrillation in the elderly. *British J Cardiol* 10 (5):373-378
- Kennedy R, Oral H (2013) Catheter ablation of atrial fibrillation in the elderly: does the benefit outweigh the risk? *Expert Rev Cardiovasc Ther* 11(6):697-704
- Yamada T, KAY G (2009) Catheter ablation of atrial fibrillation in the elderly. *Pacing Clin Electrophysiol* 32 (8):1085-1091
- Wongcharoen W, Chen Y-C, Chen Y-J, Chen S-Y, Yeh H-I, Lin C-I, Chen S-A (2007) Aging increases pulmonary veins arrhythmogenesis and susceptibility to calcium regulation agents. *Heart Rhythm* 4 (10):1338-1349
- Stewart S, Hart CL, Hole DJ, McMurray JJ (2002) A population-based study of the long-term risks associated with atrial fibrillation: 20-year follow-up of the Renfrew/Paisley study. *Am J Med* 113 (5):359-364
- Aronow WS (1999) Management of the older person with atrial fibrillation. *J Am Geriatr Soc* 47 (6):740-748
- Prystowsky EN (2006) Assessment of rhythm and rate control in patients with atrial fibrillation. *J Cardiovasc Electrophysiol* 17 (s2):S7-S10
- Hurwitz JL (2008) Atrial fibrillation treatment in the elderly: are we getting closer to an answer? *J Cardiovasc Electrophysiol* 19 (8):812-814
- Dayer M, Hardman S (2002) Special Problems With Antiarrhythmic Drug in the Elderly: Safety, Tolerability, and Efficacy. *Am J Geriatr Cardiol* 11 (6):370-379
- Curtis AB, Rich MW (2007) Atrial fibrillation in the elderly: mechanisms and management. *Heart Rhythm* 4 (12):1577-1579
- Whitbeck MG, Charnigo RJ, Khairy P, Ziada K, Bailey AL, Zegar MM, Shah J, Morales G, Macaulay T, Sorrell VL (2013) Increased mortality among patients taking digoxin—analysis from the AFFIRM study. *Eur Heart J* 34(20):1481-8
- Hsieh MH, Tai CT, Lee SH, Tsao HM, Lin YK, Huang JL, Chan P, Chen YJ, Kuo JY, Tuan TC (2005) Catheter ablation of atrial fibrillation versus atrioventricular junction ablation plus pacing therapy for elderly patients with medically refractory paroxysmal atrial fibrillation. *J Cardiovasc Electrophysiol* 16 (5):457-461
- Zado E, Callans DJ, Riley M, Hutchinson M, Garcia F, Bala R, Lin D, Cooper J, Verdino R, Russo AM (2008) Long-Term Clinical Efficacy and Risk of Catheter Ablation for Atrial Fibrillation in the Elderly. *J Cardiovasc Electrophysiol* 19 (6):621-626
- Leong-Sit P, Zado E, Callans DJ, Garcia F, Lin D, Dixit S, Bala R, Riley MP, Hutchinson MD, Cooper J (2010) Efficacy and risk of atrial fibrillation ablation before 45 years of age. *Circ Arrhythm Electrophysiol* 3 (5):452-457
- Traub D, Daubert JP, McNitt S, Zareba W, Hall B (2009) Catheter ablation of atrial fibrillation in the elderly: where do we stand? *Cardiol J* 16 (2):113-120
- Pandit SV, Jalife J (2007) Aging and atrial fibrillation research: Where we are and where we should go. *Heart Rhythm* 4 (2):186-7
- Lee G, Sparks PB, Morton JB, Kistler PM, Vohra JK, Medi C, Rosso R, Teh A, Halloran K, Kalman JM (2011) Low risk of major complications associated with pulmonary vein antral isolation for atrial fibrillation: results of 500 consecutive ablation procedures in patients with low prevalence of structural heart disease from a single center. *J Cardiovasc Electrophysiol* 22 (2):163-168
- Santangeli P, BIASE LD, Mohanty P, Burkhardt JD, Horton R, Bai R, Mohanty S, Pump A, Gibson D, Coutts L (2012) Catheter ablation of atrial fibrillation in octogenarians: safety and outcomes. *J Cardiovasc Electrophysiol* 23 (7):687-693
- Wolf PA, Abbott RD, Kannel WB (1991) Atrial fibrillation as an independent risk factor for stroke: the Framingham Study. *Stroke* 22 (8):983-988
- Corrado A, Patel D, Riedlbauchova L, Fahmy TS, Themistoclakis S, Bonso A, Rossillo A, Hao S, Schweikert RA, Cummings JE (2008) Efficacy, safety, and outcome of atrial fibrillation ablation in septuagenarians. *J Cardiovasc Electrophysiol* 19 (8):807-811
- Oral H, Chugh A, Özyaydin M, Good E, Fortino J, Sankaran S, Reich S, Igic P, Elmouchi D, Tschopp D (2006) Risk of thromboembolic events after percutaneous left atrial radiofrequency ablation of atrial fibrillation. *Circulation* 114 (8):759-765
- Guiot A, Jongnarangsin K, Chugh A, Suwanagool A, Latchamsetty R, Myles JD, Jiang Q, Crawford T, Good E, Pelosi Jr F (2012) Anticoagulant therapy and risk of cerebrovascular events after catheter ablation of atrial fibrillation in the elderly. *J Cardiovasc Electrophysiol* 23 (1):36-43

30. Bunch TJ, Weiss JP, Crandall BG, May HT, Bair TL, Osborn JS, Anderson JL, Lappe DL, Muhlestein JB, Nelson J (2010) Long-Term Clinical Efficacy and Risk of Catheter Ablation for Atrial Fibrillation in Octogenarians. *Pacing Clin Electrophysiol* 33 (2):146-152