Management of Atrial Fibrillation in the Elderly: Should Age Matter?

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THE GRAYING OF AMERICA
— U.S. CENSUS PROJECTIONS

2003: 36 MILLION
2030: 72 MILLION
2050: 87 MILLION

SOURCE: U.S. CENSUS REPORT "65+ IN THE UNITED STATES: 2005"
Atrial Fibrillation

“The Age Effect”

AF prevalence

Circulation 2000
WHICH IS THE MEAN AGE OF THE AFIB POPULATION?

✓ 55?
✓ 65?
✓ Or... 75!

2.3 million US adults have AF...

...with an increase to more than 5.6 million by the year 2050.
MORTALITY ASSOCIATED TO AFib

Framingham overall study Circulation 2000

A

Percent of subjects dead in follow-up

Years of Follow-up

AFib

No AFib

Framingham overall study Circulation 2000
Morbidity, QoL and mortality are important in elderly people with atrial fibrillation.
AF & THE ELDERLY

With increasing life expectancy and mean age of the general population in the last decade and prediction of increasing ageing population in the next decade, there will be an ongoing increasing demand on catheter ablation procedures in this group of patients.
Characteristics of Patients Undergoing Atrial Fibrillation Ablation: Trends Over a Seven-Year Period 1999–2005

EDWARD P. GERSTENFELD, M.D., DAVID CALLANS, M.D., SANJAY DIXIT, M.D., DAVID LIN, M.D., JOSHUA COOPER, M.D., ANDREA M. RUSSO, M.D., RALPH VERDINO, M.D., MARK WEINER, M.D., ERICA ZADO, P.A.C., and FRANCIS E. MARCHLINSKI, M.D.

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>Patient Characteristics by Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>47.1</td>
</tr>
<tr>
<td>Gender (% male)</td>
<td>90</td>
</tr>
<tr>
<td>Prior AF duration (years)</td>
<td>7.6</td>
</tr>
<tr>
<td># Prior AA drugs</td>
<td>3.9</td>
</tr>
<tr>
<td>Left atrial size (cm)</td>
<td>4.0</td>
</tr>
<tr>
<td>LV ejection fraction (%)</td>
<td>55</td>
</tr>
<tr>
<td>Prior stroke/TIA (%)</td>
<td>3.4</td>
</tr>
<tr>
<td>Prior cardiomyopathy (%)</td>
<td>0</td>
</tr>
<tr>
<td>Obstructive sleep apnea (%)</td>
<td>10.3</td>
</tr>
<tr>
<td>Body mass index</td>
<td>31.2</td>
</tr>
</tbody>
</table>
AF IN THE ELDERLY
OPEN ISSUES

**SUBSTRATE**
- Fibrosis
- Cellular deconnectivity
- Atrial remodeling

**THROMBOEMBOLISM**
- Higher risk of stroke
- Greater risk of bleeding

**RATE**
- AV impairment
- Drug metabolism

**RHYTHM**
- Side effect
- Drug metabolism

**ABLATION**
- Atrial substrate
- Comorbidities
- Complications
- Outcome
AF in the elderly: Symptoms

- Palpitations
- Dyspnea
- Exercise intolerance
- NOTHING
AF in the elderly: Morbidity

- Stroke
- Dementia
- Heart Failure
- Systemic consequence of AFib (e.g., chronic renal failure, Alzheimer, organ failure due to peripheral embolism)
In all age groups AFib is the leading cause of stroke.

AF may lead to dementia (Alzheimer’s disease and vascular dementia) even if no clinical strokes have occurred.

Ott PA et al, Stroke 1997;28:316-21
Heart Failure

Ventricular filling, PA pressure

LV volumes (systolic & diastolic)

Cardiac output & ejection fraction

Cardiac output

Ejection fraction

Onset of AF
Termination of AF

Schumacher B et al, Am J Cardiol 1998;82:29n-36n
AF in the elderly: often myopathy

Sueda
Ann Thorac Surg 1997

Microreentrant circuits

PV foci
Haissaguerre
NEJM 1998

Vagal Ganglia
Pappone
Circulation 2004

LOM
Hwang
Circulation 2000

Dominant Spiral Wave
Mandapati
Circulation 2000

CS
Oral
JCE 2003
Age-associated changes in electrophysiologic remodeling: a potential contributor to initiation of atrial fibrillation

Evgeny P. Anyukhovsky, Eugene A. Sosunov, Parag Chandra, Tove S. Rosen, Penelope A. Boyden, Peter Danilo Jr., Michael R. Rosen*

Changes in AP duration and dispersion
AF in the elderly: structural changes

Mechanism of origin of conduction disturbances in aging human atrial bundles: Experimental and model study

Madison S. Spach, MD,* J. Francis Heidlage, PhD,* Paul C. Dolber, PhD,† Roger C. Barr, PhD†

From the *Department of Pediatrics and †Biomedical Engineering, Duke University Medical Center, Durham, North Carolina, and the ‡Department of Surgery, Veterans Affairs Medical Center, Durham, North Carolina.

• Increase in collagen content and septa
• Fractionation of propagation
**AF in the elderly: often already progressed**

- **Recurrent AF**
- **Persistent AF**
- **Permanent AF**

**Follow-up (months)**

*Pappone et al. Heart Rhythm 09*
In the elderly long-term AAD therapy is associated with low success rate and poor QoL.
A COMPARISON OF RATE CONTROL AND RHYTHM CONTROL IN PATIENTS WITH ATRIAL FIBRILLATION

THE ATRIAL FIBRILLATION FOLLOW-UP INVESTIGATION OF RHYTHM MANAGEMENT (AFFIRM) INVESTIGATORS

- AAD do not work
- Better to control rate

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>OVERALL (N=4060)</th>
<th>RATE-Cr (N=2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age — yr</td>
<td>69.7±9.0</td>
<td>69.8±</td>
</tr>
<tr>
<td>Female sex — no. (%)</td>
<td>1594 (39.3)</td>
<td>823 (</td>
</tr>
<tr>
<td>Ethnic minority group — no. (%)</td>
<td>461 (11.4)</td>
<td>241 (</td>
</tr>
<tr>
<td>Predominant cardiac diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>— no. (%) Coronary artery disease</td>
<td>1059 (26.1)</td>
<td>497 (</td>
</tr>
<tr>
<td>— no. (%) Cardiomyopathy</td>
<td>194 (4.8)</td>
<td>99 (</td>
</tr>
<tr>
<td>— no. (%) Hypertension</td>
<td>2063 (50.8)</td>
<td>1045 (</td>
</tr>
<tr>
<td>— no. (%) Valvular disease</td>
<td>198 (4.9)</td>
<td>98 (</td>
</tr>
<tr>
<td>Other</td>
<td>42 (1.0)</td>
<td>23 (1.1)</td>
</tr>
<tr>
<td>No apparent heart disease</td>
<td>504 (12.4)</td>
<td>265 (13.1)</td>
</tr>
<tr>
<td>History of congestive heart failure</td>
<td>939 (23.1)</td>
<td>475 (23.4)</td>
</tr>
<tr>
<td>— no. (%) Duration of qualifying atrial fibrillation ≥2 days — no. (%)</td>
<td>2808 (69.2)</td>
<td>1406 (69.4)</td>
</tr>
<tr>
<td>— no. (%) First episode of atrial fibrillation (vs. recurrent episode) — no. (%)</td>
<td>1391 (35.5)</td>
<td>700 (35.8)</td>
</tr>
<tr>
<td>— no. (%) Any prerandomization failure of an antiarrhythmic drug — no. (%)</td>
<td>713 (17.6)</td>
<td>364 (18.0)</td>
</tr>
<tr>
<td>— no. (%) Size of left atrium normal — no. (%)‡</td>
<td>1103 (35.3)</td>
<td>549 (35.3)</td>
</tr>
<tr>
<td>— %§ Left ventricular ejection fraction</td>
<td>54.7±13.5</td>
<td>54.9±13.1</td>
</tr>
<tr>
<td>— no. (%) Normal left ventricular ejection fraction</td>
<td>2244 (74.0)</td>
<td>1131 (74.9)</td>
</tr>
<tr>
<td>— %§</td>
<td>1113 (73.2)</td>
<td>0.29</td>
</tr>
</tbody>
</table>
Rate or rhythm? Stroke or hemorrhage?

CLINICAL SIGNIFICANCE

- Atrial fibrillation management is directed at stroke prevention and heart rate and rhythm control.
- Risk stratification schemes can help guide the anticoagulation decision, although warfarin’s benefits generally outweigh its risks.
- Rate and rhythm control result in similar outcomes; rate control is usually the initial therapy for elderly patients.
- Invasive strategies to control atrial fibrillation can improve quality of life but do not obviate the need for antithrombotic therapy.
PERMANENT ATRIAL FIBRILLATION
THE ABLATION SCHEMA

ABLATION STEPS
1. CPVA
2. ENDO CS
3. SEPTUM
4. LAA
5. EPI CS
6. RIGHT ATRIUM
7. CFE
1. AF CONVERSION to SR

Inducibility?

- NO: Procedure stop
- YES: Next step

2. ORGANIZATION TO AT

Mapping after protocol completion

Inducibility to evaluate other circuits
PERMANENT AF
CLINICAL OUTCOME

Biatrial Ablation
CPVA
Cumulative Milan Experience
(n = 19029 pts)
From Jan 1998 to Dec 2008

Baseline Features

- Male 54%
- Prior Stroke 9%
- CHF 11%
- CAD 11%
- Valve Disease 17%
- LVH 19%
- DCM 8%
- HTN 39%
Pulmonary vein ablation improves mortality, morbidity, and QoL as compared with medical therapy. Our findings pave the way for randomized trials to prospect a wider application of ablation therapy for AF.
Sinus rhythm can be maintained long term in the majority of patients with chronic atrial fibrillation by means of CPVA independently of the effects of antiarrhythmic-drug therapy, cardioversion, or both. The maintenance of sinus rhythm is associated with a significant decrease in both the severity of symptoms and the left atrial diameter.

**Mean age 63**

**ablation better than drugs**

**Figure 3. Percentages of Patients without Atrial Fibrillation and Atrial Flutter in the Absence of Antiarrhythmic-Drug Therapy.**

Patients in the control group who had recurrent atrial fibrillation and subsequently underwent circumferential pulmonary-vein ablation or resumed amiodarone therapy for recurrent atrial fibrillation were considered to have remained in atrial fibrillation for the remainder of the study. Therefore, the total number of patients randomly assigned to each study group was used as the denominator in calculating the proportions for the respective study periods.
Circumferential pulmonary vein ablation is more successful than ADT for prevention of PAF with few complications.

Atrial fibrillation ablation warrants consideration in selected patients in whom ADT had already failed and maintenance of sinus rhythm is desired.
Cumulative Success Rates
(n = 19029 pts) Mean F/U 38 ± 21 Mo.

AF-free
90%

Paroxysmal
91%*

*AA drugs
3% at long-term

Chronic
88%*

*AA drugs:
7% at long-term
Complications of Catheter Ablation
University of Milan (N=19029)

Year

% 
0 10 20 30 40 50 60 70 80

Pericardial effusion and tamponade

Matter of experience, also...

Atrial Tachy

LA “maze”

Ostial CPVA

Junctional CPVA

Irrigated catheter

CPVA-M

Vagal Denervation
## Complications of Catheter Ablation

University of Milan (N=19029)

<table>
<thead>
<tr>
<th>Complication</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Pericardial effusion</td>
<td>38</td>
<td>0.23%</td>
</tr>
<tr>
<td>Stroke</td>
<td>18</td>
<td>0.11%</td>
</tr>
<tr>
<td>TIA</td>
<td>25</td>
<td>0.15%</td>
</tr>
<tr>
<td>Tamponade</td>
<td>31</td>
<td>0.19%</td>
</tr>
<tr>
<td>Atrial-esophageal fistula</td>
<td>1</td>
<td>0.006%</td>
</tr>
<tr>
<td>PV stenosis</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Incisional LA tachycardia</td>
<td>1138</td>
<td>6.99%</td>
</tr>
<tr>
<td>Transient ERAF</td>
<td>2805</td>
<td>17%</td>
</tr>
</tbody>
</table>

**Major complication rate**

0.38% over 8,682 AFib patients treated with CPVA or CPVA-M*

**Minor complication preventable with the CPVA-M**

*Overall complication rate including post CPVA LA AT 7.30%
Older age is the best predictor of complications during an AF procedure.
Efficacy, Safety, and Outcome of Atrial Fibrillation Ablation in Septuagenarians

ANDREA CORRADO, M.D.,*,† DIMPI PATEL, M.D.,* LUCIE RIEDLBAUCHOVA, M.D.,* TAMER S. FAHMY, M.D.,* SAKIS THEMISTOCLAKIS, M.D.,† ALDO BONSO, M.D.,† ANTONIO ROSSILLO,† STEVEN HAO, M.D.,‡ ROBERT A. SCHWEIKERT, M.D.,* JENNIFER E. CUMMINGS, M.D.,* MANDEEP BHARGAVA, M.D.,* DAVID BURKHARDT, M.D.,* WALID SALIBA, M.D.,* ANTONIO RAVIELE, M.D.,† and ANDREA NATALE, M.D.,§,#

SUCCESS RATE 70%

COMPLICATION 5%

TABLE 2
Procedural Acute Complications

<table>
<thead>
<tr>
<th>Number of procedures, n</th>
<th>194 (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embolic TIA/stroke, n (%)</td>
<td>1 (0.5%)</td>
</tr>
<tr>
<td>Hemothorax, n (%)</td>
<td>1 (0.5%)</td>
</tr>
<tr>
<td>Groin hematoma, n (%)</td>
<td>3 (1.5%)</td>
</tr>
</tbody>
</table>

(*194 ablations = 174 first ablations + 20 second ablations. TIA = transient ischemic attack.)
Catheter ablation of atrial fibrillation in the elderly: Where do we stand?

Darren Traub, James P. Daubert, Scott McNitt, Wojciech Zaręba, Burr Hall

Cardiology Division, University of Rochester Medical Center, Rochester, NY, USA

<table>
<thead>
<tr>
<th></th>
<th>Age &lt; 70 (n = 45)</th>
<th>Age ≥ 70 (n = 15)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSR in the absence of symptoms at 12 months</td>
<td>36 (80.0%)</td>
<td>9 (60.0%)</td>
<td>0.169</td>
</tr>
<tr>
<td>NSR or symptomatic improvement</td>
<td>42 (93.3%)</td>
<td>12 (80.0%)</td>
<td>0.159</td>
</tr>
<tr>
<td>Remaining on anti-arrhythmic therapy (%)</td>
<td>7 (15.6%)</td>
<td>9 (60.0%)</td>
<td>0.002</td>
</tr>
<tr>
<td>With successful ablations who remained on anti-arrhythmic therapy (%)</td>
<td>3/36 (8%)</td>
<td>3/9 (33%)</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Remaining on warfarin (%)</td>
<td>10 (22.2%)</td>
<td>12 (80.0%)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Complications</td>
<td>2 (4.4%)</td>
<td>1 (6.7%)</td>
<td>1.000</td>
</tr>
</tbody>
</table>

NSR — normal sinus rhythm

After ablation older patients more often remain on antiarrhythmic drugs
Long-Term Clinical Efficacy and Risk of Catheter Ablation for Atrial Fibrillation in the Elderly

ERICA ZADO, P.A.-C., DAVID J. CALLANS, M.D., MICHAEL RILEY, M.D. PH.D., MATHEW HUTCHINSON, M.D., FERMIN GARCIA, M.D., RUPA BALA, M.D., DAVID LIN, M.D., JA COOPER, M.D., RALPH VERDINO, M.D., ANDREA M. RUSSO, M.D., SANJAY G., M.D., EDWARD GERSTENFELD, M.D., and FRANCIS E. MARCHLINSKI, M.D.

**TABLE 2**
Complications

<table>
<thead>
<tr>
<th></th>
<th>Group 1: 65&lt;65</th>
<th>Group 2: 65–74</th>
<th>Group 3: ≥75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedures</td>
<td>N = 1244</td>
<td>N = 228</td>
<td>N = 34</td>
</tr>
</tbody>
</table>

**Major complications**
- Tamponade/effusion requiring drainage: 11/1/0
- CVA/TIA: 4/1/1
- Atrial-esophageal fistula: 1/0/0
- PV stenosis requiring intervention: 1/0/0
- Phrenic nerve injury-resolved: 1/1/0
- Anaphylaxis: 2/0/0
- Retroperitoneal bleed: 0/1/0

**Other complications**
- PV stenosis-asymptomatic: 5/0/0
- Pseudoaneurysm: 6/2/1
- AV fistula: 7/3/1
- Large groin hematoma: 1/2/0
- DVT: 1/0/0
- Significant fluid overload prolonging hospitalization: 2/0/0
- Radiation burn: 1/0/0
- Air embolism with transient ST changes: 0/1/0

AV = arteriovenous; CVA/TIA = cerebral vascular accident or transient ischemic attack; DVT = deep venous thrombosis.
Catheter Ablation of Atrial Fibrillation Versus Atrioventricular Junction Ablation Plus Pacing Therapy for Elderly Patients with Medically Refractory Paroxysmal Atrial Fibrillation

MING-HSIUNG HSIEH, M.D.,*,† CHING-TAI TAI, M.D.,† SHIH-HUANG LEE, M.D.,‡,§ HUAN-MING TSAO, M.D.,† YUNG-KUO LIN, M.D.,† JIN-LONG HUANG, M.D.,†,‡ PAUL CHAN, M.D.,*,† YI-JEN CHEN, M.D.,*,† JEN-YUAN KUO, M.D.,*,† TA-CHUAN TUAN, M.D.,† TSUI-LIEH HSU, M.D.,† CHI-WOON KONG, M.D.,† SHIH-LIN CHANG, M.D.,† and SHIH-ANN CHEN, M.D.,†

### TABLE 2
Clinical Outcomes at the End of Follow-Up

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Group 1 (N = 32)</th>
<th>Group 2 (N = 37)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free of symptomatic AF, n (%)</td>
<td>32 (100)</td>
<td>30 (81)</td>
<td>0.013</td>
</tr>
<tr>
<td>Persistent AF, n (%)</td>
<td>22 (69)</td>
<td>3 (8)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Heart failure, n (%)</td>
<td>17 (53)</td>
<td>9 (24)</td>
<td>0.001</td>
</tr>
<tr>
<td>NYHA function class</td>
<td>1.7 ± 0.9</td>
<td>1.3 ± 0.6</td>
<td>0.02</td>
</tr>
<tr>
<td>Cerebral infarction, n (%)</td>
<td>1 (3)</td>
<td>1 (3)</td>
<td>1.0</td>
</tr>
<tr>
<td>Atrial enlargement, n (%)</td>
<td>24 (74)</td>
<td>16 (43)</td>
<td>0.02</td>
</tr>
<tr>
<td>Left atrial dimension (mm)</td>
<td>42 ± 9</td>
<td>37 ± 7</td>
<td>0.07</td>
</tr>
<tr>
<td>Left ventricular end-diastolic dimension (mm)</td>
<td>53 ± 6</td>
<td>51 ± 8</td>
<td>0.46</td>
</tr>
<tr>
<td>Left ventricular ejection fraction (%)</td>
<td>44 ± 8</td>
<td>46 ± 10</td>
<td>0.46</td>
</tr>
<tr>
<td>Death, n (%)</td>
<td>5 (16)</td>
<td>3 (8)</td>
<td>0.47</td>
</tr>
<tr>
<td>Cardiac causes, n (%)</td>
<td>2 (6)</td>
<td>0 (0)</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Data are presented as mean ± 1 SD or number (%).

**MERITS OF PV ABLATION VS. ABLATE & PACE**

**LESS AF**
**LESS HEART FAILURE**
**LESS SYMPTOMS**
**LESS LA DILATION**
THE HSR EXPERIENCE

- Between January 2005 and December 2006, all consecutive patients older than 80 yrs referred for catheter ablation were enrolled.

- Long-term outcome was prospectively assessed by daily transtelephonic monitoring (TTM) and echo (at 3, 6, 12 months).
### Baseline clinical characteristics

<table>
<thead>
<tr>
<th></th>
<th>CPVA (N = 172)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n</strong></td>
<td><strong>%</strong></td>
</tr>
<tr>
<td>Age at ablation (mean, years)</td>
<td>83±2</td>
</tr>
<tr>
<td>Male</td>
<td>95</td>
</tr>
<tr>
<td>Paroxysmal AF</td>
<td>60</td>
</tr>
<tr>
<td>Persistent AF</td>
<td>50</td>
</tr>
<tr>
<td>Permanent AF</td>
<td>62</td>
</tr>
<tr>
<td>Duration of AF prior to ablation (mean, years)</td>
<td>7±5</td>
</tr>
<tr>
<td>Presence of coronary disease</td>
<td>65</td>
</tr>
<tr>
<td>Heart Failure</td>
<td>26</td>
</tr>
<tr>
<td>Valvular heart disease</td>
<td>79</td>
</tr>
<tr>
<td>Hypertension</td>
<td>132</td>
</tr>
<tr>
<td>Diabetes</td>
<td>34</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td>17</td>
</tr>
</tbody>
</table>
Enrolled patients (age >80 yrs) with AF (n = 172)

Catheter ablation

Paroxysmal AF (n= 60)
  Sinus rhythm (n = 57)
  54 after first ablation
  3 after redo procedure

Persistent AF (n= 50)
  Sinus rhythm (n = 41)
  38 after first ablation
  3 after redo procedure

Permanent AF (n=62)
  Sinus rhythm (n = 42)
  37 after first ablation
  5 after redo procedure

<table>
<thead>
<tr>
<th></th>
<th>Paroxysmal AF</th>
<th>Persistent AF</th>
<th>Permanent AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>First procedure</td>
<td>54/60 (90%)</td>
<td>38/50 (76%)</td>
<td>37/62 (60%)</td>
</tr>
<tr>
<td>Redo procedure</td>
<td>57/60 (95%)</td>
<td>41/50 (82%)</td>
<td>42/62 (68%)</td>
</tr>
</tbody>
</table>
A second procedure was performed in 10 (23%) patients and 33 patients were treated medically.
THE HSR EXPERIENCE

Freedom from AF recurrence

Follow-up (months)

Paroxysmal AF
Persistent AF
Permanent AF

p < .0001
**THE HSR EXPERIENCE**

**Procedure-related complications**

- **Respiratory arrest** during anesthesia (5 pts)

- **Femoral pseudoaneurysm** (1 pt), arterovenous fistula (2 pts), tamponade not requiring surgical intervention (1 pt)
• AF recurrence occurred in 43/172 (25%) pts, all with comorbidities (HF, diabetes and hypertension)

• AF recurrences, as documented by TTM, were silent in 23/43 patients (53%).
Adverse events during follow-up

Embolic events occurred in 6 patients (3.5%) despite optimal anticoagulation
Post-ablation atrial function

• Patients with permanent AF and sinus rhythm after ablation showed an inadequate atrial function which persisted up to 1 year after procedure
Table 3. Summary of studies of atrial fibrillation (AF) ablation in the elderly.

<table>
<thead>
<tr>
<th>Author</th>
<th>Patients (age range in years)</th>
<th>AF type (paroxysmal, persistent, chronic)</th>
<th>Mean-follow (months)</th>
<th>Outcome</th>
<th>Remaining on AAD's</th>
<th>Major complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hseih et al.</td>
<td>37 (72 ± 4)</td>
<td>Paroxysmal</td>
<td>52 ± 6</td>
<td>81% in SR</td>
<td>11%</td>
<td>0%</td>
</tr>
<tr>
<td>Corrado et al.</td>
<td>174 (&gt; 75)</td>
<td>Paroxysmal 55%</td>
<td>20 ± 14</td>
<td>88% (127/143) SR off AAD's after 1st procedure</td>
<td>13%</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Persistent 45%</td>
<td></td>
<td>10.8% (16/143) SR off AAD's after 2nd procedure</td>
<td></td>
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</tr>
<tr>
<td>Zado et al.</td>
<td>635 (&lt; 65)</td>
<td>65% paroxysmal**</td>
<td>27.6 ± 13.8</td>
<td>89% AF control*</td>
<td>20%</td>
<td>1.6%</td>
</tr>
<tr>
<td></td>
<td>124 (65–74)</td>
<td>62% paroxysmal</td>
<td>27.7 ± 13.6</td>
<td>84% AF control*</td>
<td>29%</td>
<td>1.7%</td>
</tr>
<tr>
<td></td>
<td>22 (≥ 75)</td>
<td>53% paroxysmal</td>
<td>23.8 ± 11.3</td>
<td>87% AF control*</td>
<td>37%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Hall et al.</td>
<td>15 (73.6)</td>
<td>100% paroxysmal</td>
<td>56</td>
<td>60% in SR at 12 months 80% in SR or with symptomatic improvement</td>
<td>60%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Santinelli et al.</td>
<td>172 (&gt; 80, mean age 83 ± 2)</td>
<td>35% paroxysmal</td>
<td>18 ± 5</td>
<td>Overall success rate of 75%</td>
<td>Not reported</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29% persistent</td>
<td></td>
<td>90% paroxysmal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>36% paroxysmal</td>
<td></td>
<td>76% persistent</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60% permanent</td>
<td></td>
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</tr>
</tbody>
</table>

AAD — antiarrhythmic drug, SR — sinus rhythm; *defined as 1) no AF episodes on or off anti-arrhythmic therapy or 2) rare AF (≤ 6 AF episodes over the follow-up year and/or > 95% reduction in AF burden in monitoring was compared pre- and post-ablation; **percentage of paroxysmal per age group, other patients in each age group were non-paroxysmal AF.
CONCLUSIONS

- In elderly people, catheter ablation is a safe and effective treatment particularly for paroxysmal and persistent AF.
CONCLUSIONS

Greater attention is required during the procedure considering a higher number of procedure-related complications.
CONCLUSIONS

Asymptomatic recurrences after ablation are frequent and this may underestimate the true recurrence rate in such population supporting the need to continue anticoagulation even in the presence of sinus rhythm.