The Current Management of Atrial Fibrillation

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Objectives

• Outline the 2015 treatment of atrial fibrillation
• Update on the oral anticoagulation therapy
• Pros and cons of the antiarrhythmic drugs (AADs) vs. ablative strategies

Projected Number of Patients with AF by 2050

Disclosures

• None
Atrial Fibrillation: Costs to the Health Care System/ALOT!!

- 35% of arrhythmia hospitalizations
- Average hospital stay = 5 days
- Mean cost of hospitalization = $18,800

**Does not include:**
- Costs of outpatient cardioversions
- Costs of drugs/side effects/monitoring
- Costs of AF-induced strokes

Estimated US cost burden 15.7 billion / year

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What Are the Goals of AF Therapy?

- Improve survival
- Reduce systemic thromboembolism
  - Stroke
- Reduce hospitalizations
- Improve symptoms
- Improve QoL
- Restore atrial function/reverse the remodeling process

QoL = quality of life.

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Classification of Patterns of AF

<table>
<thead>
<tr>
<th>Acute illness-related</th>
<th>Recurrent</th>
</tr>
</thead>
<tbody>
<tr>
<td>New onset-first episode</td>
<td></td>
</tr>
<tr>
<td>No recurrence</td>
<td></td>
</tr>
<tr>
<td>Paroxysmal (self-terminating)</td>
<td></td>
</tr>
</tbody>
</table>

Established

- Persistent (requires cardioversion)*
- Permanent (NSR is not/cannot be restored)

*Termination with pharmacologic therapy or DC cardioversion does not change the designation.

All forms can present with or without associated SHD


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AF: TREATMENT OPTIONS

- Rate control
- Maintenance of SR
- Stroke prevention

**Pharmacologic**
- Class IA
- Class IC
- Class III

**Nonpharmacologic**
- Ablate and pace
- Catheter ablation
- Pacing
- Surgery
- *mini maze + valve surgery*

**Pharmacologic**
- Aspirin
- Thrombin inhibitor
- Warfarin

**Nonpharmacologic**
- Removal/isolation LA appendage

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#AF:

CCB = calcium channel blocker; SR = sinus rhythm; ACE-I = angiotensin-converting enzyme inhibitor; ARB = angiotensin II receptor blocker; LA = left atrial


Prevent remodeling

CCBs, ARBs, Statins, Fish oil, OSA

Incidence of AF Based on Presence or Absence of OSA

- Cumulative Frequency of AF (%)
- OSA: Significant rise
- No OSA: Steady increase

Number at Risk

Number at Risk
- No OSA: 2,209, 1,352, 1,296, 1,241, 1,186, 1,131, 1,076, 1,021, 966, 911, 856, 801, 746, 691, 636, 581, 526, 471, 416, 361, 306, 251, 196, 141, 86, 31, 7

Incidence of AF Based on Presence or Absence of OSA

Acute Rate Control in AF with RVR

- IV beta blocker or calcium channel blocker.
- Caution in hypotension & CHF Patients

- Digoxin and amiodarone should be used in
  - AF with RVR in CHF patient
  - AF with RVR in patient with hypotension

AF = atrial fibrillation; i.v. = intravenous.

AF with RVR & Pre-excitation (WPW)

AF with Pre-excitation (WPW)
AF with RVR & Pre-excitation (WPW)

Avoid Beta blocker, CCB, Digoxin, adenosine Procainamide or amiodarone or cardioversion

Electrical conversion recent-onset AF (< 48 hrs)

- Haemodynamic instability
- Yes
- No

Synchronized Electrical Cardioversion

- Structural heart disease
- Yes
- No

IV flecainide and IV propafenone is not available in USA

- Iv amiodarone
- Iv flecainide or Iv propafenone
- Iv ibutilide

TEE Prior to Cardioversion (> 48hr)

Ibutilide

- Activates slow inward Na channels
- Risk of TdP: 1.7 to 8%
- Only IV
- Dose:
  - ≥ 60 kg: 1mg over 10min
  - < 60 kg: 0.01mg/kg over 10min
  - May repeat once 10 min after 1st dose finished
- Telemetry > 4 hr or until QTc at baseline

Stroke is the most common complication
- AF is an independent risk factor for stroke
- AF accounts for 15%
- Stroke risk unchanged regardless if the pt has a little or a lot of AF
- Stroke risk persists even in asymptomatic AF
- If maintaining sinus rhythm with medications, stroke risk still exists and is unchanged


Stroke Atrial Fibrillation and Stroke

- Stroke is the most common complication
- AF is an independent risk factor for stroke
- AF accounts for 15%
- Stroke risk unchanged regardless if the pt has a little or a lot of AF
- Stroke risk persists even in symptomatic AF
- If maintaining sinus rhythm with medications, stroke risk still exists and is unchanged

Annual stroke rate (%)

Low risk
Moderate risk
High risk
**CHADS<sub>2</sub> Score**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive HF</td>
<td>1</td>
</tr>
<tr>
<td>HTN</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥ 75</td>
<td>1</td>
</tr>
<tr>
<td>DM</td>
<td>1</td>
</tr>
<tr>
<td>Stroke / TIA / TE</td>
<td>2</td>
</tr>
<tr>
<td>Maximum Score</td>
<td>6</td>
</tr>
</tbody>
</table>

**Major Risks (2 pts):**
- Prior CVA / TIA
- Systemic embolism

**Non-Major Risks (1 pt):**
- CHF / LVEF ≤ 40%
- HTN
- Age ≥ 75 yo
- DM

---

**CHA<sub>2</sub>DS<sub>2</sub>-VASc Score**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive HF</td>
<td>1</td>
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</tr>
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<td>Age ≥ 75</td>
<td>2</td>
</tr>
<tr>
<td>DM</td>
<td>1</td>
</tr>
<tr>
<td>Stroke / TIA / TE</td>
<td>2</td>
</tr>
<tr>
<td>Vascular Disease</td>
<td>1</td>
</tr>
<tr>
<td>Age 65 - 74</td>
<td>1</td>
</tr>
<tr>
<td>Female Sex</td>
<td>1</td>
</tr>
<tr>
<td>Age 65-74</td>
<td>1</td>
</tr>
<tr>
<td>Maximum Score</td>
<td>9</td>
</tr>
</tbody>
</table>

**Major Risks (2 pts):**
- Prior CVA / TIA
- Systemic embolism
- Age ≥ 75 yo

**Non-Major Risks (1 pt):**
- CHF / LVEF ≤ 40%
- HTN
- DM
- Female Sex
- Age 65-74
- Vascular Disease

---

**Adjusted Annual Stroke Risk Using CHA<sub>2</sub>DS<sub>2</sub>-VASc Score n = 7329**

**Stroke Risk Related to CHADS2 Score**

- Low, ASA
- Moderate, ASA or Coumadin
- High, Coumadin

Warfarin Risk/Benefit Balance
INR Goal 2-3

- Ischemic stroke
- Intracranial bleeding


Dabigatran

- RE-LY: dabigatran vs. warfarin
- RELY-ABLE: dabigatran vs. warfarin (extension)
- Brand Name Pradaxa


Meta-analysis: 8 studies; 41,199 patient-yrs

On warfarin

Time in therapeutic INR range

Patients (%)
**RE-LY: design**

Noninferiority Trial
Randomized
Blinded/unblinded
(N = 18,113*)

- **Dabigatran 150 mg twice daily**
- **Warfarin (target INR 2-3)**

*N = 12,089 excluding patients taking dabigatran 110 mg


**RE-LY: stroke or systemic embolism**

- **HR 0.66 (0.53-0.82) p < 0.001 for noninferiority**

- **Rivaroxaban**
  - ROCKET-AF: rivaroxaban vs. warfarin
  - Brand name Xarelto

**ROCKET-AF: design**

Noninferiority Trial  
Randomized  
Double-blind  
Double-dummy  
(N = 14 264)

- Rivaroxaban 20 mg once daily (15 mg once daily*)  
- Warfarin (target INR 2-3)

*N = 30-49 mL/min

**ROCKET-AF: stroke or systemic embolism**

- Rivaroxaban vs. Warfarin
  - HR 0.79 (0.68-0.91), p = 0.001 for noninferiority

**ROCKET-AF: major bleeding**

- 1.04 (0.90-1.20), p = 0.58
- 3.4 3.6
- 0.67 (0.47-0.93), p = 0.02

- 0.7 0.5

**Apixaban**

- AVERROES: apixaban vs. aspirin
- ARISTOTLE: apixaban vs. warfarin
- Brand name: Eliquis
ARISTOTLE: design
Noninferiority Trial

Randomized, Double blind
Double dummy (N = 18,201)

Apixaban
5 mg twice daily
(2.5 mg twice daily*)

Warfarin
(target INR 2-3)

*age > 80 years, < 60 kg, SCr > 1.5 mg/dL
~ 4.7% of patients

Previous use for > 30 days
~ 57% of patients

Mean time in therapeutic range of 62.2%

ARISTOTLE: stroke or systemic embolism

ARISTOTLE: major bleeding

Edoxaban

- ENGAGE AF-TIMI
- Approved by FDA on 01/2015
**ENGAGE AF: design**

Noninferiority Trial
- Randomized
- Double-blind
- Double-dummy
  \( N = 21,105 \)

High Dose
- Edoxaban 60 mg daily*  
Low Dose
- Edoxaban 30 mg daily*  
Warfarin
- (target INR 2-3)

*Dose reduced by 50% if:
- CrCl 30-50 mL/min
- Weight < 60 kg
- Strong P-gp inhibitor


**ENGAGE AF: stroke or systemic embolism**

Edoxaban

- Edoxaban blood levels are lower in patients with better renal function
- Reduced efficacy in non-valvular AF in patients with creatinine clearance > 95 ml/min
- Assess creatinine clearance, before initiating therapy

\[
CrCL = (140-age) \times \text{(weight in kg)} \times (0.85 \text{ if female}) / (72 \times \text{creatinine in mg/dL}).
\]


**ENGAGE AF: major bleeding**

- High dose: 0.80 (0.71-0.91), \( p < 0.001 \)
- Low dose: 0.47 (0.41-0.55), \( p < 0.001 \)
- Intracranial bleeding
  - High dose: 0.47 (0.34-0.63), \( p < 0.001 \)
  - Low dose: 0.30 (0.210.43), \( p < 0.001 \)

Early discontinuation

Black Box Warning:
“Premature discontinuation of any anticoagulant... increases the risk of thrombotic events”

Summary of AF Data (vs. Warfarin)

<table>
<thead>
<tr>
<th></th>
<th>Dabigatran 150 mg (Pradaxa®)</th>
<th>Rivaroxaban (Xarelto®)</th>
<th>Apixaban (Eliquis®)</th>
<th>Edoxaban (Savaysa®)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke and Systemic Embolism</td>
<td>Reduced</td>
<td>Equal</td>
<td>Reduced</td>
<td>Equal</td>
</tr>
<tr>
<td>Major Bleeding</td>
<td>Equal</td>
<td>Equal</td>
<td>Reduced</td>
<td>Reduced</td>
</tr>
<tr>
<td>Intracranial Hemorrhage</td>
<td>Reduced</td>
<td>Reduced</td>
<td>Reduced</td>
<td>Reduced</td>
</tr>
<tr>
<td>Gastrointestinal Bleeding</td>
<td>Increased</td>
<td>Increased</td>
<td>Equal</td>
<td>Equal (Reduced with 30 mg)</td>
</tr>
</tbody>
</table>

In RE-LY, ROCKET-AF, and ENGAGE-AF, patients with CrCl < 30 mL/min were excluded.
In ARISTOTLE, patients with CrCl < 25 mL/min were excluded.

FDA-Approved NOACs Indications

<table>
<thead>
<tr>
<th></th>
<th>Dabigatran (Pradaxa®)</th>
<th>Rivaroxaban (Xarelto®)</th>
<th>Apixaban (Eliquis®)</th>
<th>Edoxaban (Savaysa®)</th>
</tr>
</thead>
</table>

AF = atrial fibrillation
VTE = venous thromboembolism, including deep vein thrombosis, pulmonary embolism

2014 AHA guidelines Risk-Based Antithrombotic Therapy

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>SPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior stroke, TIA, or CHA2DS2-VASc score ≥2, oral anticoagulants are recommended. Options include:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1- Warfarin</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>2- Dabigatran, rivaroxaban, or apixaban</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>3- Direct thrombin or factor Xa inhibitor recommended if unable to maintain therapeutic INR</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Reevaluate the need for anticoagulation at periodic intervals (pt might develop HTN...)</td>
<td>I</td>
<td>C</td>
</tr>
</tbody>
</table>

COR: Class of recommendations
SPE: strength of the evidence
Recommendations

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>SOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warfarin recommended for mechanical heart valves</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Direct thrombin inhibitor dabigatran should not be used with a mechanical heart valve</td>
<td>III</td>
<td>B</td>
</tr>
<tr>
<td>Direct thrombin &amp; factor Xa inhibitor are not recommended in patients with AF and end-stage CKD (CrCl &lt;15 mL/min) or on dialysis</td>
<td>III</td>
<td>C</td>
</tr>
<tr>
<td>Evaluate renal function before initiation of direct thrombin or factor Xa inhibitors, and reevaluate when clinically indicated and at least annually</td>
<td>I</td>
<td>B</td>
</tr>
</tbody>
</table>

**COR:** Class of recommendations

**SPE:** strength of the evidence

**Exclusion for use of NOAC?**

- Concurrent use of dronedarone, carbamazepine, phenytoin, ketoconazole, itraconazole, HIV protease inhibitors, rifampin
- Oncology patients
- Morbid obesity
- Concurrent MI, ASA/Plavix (triple therapy)
- Concurrent high risk thrombosis? (lupus anticoagulant disorder)
- Past hx GI bleed – avoid dabigatran / rivaroxaban?
- Advanced age – consider apixiban?

**Reversal Agents**

- Andexanet Alfa is Designated as Factor Xa Inhibitor Antidote

**Reversal Agents**

- Idarucizumab is a humanized antibody fragment, or Fab Immediate reversal of the anticoagulant effect of dabigatran
AFFIRM: Primary Endpoint
All-Cause Mortality

![Cumulative Mortality Graph]

Number of Deaths Number (%)
Rhythm 0 80 (4) 175 (9) 257 (13) 314 (18) 352 (24)
Rate 0 78 (4) 148 (7) 210 (11) 275 (16) 306 (21)

AFFIRM = Atrial Fibrillation Follow-up Investigation of Rhythm Management.
The AFFIRM Investigators.

AFFIRM Results: Additional Analysis

<table>
<thead>
<tr>
<th>Covariate</th>
<th>HR 99% CI</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR</td>
<td></td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Warfarin use</td>
<td></td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Digoxin use</td>
<td>.0007</td>
<td></td>
</tr>
<tr>
<td>AAD use</td>
<td>.0005</td>
<td></td>
</tr>
</tbody>
</table>

The toxicity of AADs (mainly amiodarone) counterbalanced the benefits of SR.

Long-term Rate Control in AF

- Resting HR < 110 bpm (RACE II)
- Stircker HR < 80 bpm / <110 bpm (mod exercise)
- Adequate rate control is critical to avoid tachycardia-mediated cardiomyopathy
- 24 hour Holter monitor.
AV node ablation in AF patients

1. Rate can not be controlled by medications.
2. Intolerance for anti-arrhythmic drugs (AAD)
3. Catheter ablation or surgical intervention is not indicated, failed or rejected by patients.
4. Tachycardia induced cardiomyopathy (1-3)
5. Pacemaker has to be implanted first.

- Anticoagulation is needed if not contra-indicated.
- Pacemaker regulate heart rate

Objective Benefits of AV nodal Ablation

Rhythm Control Strategy

• Anti-arrhythmic drugs or ablation to restore SR.

• The aim is not to restore SR and discontinue anticoagulation.

• Needs anticoagulation if indicated by CHADS2 or CHA2DS2-Vasc score

Benefits of Sinus Rhythm

• Reduce symptoms and improve QoL

• Improve ejection fraction and reduce HF in patients with SHD

• Reduce LA size

• Reduce CV morbidity and mortality (may be patient- and therapy-specific)

Antiarrhythmic Classification

Vaughn Williams

Class I: fast Na+ blocker

• Class IA- Procainamide, quinidine, disopyramide

• Class IB- Lidocaine, mexilitine (ventricle)

• Class IC- Propafenone, flecainide

• Class II- Beta-blockers

• Class III (K+ blocker) sotalol and dofetilide

• Class IV- Calcium-channel blockers

Amiodarone, ibutilide and dronedarone

Class II: slow Na+ blocker

Class III: K+ blocker

Sotalol, dofetilide

Class IV: Calcium-channel blockers

Amiodarone

Rhythm Control for AF: Commonly Used Oral Antiarrhythmic Drugs

Class IA

Quinidine

Class IC

Propafenone

Class III

Sotalol

Procainamide

Propafenone SR

Amiodarone

Disopyramide

Flecainide

Dofetilide

Procainamide, disopyramide, and amiodarone are not FDA-approved for treatment of AF.

AF Efficacy: Maintaining NSR > 6 Months

 Canadian Trial of AF Medications Rarely Provide Long Term Efficacy

At 1 yr, Recurrence rate 60%

AF Antiarrhythmic Therapy

- Treatment goals
  - ↓ frequency of recurrences
  - ↓ duration of recurrences
  - ↓ severity of recurrences
  - Not to abolish every episode
- Safety is primary concern
- Minimize risk of pro-arrhythmia

Factors Which Influence Ventricular Pro-arrhythmia Risk

- Hypokalemia, hypomagnesemia
- Long QT at baseline
- CHF / Decreased EF
- Ventricular hypertrophy
- Bradycardia
- Female gender
- Reduced drug metabolism or clearance
- Amiodarone has lowest risk
### Antiarrhythmic Therapy

**ORGAN TOXICITY**

- **Examples:**
  - Lupus, agranulocytosis, thrombocytopenia, optic neuritis, pulmonary fibrosis, hepatitis, etc.

- **Negligible:**
  - Dofetilide, flecainide, propafenone, sotalol

- **High:**
  - Amiodarone, procainamide, quinidine

### Sotalol - Baseline Assessment

- **QT interval (EKG)**
  - **Contraindicated:** QT > 450 ms

- **Avoid in:**
  - Asthma/COPD
  - Overt CHF
  - Long QT syndromes
  - Severe bradycardia
  - 2nd or 3rd degree block

### Dofetilide - Drug Interactions

- **Contraindicated**
  - Cimetidine
  - *Trimethoprim* (*including Bactrim*)
  - Ketoconazole
  - Verapamil
  - Prochlorperazine
  - Megestrol
  - HCTZ

- **Avoid if possible Any drug that prolongs QT interval**
  - Tricyclic antidepressants
  - Phenothiazines
  - Metformin
  - *(fluoroquinolones, macrolides)*

### Amiodarone

- **Multiple channel blockade**
  - K, Na, Beta, Ca, Alpha

- **Effective for most arrhythmias**

- **Drawbacks:** toxicity, drug interactions

- **Comparatively more effective than other AARx**
Amiodarone- Drug Interactions

<table>
<thead>
<tr>
<th>Drug</th>
<th>Effect</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digoxin</td>
<td>↑</td>
<td>↓ Digoxin by 50%</td>
</tr>
<tr>
<td>Warfarin</td>
<td>↑</td>
<td>↓ Warfarin by 30 to 50%</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>↑</td>
<td>Avoid &gt;20mg/day</td>
</tr>
<tr>
<td>Lovastatin</td>
<td>↑</td>
<td>Avoid &gt;40mg/day</td>
</tr>
<tr>
<td>Cyclosporine</td>
<td>↑</td>
<td>Check levels</td>
</tr>
</tbody>
</table>

Amiodarone Monitoring- OSU Ross Heart Hospital Antiarrhythmic Clinic Protocol

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>CXR, ECG, LFT, PFT, TFT</td>
</tr>
<tr>
<td>Q6 Months</td>
<td>ECG, LFT, TFT</td>
</tr>
<tr>
<td>Q12 Months</td>
<td>CXR, PFT</td>
</tr>
<tr>
<td>PRN</td>
<td>Ophthalmology</td>
</tr>
</tbody>
</table>


Amiodarone and Dronedarone
Less thyroid and lung toxicity
Iodine molecules were removed from the amiodarone chemical structure

Liver toxicity and the concern in CHF in patient who are taking Dronedarone?
Liver toxicity
Acute liver failure and worsening of heart failure
were reported during post marketing Multaq therapy

Dronedarone: Labeling Changes

- 6 Label changes in 2011
  - Liver injury
  - New/worsening CHF
  - ↑ INR with warfarin
  - Reports of interstitial lung disease
  - ↑ Serum Creatinine beyond initiation
  - Updated Black Box Warning and warnings regarding use in permanent AF

Comorbidities to Avoid/Adjust AADs

<table>
<thead>
<tr>
<th>CAD/MI</th>
<th>CHF</th>
<th>Hepatic Failure</th>
<th>Renal Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class IC</td>
<td>Class I (especially IC) Dronedarone</td>
<td>Class I Amiodarone Dronedarone</td>
<td>Dofetilide Sotalol Flecainide Disopyramide</td>
</tr>
</tbody>
</table>

Drug-Induced Proarrhythmia - Torsades

Indications for Catheter AF Ablation

- Symptomatic AF refractory or intolerant to at least 1 class I or III AAD
- Selected symptomatic patients with HF and/or reduced ejection fraction
- As an alternative to device implantation to support AAD therapy in bradycardic patients
- Presence of an LA thrombus is a contraindication to catheter ablation of AF

Beginnings of “Non Drug” Therapies for AFib

- Minneapolis Feb 1999
- Haisseguerra – Bordeaux, France
- Designed a circular catheter to map the pulmonary veins
- “Pulmonary Vein Isolation”
  - Atrial muscle bundles span the transition zone from the pulmonary veins into the atria – trigger for AFib

Focal Origin of Atrial Fibrillation

Hassaiguerre M, NEJM, 1998

- 94% of AF triggers from Pulmonary Veins
- “90 – 95% of all AF is initiated by PV ectopy”
- Pulmonary vein isolation is the target of the RF ablation or cryo-ablation

Prior to RF ablation we need

- TEE to rule out LAA thrombus
- Cardiac CT/ MRI to assess:
  - The pulmonary vein anatomy
  - Adjacent structure next to the posterior wall “the esophagus”

Atrial Fibrillation Ablation

Atrial Shell and Cardiac CT
**A4 study: Catheter Ablation vs Anti-arrhythmic drug therapy for PAF**

Paroxysmal AF resistant to ≥1 AAD, n = 112

<table>
<thead>
<tr>
<th>Follow-up (days)</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiofrequency Ablation</td>
<td>100.0</td>
<td>80.0</td>
<td>60.0</td>
<td>40.0</td>
<td>20.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antiarrhythmic Medications</td>
<td>100.0</td>
<td>80.0</td>
<td>60.0</td>
<td>40.0</td>
<td>20.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Logrank P < 0.0001

**Comparison of Antiarrhythmic Drug vs. RF Ablation in Patients With Paroxysmal AFib Randomized Controlled Trial**

D. Wilber, MD, C. Pappone, MD, F. Marchlinski, MD, A. Natale, MD, L. Macle, MD, E. Daoud, MD, H. Calkins, MD; *JAMA*, 2010

<table>
<thead>
<tr>
<th>Follow Up (mos)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiofrequency Ablation, n = 106</td>
<td>100.0</td>
<td>80.0</td>
<td>60.0</td>
<td>40.0</td>
<td>20.0</td>
<td>0.0</td>
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<tr>
<td>Antiarrhythmic Medications, n = 61</td>
<td>100.0</td>
<td>80.0</td>
<td>60.0</td>
<td>40.0</td>
<td>20.0</td>
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</tbody>
</table>

Log rank, p < 0.001

**Catheter Ablation vs Antiarrhythmic Drug Therapy for AF**

Meta-analysis of 4 randomized clinical trials

<table>
<thead>
<tr>
<th>Source</th>
<th>AAD more effective</th>
<th>Ablation more effective</th>
<th>Risk ratio (95% CI)</th>
<th>% Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pappone et al, 2006</td>
<td>3.86 (2.65-5.63)</td>
<td>25.5</td>
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<tr>
<td>Stabile et al, 2006</td>
<td>6.43 (2.91-14.21)</td>
<td>16.1</td>
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<td>Wazni et al, 2005</td>
<td>4.22 (2.14-8.32)</td>
<td>12.0</td>
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<tr>
<td>Krittayaphong et al, 2003</td>
<td>2.00 (1.02-3.91)</td>
<td>14.4</td>
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<td>Jais et al, 2008</td>
<td>2.85 (2.24-5.71)</td>
<td>14.2</td>
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<tr>
<td>Wilber et al, 2010</td>
<td>6.35 (3.1-10.2)</td>
<td>17.8</td>
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<tr>
<td>Overall (95% CI)</td>
<td>4.73 (2.87-6.63)</td>
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</tr>
</tbody>
</table>

**Complications, OSU Experience**

- Major complications 1.4%
  - Pericardial Effusion/Tamponade
  - Stroke
  - Vascular access complication
  - Phrenic nerve injury
- No deaths
- No inadvertent damage to the esophagus
Atrial Fibrillation: Ablation vs Drug Rx.

Ablation
- 80% success
- PV stenosis
- AE fistula
- TIA/CVA
- PV stenosis
- AE fistula

Drug Rx.
- 50% success
- Proarrhythmia
- End Organ Toxicity

Pick Your Poison

Torsades

Maintenance of Sinus Rhythm

No/Minimal Heart Disease
- Hypertension
- Coronary Artery Disease
- Heart Failure

Doridenarone
- Flecainide
- Propafenone
- Sotalol

Dronacidone
- Dofetilide
- Sotalol

Amiodarone
- Dofetilide
- Amiodarone

Catheter Ablation

Conclusion

- AF is a common disease that is increasing in prevalence
- Decision regarding Rate control strategy Vs. Rhythm control strategy and antithrombotic therapy are patient specific.
- Anticoagulation is essential in AF patients with risk markers, regardless of any restoration of SR
- Guidelines provide recommendations for the management of patients with AF