Updates in Atrial Fibrillation

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DISCLOSURE

Relevant Financial Relationship(s)
None

Off Label Usage
None
Mayo Clinic Arrhythmia Review
Learning Objectives

• To recognize the epidemiology, subtypes, and differential diagnosis of atrial fibrillation

• To understand the advantages of a rate control vs rhythm control strategy in atrial fibrillation

• To review the role of novel oral anticoagulants
  • Advantages
  • Disadvantages
Afib Epidemiology

- **Age adjusted incidence has been increasing** from 1980 to 2000: **3.2 million in 1980; 5.1 million in 2000**

- The detection of Afib requires symptoms and asymptomatic PAF may go undetected. Current estimates at the Mayo Clinic would suggest 2.3 million Americans.

- Afib prevalence increases with age: 0.1% <55 years; at 9% in octogenerians.

- At younger ages (<70), Afib has a greater prevalence among males (5.8%) than females (2.8%).

- The lifetime risk based on the Framingham cohort is 23-26% among 40 year olds.

- Leading cause of embolic strokes; associated with ↑ CHF and ↑ mortality

Afib Epidemiology

- HTN and Diastolic dysfunction
- Obesity has been associated with new onset Afib in the Framingham and other cohorts
- OSA, Etoh, anger, ethnicity, and genetic influences have been reported to be associated with incident Afib.
- Appropriately treated OSA reduces AFib recurrence after cardioversion
- AA race is associated with less Afib than whites.
- Afib and CAD are co-existent
- Rheumatic heart disease and valvular heart disease

Atrial Fibrillation--assessment

• H & P—assess heart rate, sxs of SOB, chest pain, edema (signs of heart failure)
• If unstable, need to cardiovert
• Try and determine onset (?<24-48 hours)
• Echocardiogram to evaluate for valvular disease and overall ventricular function
• Check TSH
Afib Categories

1. Lone atrial fibrillation: no structural heart disease (usually <60 years)

2. Paroxysmal: terminates spontaneously <7 days

3. Persistent: fails to self-terminate within 7 days. Episodes may eventually terminate spontaneously, or they can be terminated by cardioversion.

4. Permanent: > 1 year and cardioversion not attempted or failed.
What are the major sequelae of atrial fibrillation?

- Worsened heart failure
- Afib begets afib leading to electrical and structural remodeling
- Tachycardia induced cardiomyopathies
- Stroke/Emboli
- Decreased quality of life and exercise tolerance
- Acute hemodynamic compromise
Differential Dx: Sinus Arrhythmia

- Variations in the cycle lengths between p waves and QRS complexes
- Often sounds irregularly irregular on exam
- Normal p waves, PR interval, normal and narrow QRS
- Usually asymptomatic – no treatment required
Multifocal Atrial Tachycardia (MAT)

- The diagnostic criteria include:
  - An average atrial rate above 100 beats/min
  - Three different non-sinus P waves in the same lead
  - Note the multiple P wave morphologies - inverted (I), upright (U), and biphasic (B).
- Significant lung disease in ~60% of cases
- COPD most common (hypoxia or hypercapnia)
- Hypokalemia, hypomagnesemia
- Aminophylline, theophylline, isoproterenol

Courtesy of Ary Goldberger, MD.
Sick Sinus Syndrome

- Often the result of a tachy-brady syndrome: where a burst of atrial tachycardia or atrial fibrillation is then followed by a long, symptomatic sinus pause/arrest
- Address and treat cardiac conditions; review med list, TSH
- Pacemaker is usually required
Atrial Fibrillation with Complete Heart Block
AF Treatment Targets

**Rate Control**
- Pharmacologic:
  - Ca²⁺ blockers
  - β-blockers
  - Digitalis
- Non-Pharmacologic:
  - AVN ablation and pace

**Maintenance of SR**
- Pharmacologic
- Non-Pharmacologic:
  - Class IA, IC, III Prevention: ACE, ARB, Statins

**Stroke Prevention**
- Pharmacologic:
  - Warfarin
  - Aspirin
  - New agents
- Non-Pharmacologic:
  - Removal/isolation left atrial appendage

**Target Areas**
- Rate Control
- Maintenance of SR
- Stroke Prevention
Atrial Fibrillation: Management

The first step in acute management is to determine whether patient is stable or not...

- Is there hemodynamic instability?
- Is the patient responsive?
- Is there a change mental status changes?
- Are symptoms persistent and unbearable?
Atrial fibrillation—acute management

• Rhythm vs Rate control—if onset is within last 24-48 hours, may be able to arrange cardioversion

• If unable to definitely conclude onset in last 24-48 hours: need 4-6 weeks of anticoagulation prior to cardioversion, and warfarin after or TEE guided cardioversion (anticoagulation necessary at time of procedure and 4-6 weeks after)
• Comparison of two treatment strategies for patients with AF
  • Rate control and anticoagulation
  • Rhythm control and “anticoagulation”
• Multicenter, randomized trial
• Patients with atrial fibrillation and risk factors predicting a high risk for stroke and death
• Null hypothesis: survival equal with both treatment strategies
Potential Benefits of Maintaining Sinus Rhythm

- Fewer symptoms / better exercise tolerance
- Lower risk of stroke
- Long-term anticoagulation may not be needed if sinus rhythm is successfully maintained
- Better quality of life
- Better survival
All Cause Mortality

**Cumulative Mortality (%)**

- **Years**: 0, 1, 2, 3, 4, 5
- **Rhythm Control**: Cumulative mortality increases with years.
- **Rate Control**: Cumulative mortality also increases with years.
- **p = 0.08**

**No. of Deaths**

<table>
<thead>
<tr>
<th>Group</th>
<th>0</th>
<th>80 (4)</th>
<th>175 (9)</th>
<th>257 (13)</th>
<th>314 (18)</th>
<th>352 (24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhythm Control</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate Control</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Number (Percent)**

- Rhythm Control: 80 (4%), 175 (9%), 257 (13%), 314 (18%), 352 (24%)
- Rate Control: 78 (4%), 148 (7%), 210 (11%), 275 (16%), 306 (21%)
## Selected Adverse Events from the AFFIRM Trial

<table>
<thead>
<tr>
<th>Event</th>
<th>Overall (n=4060)</th>
<th>Rate-Control Group (n=2027)</th>
<th>Rhythm-Control Group (n=2033)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Patients (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary end point (death)</td>
<td>666 (26.3)</td>
<td>310 (25.9)</td>
<td>356 (26.7)</td>
<td>0.08</td>
</tr>
<tr>
<td>Secondary end point (composite of death, disabling stroke, disabling anoxic encephalopathy, major bleeding, and cardiac arrest)</td>
<td>861 (32.3)</td>
<td>416 (32.7)</td>
<td>445 (32.0)</td>
<td>0.33</td>
</tr>
<tr>
<td><strong>Torsade de pointes</strong></td>
<td>14 (0.5)</td>
<td>2 (0.2)*</td>
<td>12 (0.8)</td>
<td>0.007</td>
</tr>
<tr>
<td>Sustained ventricular tachycardia</td>
<td>15 (0.6)</td>
<td>9 (0.7)</td>
<td>6 (0.6)</td>
<td>0.44</td>
</tr>
<tr>
<td><strong>Cardiac Arrest Followed by Resuscitation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventricular fibrillation or ventricular tachycardia</td>
<td>19 (0.6)</td>
<td>10 (0.7)</td>
<td>9 (0.5)</td>
<td>0.83</td>
</tr>
<tr>
<td><strong>Pulseless electrical activity, bradycardia, or other rhythm</strong></td>
<td>10 (0.3)</td>
<td>1 (&lt;0.1)</td>
<td>9 (0.6)</td>
<td>0.01</td>
</tr>
<tr>
<td>Hospitalization after base line</td>
<td>2594 (76.6)</td>
<td>1220 (73.0)</td>
<td>1374 (80.1)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

* One patient had crossed over to the rhythm-control group and was taking quinidine, and one patient had torsade de pointes 72 hours after mitral valve replacement.
Recurrence of Atrial Fibrillation

Graph showing the percentage of patients without recurrence over years for Amiodarone and Class I Drugs. The graph indicates that Amiodarone has a lower percentage of recurrence compared to Class I Drugs. The table below shows the number of recurrences (% without recurrence) over different years:

<table>
<thead>
<tr>
<th>Years</th>
<th>Amio</th>
<th>Class I</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 (100%)</td>
<td>0 (100%)</td>
</tr>
<tr>
<td></td>
<td>35 (66%)</td>
<td>61 (45%)</td>
</tr>
<tr>
<td></td>
<td>50 (51%)</td>
<td>70 (37%)</td>
</tr>
<tr>
<td></td>
<td>55 (45%)</td>
<td>74 (33%)</td>
</tr>
<tr>
<td></td>
<td>64 (33%)</td>
<td>77 (28%)</td>
</tr>
<tr>
<td></td>
<td>65 (31%)</td>
<td>80 (21%)</td>
</tr>
</tbody>
</table>

The p-value for the difference is 0.011.
Recurrence of Atrial Fibrillation

![Graph showing the recurrence of atrial fibrillation over years with data for Amiodarone and Sotalol.](image)

- **Amiodarone**
  - 0 (100%) at 0 years
  - 42 (67%) at 1 year
  - 58 (53%) at 2 years
  - 61 (50%) at 3 years
  - 69 (39%) at 4 years
  - 70 (37%) at 5 years

- **Sotalol**
  - 0 (100%) at 0 years
  - 61 (48%) at 1 year
  - 76 (34%) at 2 years
  - 81 (29%) at 3 years
  - 84 (25%) at 4 years
  - 89 (15%) at 5 years
<table>
<thead>
<tr>
<th>Covariate</th>
<th>P</th>
<th>HR</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at enrollment*</td>
<td>&lt;0.0001</td>
<td>1.06</td>
<td>1.04</td>
<td>1.08</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>&lt;0.0001</td>
<td>1.65</td>
<td>1.31</td>
<td>2.07</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>&lt;0.0001</td>
<td>1.83</td>
<td>1.45</td>
<td>2.32</td>
</tr>
<tr>
<td>Diabetes</td>
<td>&lt;0.0001</td>
<td>1.56</td>
<td>1.22</td>
<td>2.00</td>
</tr>
<tr>
<td>Stroke or transient ischemic attack</td>
<td>&lt;0.0001</td>
<td>1.54</td>
<td>1.17</td>
<td>2.05</td>
</tr>
<tr>
<td>Smoking</td>
<td>&lt;0.0001</td>
<td>1.75</td>
<td>1.29</td>
<td>2.39</td>
</tr>
<tr>
<td>First episode of atrial fibrillation</td>
<td>0.0067</td>
<td>1.27</td>
<td>1.01</td>
<td>1.58</td>
</tr>
<tr>
<td>Sinus rhythm</td>
<td>&lt;0.0001</td>
<td>0.54</td>
<td>0.42</td>
<td>0.70</td>
</tr>
<tr>
<td>Warfarin use</td>
<td>&lt;0.0001</td>
<td>0.47</td>
<td>0.36</td>
<td>0.61</td>
</tr>
<tr>
<td>Digoxin use</td>
<td>&lt;0.0001</td>
<td>1.50</td>
<td>1.18</td>
<td>1.89</td>
</tr>
<tr>
<td>Rhythm-control drug use</td>
<td>0.0005</td>
<td>1.41</td>
<td>1.10</td>
<td>1.83</td>
</tr>
</tbody>
</table>

*Per year of age.
Take Home Points: AFFIRM Trial

- Warfarin use improves survival
- Currently available anti-arrhythmic drugs are not associated with improved survival, which suggests that any beneficial antiarrhythmic effects of AADs are offset by their adverse effects
- If an effective method for maintaining SR with fewer adverse effects were available, it might be beneficial
- No difference in any key endpoint
Increased Mortality Associated With Digoxin in Contemporary Patients With Atrial Fibrillation

Findings From the TREAT-AF Study

Mintu P. Turakhia, MD, MAS,*† Pasquale Santageli, MD,†† Wolfgang C. Winkelmayr, MD, MPH, ScD,§
Xiangyan Xu, MS,* Aditya J. Ullal, BA,* Claire T. Than, MPH,* Susan Schmitt, PhD,* Tyson H. Holmes, PhD,||
Susan M. Frayne, MD, MPH,*# Ciaran S. Phibbs, PhD,*# Felix Yang, MD,** Donald D. Hoang, BA,*
P. Michael Ilo, MD, PhD,||| Paul A. Heidenreich, MD, MS*
Mortality
The DIG Trial
Importance of Digoxin Levels

HR = 0.99;
95% CI = 0.91–1.07;
P = 0.80

Figure 1. Mortality in the Digoxin and Placebo Groups.
The number of patients at risk at each four-month interval is shown below the figure.

Figure 2. Kaplan-Meier Survival Analysis for All-Cause Mortality

Log-Rank Test P<.001

JAMA. 2003;289:871-878
1. Lenient rate-control did not lead to significantly different outcomes than strict rate-control

2. Compared to strict rate-control, lenient rate-control could be achieved more easily (i.e., with lower doses of medications, fewer medications)
Primary Outcome: Composite of death from CV causes, hospitalization for HF, Stroke, Systemic embolism, bleeding and life-threatening arrhythmia
CHADS\(_2\) Score Criteria

<table>
<thead>
<tr>
<th>CHADS(_2) Risk Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>C  Congestive heart failure</td>
<td>1</td>
</tr>
<tr>
<td>H  Hypertension — high blood pressure</td>
<td>1</td>
</tr>
<tr>
<td>A  Age(\geq 75)</td>
<td>1</td>
</tr>
<tr>
<td>D  Diabetes mellitus</td>
<td>1</td>
</tr>
<tr>
<td>S(_2) Stroke or TIA (transient ischemic attack, called a mini-stroke)</td>
<td>2</td>
</tr>
</tbody>
</table>

JAMA 2001; 285:28 64-70
CHADS$_2$

Annual Risk of Stroke:

- 0 = 1.9%
- 1 = 2.8%
- 2 = 4.0%
- 3 = 5.9%
- 4 = 8.5%
- 5 = 12.5%
- 6 = 18.2%

Score:

- 0 = ASA alone
- 1 = either anticoagulation or ASA
- 2 or more = anticoagulation

JAMA 2001; 285:28 64-70
### CHA₂DS₂-VASc Score for Atrial Fibrillation Stroke Risk

Calculates stroke risk for patients with atrial fibrillation, possibly better than the CHADS₂ score.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in Years</td>
<td>&lt;65 0</td>
</tr>
<tr>
<td>Sex</td>
<td>Male 0</td>
</tr>
<tr>
<td>Congestive Heart Failure History</td>
<td>+1 NO</td>
</tr>
<tr>
<td>Hypertension History</td>
<td>+1 NO</td>
</tr>
<tr>
<td>Stroke/TIA/Thromboembolism History</td>
<td>+2 NO</td>
</tr>
<tr>
<td>Vascular Disease History</td>
<td>+1 NO</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>+1 NO</td>
</tr>
</tbody>
</table>

- **0** = "low" risk and may not require anticoagulation
- **1** = "low-moderate" risk and should consider antiplatelet or anticoagulation
- **2 or greater** = "moderate-high" risk and should otherwise be an anticoagulation candidate
Good News: Warfarin Works!

- RRR of stroke: 62%
- RRR All-cause mortality: 26%

Bad News: Warfarin Is Not Used Very Well!

A New Era: Understanding Trials of Anticoagulation for Afib

- 6 Trials
- 4 Drugs
  - Dabigatran
  - Apixaban
  - Rivaroxaban
  - (Edoxaban)
- > 55,000 patients
- Global exposure
- Pragmatic studies
- Strong foundation for evidence-based clinical decisions
New anticoagulant therapies vs warfarin

Stroke or systemic embolism

- Dabigatran 150 mg b.i.d.
- Dabigatran 110 mg b.i.d.
- Rivaroxaban 20 mg o.d.
- Abixaban 5 mg b.i.d.

Connolly S et al NEJM 2009; Patel M et al NEJM 2011; Granger CB et al NEJM 2011
New anticoagulant therapies vs warfarin

Stroke of ischemic or unknown type

- Dabigatran 150 mg b.i.d.
- Dabigatran 110 mg b.i.d.
- Rivaroxaban 20 mg o.d.
- Abixaban 5 mg b.i.d.

Connolly S et al NEJM 2009; Patel M et al NEJM 2011; Granger CB et al NEJM 2011
New anticoagulant therapies vs warfarin

Major bleeding

- Dabigatran 150 mg b.i.d.
- Dabigatran 110 mg b.i.d.
- Rivaroxaban 20 mg o.d.
- Abixaban 5 mg b.i.d.

Connolly S et al NEJM 2009; Patel M et al NEJM 2011; Granger CB et al NEJM 2011
GI bleeding

- **dabigatran 150**: HR 1.49*
- **rivaroxaban**: HR 1.61*
- **apixaban**: HR .89

*statistically significant

Connolly S et al NEJM 2009; Patel M et al NEJM 2011; Granger CB et al NEJM 2011
New anticoagulant therapies vs warfarin

All-cause mortality

- Dabigatran 150 mg b.i.d.
- Dabigatran 110 mg b.i.d.
- Rivaroxaban 20 mg o.d.
- Abixaban 5 mg b.i.d.

Connolly S et al NEJM 2009; Patel M et al NEJM 2011; Granger CB et al NEJM 2011
New anticoagulant therapies vs warfarin

Intracranial hemorrhage

- Dabigatran 150 mg b.i.d.
- Dabigatran 110 mg b.i.d.
- Rivaroxaban 20 mg o.d.
- Abixaban 5 mg b.i.d.

Connolly S et al NEJM 2009; Patel M et al NEJM 2011; Granger CB et al NEJM 2011
# Summary of Recent Clinical Trials

<table>
<thead>
<tr>
<th>Drug</th>
<th>Target</th>
<th>Dose</th>
<th>Endpoints</th>
<th>Sensitivity</th>
</tr>
</thead>
</table>
| Dabigatran | Thrombin | 150 mgm bid 110 mgm bid (not in USA) 75 mgm bid | - Stroke/systemic embolism: 150 mgm bid – superiority 110 mgm bid – noninferior (↑ age) >75 yrs with 150 mgm bid | - Noninferior ***  
- ↓ in fatal bleeding but not in major and non-major clinically relevant bleeding |
| Rivaroxaban | Factor Xa | 20 mgm/day                   | Noninferior                                                                                   | ***  
- ↓ in fatal bleeding but not in major and non-major clinically relevant bleeding |
| Apixiban  | Factor Xa | 5 mgm bid**                  | Superiority                                                                                   | Age >80 yrs  
Wt <60 kg  
Creatinine >1.5 mgm dL |

*Creatinine clearance <30 mL/min  
**2.5 mgm bid in high-risk pts  
***↓ in fatal bleeding but not in major and non-major clinically relevant bleeding
Transition From Warfarin

- Dabigatran
  - Stop warfarin, and when INR < 2.0, start dabigatran

- Rivaroxaban
  - Stop warfarin, and when INR < 3.0, start rivaroxaban (but 6X higher bleeding in first 7d in start of ROCKET-AF in both warfarin exp. and naïve#)

- Apixaban
  - Stop warfarin, and when INR < 2.0, start apixaban

- Edoxaban*
  - Stop warfarin, and when INR < 2.5, start edoxaban

#Mahaffey KM Ann Intern Med. 2013 18;158(12):861-8
*Not yet approved
Temporary Discontinuation for Procedures

- For procedures with low bleeding risk, stop 2-3 half lives before procedure (1-2 days)
- For procedures with high bleeding risk, stop 4-5 half lives before procedure (3 days, longer with dabi and CrCL < 50)
- Resume after allowing full hemostasis

Adapted from Circulation. 2012;126:343-348
Renal Function and Novel Oral Anticoagulants

- RE-LY, ROCKET excluded patients with eGFR < 30, ARISTOTLE excluded patients with eGFR < 25
- Dabigatran is 80% renally eliminated; rivaroxaban, apixaban, and edoxaban are around 30%
- Renal impairment is independent risk factor for stroke, for bleeding, for death
Case

• 54 y/o man presents in 2006 with hx DCM and AF

• Palpitations since 1985; periodic AF over years

• Rx in past: propafenone, dofetilide, amiodarone

• OSA (on CPAP), Hyperlipidemia

• Meds: carvedilol 18.25 mg BID, statin, Dig 0.25 mg/d, furosimide 40mg/d, lisinopril 5/day, warfarin (INR 2-2.5), KCl 20 mEq/day
Case

• Last cardioversion July 2004 – chronic AF since
• C/O palpitations, fatigue, somnolence
• Exam: BP 95/65 mmHg, HR 88 bpm
• EF 30-35%; LA volume index: 41 cc/m² (nl=28 cc/m²)
• TSH, chemistries, CBC: normal
Holter Results

- Basic rhythm AF. HR 61-138, avg = 83
- 16 pauses, longest 2.3 sec
- 737 PVCs; single 3 beat run at 170 bpm
### EKG

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-JUL-1951</td>
<td>Vent. rate</td>
<td>81 BPM</td>
<td>Atrial fibrillation</td>
</tr>
<tr>
<td></td>
<td>PR interval</td>
<td>9 ms</td>
<td>Incomplete left bundle branch block</td>
</tr>
<tr>
<td></td>
<td>QRS duration</td>
<td>108 ms</td>
<td>ST and T wave abnormality, consider lateral ischemia</td>
</tr>
<tr>
<td></td>
<td>QTc/QTc duration</td>
<td>328/381 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P–R–T axes</td>
<td># 46 – 74</td>
<td>No previous ECGs available</td>
</tr>
</tbody>
</table>

**Technician ID:** 519

**Referred by:** 47661

**Confirmed by:** ALLAN JAFFE MD

---

**EKG Traces:**

- Lead I
- aVR
- V1
- V4
- Lead II
- aVL
- V2
- V5
- Lead III
- aVF
- V3
- V6
Pulmonary Vein Muscle Fibers

Muscle bundles

Point Ablation
To restore sinus rhythm

Atrial Fibrillation
Normal Rhythm

Gurevitz, Friedman Circ 2001
EKG 2 days post ablation:

- Vent. rate: 83 BPM
- PR interval: 124 ms
- QRS duration: 362/425 ms
- QT/QTc: 29/21 ms

Atrial fibrillation
Non-specific intra-ventricular conduction delay
Non-specific ST and T wave abnormality

When compared with ECG of 19–JAN–2006 05:25,
Atrial fibrillation has replaced Sinus rhythm
Nonspecific T wave abnormality has replaced inverted T waves in Lateral leads

Technician ID: 573

Referred by: 47661
Confirmed By: STEPHEN HAMMILL MD
• Amiodarone is restarted → pt converts to NSR
• Patient seen back April 2006
  • NSR, Ejection Fraction = 57%
• Amiodarone is discontinued
• July 2006 pt is pushing truck out of mud in Alaska – develops “flutter”
• Cardioverted, 1 month amiodarone
• Active, travels, hunts
• Dec 25, 2006, recurrent arrhythmia (next slide)
• EF 30%, severe LA enlargement, dilated LAA (no thrombus)
You recommend:

1. Resume amiodarone
2. AV Node ablation & CRT-D
3. Repeat “ablation”
Typical Atrial Flutter
Case

- Jan 9, 2007 – pt re-ablated
  - Ablation terminates atrial flutter
  - Not inducible with or without isoprel
- POD #1: EF 40-45%
- Dismissed off of anti-arrhythmic medications
- Patient continues to do well
Key Points from Case

- Treatment of AF can improve CHF, even if rate not fast
  - Try drugs → ablation if EF better
  - In CHF: Amiodarone, Dofetilide
  - If structural defect or no improvement:
    - CRT-D improves symptoms, survival

- Early recurrence (<3 mos) after ablation treated with medications

- Atrial flutter occurs in 10-15% of patients after LA linear ablation – can be re-ablated

- Long-term rhythm control can be achieved - but requires repeat procedure in 50% of pts
How Effective is Ablation for Atrial Fibrillation?
Long-Term AF Ablation Outcomes

Late Ablation Success

Years after ablation

<table>
<thead>
<tr>
<th>Years after ablation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td>Single (no. of studies)</td>
<td>17</td>
<td>17</td>
<td>17</td>
<td>10</td>
<td>6</td>
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<tr>
<td>Multiple (no. of studies)</td>
<td>9</td>
<td>9</td>
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<td>9</td>
<td>4</td>
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Late Ablation Success by AF Type

Years after ablation

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<th>Years after ablation</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<td>PAF (no. of studies)</td>
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<td>NPAF (no. of studies)</td>
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<td>2</td>
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</table>

Ganesan et al: J Am Heart Assoc, 2013
Meta Analysis of Trials Randomizing Patients to Drugs or Ablation: Odds Ratio of Freedom from AF at 1 Year → Drugs vs Ablation

Wazni
Krittayaphong
Jais
Pappone
Stabile

<table>
<thead>
<tr>
<th>Ablation</th>
<th>Ablation Control</th>
<th>OR</th>
<th>95% CI</th>
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<tr>
<td>Wazni</td>
<td>28/32</td>
<td>13/35</td>
<td>11.85</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>3.39-41.43</td>
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<tr>
<td>Krittayaphong</td>
<td>12/15</td>
<td>6/15</td>
<td>6.00</td>
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<td></td>
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<td></td>
<td>1.17-30.73</td>
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<tr>
<td>Jais</td>
<td>46/53</td>
<td>13/59</td>
<td>23.25</td>
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<td></td>
<td>8.51-63.57</td>
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<tr>
<td>Pappone</td>
<td>85/99</td>
<td>24/99</td>
<td>18.97</td>
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<td>9.16-39.3</td>
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<td>Stabile</td>
<td>38/68</td>
<td>6/69</td>
<td>13.30</td>
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<td>5.07-34.89</td>
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<tr>
<td>Combined</td>
<td>266/344</td>
<td>102/346</td>
<td>15.78</td>
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<td>10.07-24.73</td>
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Odds ratio

Piccini et al: Circ Arrhythm and Elec, 2009
Improvement in Left Ventricular Function and Dimension After Ablation in Patients with Congestive Heart Failure

Associated with ↑ Exercise, ↓ Symptoms & NYHA

Hsu et al: NEJM, 2004
Catheter Ablation versus Antiarrhythmic Drug Therapy for Atrial Fibrillation Trial, CABANA

- What is Atrial Fibrillation (AF)? Click to learn more.
- Why Should you Participate in Clinical Trials?
- Is CABANA Located in my Area?
- Valuable Resources

CABANA: The Catheter Ablation versus Antiarrhythmic Drug Therapy for Atrial Fibrillation trial is being done to compare drug therapy with catheter ablation in patients with atrial fibrillation. This study will help to decide which treatment approach is best and if under certain circumstances, one therapy is preferred over the other treatment. The CABANA study will also compare the cost of care for the two treatment approaches and determine the effect these therapies have on quality of life.
Me

Electrophysiologist
Thank You!

mankad.sunil@mayo.edu
@MDMankad
References

• Uptodate.com; Topics: SVT, atrial fibrillation management, afib overview


• MKSAP 16; Cardiology ACP 2012

• Maxine A. Papadakis, Stephen J. McPhee, Eds; CURRENT Diagnosis and Treatment; McGraw Hill Education 2012.

Guidelines for the management of atrial fibrillation

The Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC)

Developed with the special contribution of the European Heart Rhythm Association (EHRA)

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS)

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