Ablation Therapy in Atrial Fibrillation Patients

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Clinical Research Trial PI: Medtronic, Boston Scientific, St. Jude
What kind of physicians go into Electrophysiology?

Mother: “Can he live a normal life?”
Doctor: “I’m afraid not, he’ll be an engineer.”
Mother begins to cry.

What is Atrial Fibrillation?
Atrial Fibrillation

- Supraventricular tachyarrhythmia characterized by “chaotic” atrial activity
- No effective atrial contraction
- Irregular and often rapid ventricular response rates
- Stasis predisposes to thrombus in left atrium and left atrial appendage

Prevalence
Atrial Fibrillation - Epidemic

• Most common sustained arrhythmia
  – 1% of those older than 60
  – 5% of those older than 69
• Currently affects 2.3 million Americans
• Prevalence in general population 0.5% - 1%
• 25% Lifetime risk

Why does it matter?

- Quality of life lower in patients with AF
  - Lower total functional capacity
  - Lower global life satisfaction
  - QOL same as or lower than post-MI or PTCA
- Stroke Risk (3-5x)
  - 15% of strokes occur in people with AF
- Increased risk of all-cause mortality
  - Odds ratio 1.5 in men, 1.9 in women – Framingham
Risk Factors

- Age
- Male
- Diabetes
- Hypertension
- Congestive Heart Failure
- Myocardial Infarction
- Valvular Heart Disease

Other Risk Factors

- Hyperthyroidism
- Alcohol Abuse
- Severe Infections
- Pulmonary disease
- Anger and Hostility
Lifestyle Cascade

- Hypertension
- Advancing age
- Obesity/Sleep Apnea
- Stress/Inflammation/Excessive Alcohol

Atrial fibrosis/enlargement

Catheter Ablation

(?)/Pulmonary vein irritability

AF

Three Different Types of AF

**Paroxysmal AF**
- AF that converts to sinus rhythm in less than 7 days spontaneously

**Persistent AF**
- AF requiring chemical or electrical cardioversion to restore sinus rhythm
- Seven days to 12 months = short lasting persistent
- > 12 months = long standing persistent

**Permanent**
- No further attempts at restoring sinus rhythm
Atrial Fibrillation

• 3 main concerns:
  – Thrombo-embolism
  – Symptoms (palpitations, CP, SOB, Fatigue, LH, syncope, etc…)
  – Tachycardia-induced cardiomyopathy

Treatment Options for AF

• **Anticoagulation** to prevent thromboembolism

• **Medication** to control the heart rate

• Restoration of normal heart rhythm either through an **electrical** cardioversion, medication, or invasive therapies
Rate vs. Rhythm Control

- Rate Control
  - Avoidance of antiarrhythmic drugs with side effects
  - Reduced need of DCCV

- Rhythm Control
  - Improved cardiac function
  - Improved quality of life
  - Prevention of thromboembolic events

- Maintenance of sinus rhythm does not necessarily eliminate stroke risk

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### Rate vs. Rhythm Control

<table>
<thead>
<tr>
<th>Trial</th>
<th>N</th>
<th>F/U</th>
<th>Endpoint</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIAF</td>
<td>252</td>
<td>1 year</td>
<td>Symptoms</td>
<td>NS</td>
</tr>
<tr>
<td>STAF</td>
<td>200</td>
<td>20mths</td>
<td>Death + thromboembolism</td>
<td>NS</td>
</tr>
<tr>
<td>RACE</td>
<td>526</td>
<td>2-3yrs</td>
<td>Composite</td>
<td>NS</td>
</tr>
<tr>
<td>Hot Café</td>
<td>205</td>
<td>1-7yrs</td>
<td>Death, stroke, hemorrhage</td>
<td>NS</td>
</tr>
<tr>
<td>AFFIRM</td>
<td>4060</td>
<td>3-5yrs</td>
<td>Total mortality</td>
<td>NS</td>
</tr>
</tbody>
</table>
Sinus rhythm maintained in only 40% - 60% rhythm-control group

Studies in persistent AF, not paroxysmal

In AFFIRM, on treatment analysis shows that sinus rhythm is associated with a 47% reduction in mortality
- Toxic effect and poor efficacy of antiarrhythmics
- Ability to maintain sinus a marker of less serious disease

In AFFIRM, population asymptomatic with rate control
Rhythm Control - Antiarrhythmics

- **Class IA**
  - Procainamide
  - Quinidine
  - Disopyramide

- **Class IC**
  - Flecainide
  - Propafenone

- **Class III**
  - Sotalol
  - Amiodarone
  - Dofetilide
  - Multaq

*AF Drug Summary*

“If many drugs are used for a disease, all are insufficient.” —Sir William Osler

In 2015, antiarrhythmic drugs continue to play an important role in AF management. However, these drugs are marginally effective and sometimes toxic. Each patient with AF should undergo stroke risk stratification by some measure (ie CHADS2 or CHADS-VaSC)
A4 Study - Catheter RFA vs Antiarrhythmics

112 patients
Paroxysmal AF


Rhythm Control

*Catheter ablation is only recommended as first-line therapy for patients with paroxysmal AF (Class IIa recommendation).
*Drugs are listed alphabetically.
*Depending on patient preference when performed in experienced centers.
*Not recommended with severe LVSD (wall thickness >3.5 mm).
*Should be used with caution in patients at risk for torsades de pointes ventricular tachycardia.
*Should be combined with AV nodal blocking agents.
MAZE Procedure
Pulmonary Vein Triggers


Evolution of AF Ablation

- 1998-2001: Focal ablation in proximal PVs
- 2002-2005: Segmental ablation at os of PVs
- 2006-present: wide area circumferential ablation
- 2011-present: cryoballoon ablation
- Other investigational technologies
Point-by-Point Technique vs Balloon Technique

Point-by-point approach

Cryoballoon approach
Cryoballoon PVI

STOP-AF

Cryoballoon Ablation of Pulmonary Veins for Paroxysmal Atrial Fibrillation: First Results of the North American Arctic Front (STOP-AF) Pivotal Trial

Journal of the American College of Cardiology, Volume 61, Issue 16, 2013, 1713 - 1723
STOP-AF

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Procedural Details

- TEE and CT scan to rule out thrombus and evaluate pulmonary vein anatomy prior to procedure
- Heparin bridge overnight in certain patients
- General Anesthesia (Jet vs. Conventional)
- Prolonged procedure time 2-6 hours
- Femoral venous (11F - 14F) and arterial access (5F vs radial) with transeptal puncture

Procedural Details

- Start with EP study
- Transeptal puncture with Intracardiac Echo
- High dose IV heparin throughout procedure – ACT > 350 seconds
- Ablation in left atrium to electrically isolate the pulmonary veins
- IV protamine to reverse heparin and remove sheaths
## Procedural Details

<table>
<thead>
<tr>
<th><strong>Radiofrequency Ablation</strong></th>
<th><strong>Cryoballoon Ablation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet Ventilation</td>
<td>Conventional Ventilation</td>
</tr>
<tr>
<td>Esophageal temp probe</td>
<td>No paralytics for right sided pulmonary veins</td>
</tr>
<tr>
<td>Paralytics OK</td>
<td>IV contrast for venogram</td>
</tr>
<tr>
<td>Rare to use contrast</td>
<td></td>
</tr>
<tr>
<td>Usually longer procedure time, less fluoro time</td>
<td></td>
</tr>
</tbody>
</table>

## Post-op Details

- Immobilize legs 6 hours
- Anticoagulation started that evening with coumadin and heparin (no bolus) or newer agent
- Watch closely for hematoma, bruits
- Incentive spirometer after general anesthesia
- Pain control – pericarditis pain not uncommon
- Prilosec or equivalent
Post-op Details

- POD#1 - 2D echo to rule out effusion and ambulate
- Remain inpatient until fully anticoagulated with INR ~ 2.0
- Not unusual to have AF 4-6 weeks post-op so usually put on empiric anti-arrhythmic agent

Major Complications

- Hemorrhage – groin / retroperitoneal
- Pseudoaneurysm / AV fistula
- Pericardial effusion / tamponade
- Stroke
- Atrio-Esophageal Fistula
Success/Complication Rates

Paroxysmal AF ~ 70-80%
Persistent AF ~ 60-70%
May require a 2\textsuperscript{nd} procedure

Serious Complication: 1-2%
Moderate Complication: 3-5%

Ideal Candidates for Catheter Approach

- Young and highly symptomatic
- Structurally normal heart, “lone” Atrial fibrillation
- Paroxysmal, Early Persistents
- Failed at least one anti-arrhythmic (Class II indication without antiarrhythmic failure)
Catheter Ablation

Class I

1. AF catheter ablation is useful for symptomatic paroxysmal AF refractory or intolerant to at least 1 class I or III anti-arrhythmic medication when a rhythm control strategy is desired.

Catheter Ablation

Class IIa

1. AF catheter ablation is reasonable for some patients with symptomatic persistent AF useful for symptomatic paroxysmal AF refractory or intolerant to at least 1 class I or III anti-arrhythmic medication.

2. Initial approach in some patients with paroxysmal AF without an anti-arrhythmic trial.
Catheter Ablation

Class III: Harm

1. AF catheter ablation should not be performed in patients who cannot be treated with anticoagulant therapy during and following 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)

Unresolved Issues in AF Ablation

- Long term efficacy and safety
- Duration and need for anticoagulation
- Maintenance of sinus rhythm and potential for prevention of structural remodeling
- Why do some fail? What to do with persistent AF
Is AF a Preventable Disorder?

AF-Arrest Trial

UPMC Center for Atrial Fibrillation (AF)

part of the UPMC Heart and Vascular Institute
Our Mission

- Diminish the prevalence of undiagnosed AF
- Reach as many afflicted persons as possible
- Diminish the incidence of AF-attributable stroke
- Diminish unnecessary AF-attributable hospital encounters
- Provide meaningful education to as to causes, consequences, and treatment options for AF
- Provide expertise in all possible AF treatment options at major HVI sites
- Examine value of individual treatment options
- Reach out to provider and payor communities

Our Strategy

- Initial educational and “triage” visit through a physician extender
- Coordinated care between Electrophysiology and Cardiac Surgery
- Provide cutting edge technology – e.g., catheter ablation, Left atrial appendage, ablation, MAZE
What the Center for AF Offers

- 24/7 consult service with the Center for AF
- Quick turn-around appointments with a Center for AF provider
- Patient education to promote disease literacy

Patient Education Packet
AF Education

Risk Assessment

CHA₂DS₂-VASc and Your Risk of Stroke

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Points</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>C: Congestive Heart Failure</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>H: Hypertension</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A: Age ≥ 75 years</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>D: Diabetes Mellitus</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>S: Prior stroke/TIA/Thromboembolism</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>V: Vascular Disease</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>A: Age 65-74 years</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sc: Sex Category (Female)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Q = Low Risk
1 = Moderate Risk
2 or greater = High Risk
Contact Information

For Providers:
412-748-7FIB (7342)

For Patients:
1-844-HVI-AFIB (484-2342)
CenterforAFib@upmc.edu

Locations
The UPMC Center for Atrial Fibrillation has several locations in western Pennsylvania. Our hospital-based locations are:

UPMC Mercy
1400 Locust Street
Pittsburgh, PA 15219

UPMC Hamot
930 Biddle St.
Pittsburgh, PA 15233

UPMC Presbyterian
2500 Lothrop St.
Pittsburgh, PA 15213

UPMC Shadyside
5200 Centre Ave.
Pittsburgh, PA 15232

UPMC University Center
1501 Lytton Ave., Suite 100B
Pittsburgh, PA 15213

To make an appointment or for more information about the UPMC Center for Atrial Fibrillation, call 1-844-HVI-AFIB (1-844-484-2342) or email CenterforAFib@upmc.edu.