Latest Treatments for Atrial Fibrillation

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Boulder Heart, 303-536-5725
Boulder Heart
Atrial Fibrillation

Sameer Oza, M.D.

sameeroza.com
Atrial Fibrillation

- Most common arrhythmia in the US
- 2.3 million people in US have A Fib
- By age 65 y, 8 in 100 patients have A Fib
- Increases risk of stroke 500%
Atrial Fibrillation (AF or A Fib)

• Normal heart beat 60-120 bpm
• A Fib – Atria (upper chambers beat at upto 300 bpm)
• Not dangerous by itself, however
  – Risk of stroke due to blood flow stasis
  – Risk of weakening heart muscle due to fast heart rates
Types of Atrial Fibrillation

• Paroxysmal (comes and goes <7 days)
• Persistent (comes and goes > 7 days)
• Permanent (here to stay)
Risk factors for Afib

• Age > 60 y
• Diabetes
• Heart problems:
  – High blood pressure,
  – Structural heart disease (valves, congenital)
  – Coronary artery disease
  – Congestive heart failure
  – Prior heart surgery
Risk factors for AFib

- Thyroid disease
- Lung disease (COPD, sleep apnea)
- Excessive alcohol use
- Smoking (ARIC study – risk x 2)
- Endurance exercise
Symptoms of A Fib

• >50% patients have no symptoms
• Fatigue/lack of energy (most common) (“old age”)
• Palpitations (irregular/fast/slow)
• Shortness of breath
• Dizziness
• Chest discomfort
A Fib and Stroke

• **15 of 100 strokes** caused by Afib
• 88,000 deaths and $16 billion in additional costs to the U.S. healthcare system
• 3 out of 4 strokes caused by Afib can be prevented
A Fib and Cardiomyopathy

- Untreated A Fib
- Multiple signals get through AV node
- Ventricles beat fast
- Heart is a muscle
- Cardiomyopathy (weak heart muscle)
- Symptoms = congestive heart failure
Diagnosis of A Fib

- EKG (snapshot)
- Long term monitors (Holter, Event, MCOT)
- Implantable monitors
- Echocardiogram (Transthoracic or Transesophageal)
LINQ monitor
Treatment Options for A Fib

• 3 pillars of treatment
  – Prevent stroke
  – Rate control
  – Rhythm control

• 4th pillar (1st pillar) - Risk factor modification
Prevent Stroke

• Warfarin (Coumadin)
• DOAC (Direct oral anticoagulants) – Pradaxa, Xarelto, Eliquis
• Left atrial appendage
  – Remove left atrial appendage surgically
  – Left atrial appendage occlusion (Watchman)
Rate Control

• Drugs
  – Beta blockers
  – Calcium channel blockers

• Pacemaker + AV node ablation
Pacemaker + AV Node Ablation

- Used for patients with permanent atrial fibrillation with fast heart rates
- Pacemaker placed previously or at time of procedure
- AV node ablation
- Treatment of last resort
Rhythm Control

• DC Cardioversion (Effective 100%, 70% recurrence in 1 yr)

• Antiarrhythmic drugs (Effective ~ 40%)
  – Flecainide (Tambocor)
  – Propafenone (Rythmol)
  – Amiodarone (Cordarone)
  – Dofetilide (Tikosyn)
  – Sotalol
  – Dronedarone (Multaq)
Rhythm Control

• Ablation
  – Effectiveness based on type of Afib
  – 70-85% success rate for paroxysmal Afib
Radiofrequency Ablation

- Catheters – narrow, flexible plastic tubes are inserted into veins through a site in the groin.
- Catheters are directed to the heart using fluoroscopy (live X-Rays).
- Once the catheter reaches the heart, electrodes along the catheter gather data and a variety of electrical measurements are made. The data pinpoints the location of the faulty electrical site.
Mapping

• Mapping is done before ablation.
• Mapping = finding source of arrhythmia
• Types:
  – Conventional mapping
  – 3D mapping
Conventional Mapping

• Uses fluoroscopy (live X-ray) and catheters with platinum electrodes that records electrical activity from different portions of the heart muscle
3D Mapping

- Similar in concept to a GPS system
- Uses magnetic and electrical fields
- Electrical activity at each point in that space is simultaneously recorded
- CT integration of data
Cryo-balloon Ablation
Boulder Heart
Atrial Fibrillation

Srinivas Iyengar, M.D.
But what else does AF cause?

• Stroke!!
• The left atrial appendage (LAA) which is in the left atrium can collect blood which forms clots that can break free in patients with AF
• That’s why we place patients with AF who have elevated risks for stroke on blood thinners
AF is a Growing Problem Associated with Greater Morbidity and Mortality

- Higher stroke risk for older patients and those with prior stroke or TIA
- 15-20% of all strokes are AF-related
- AF results in greater disability compared to non-AF-related stroke

AF = most common cardiac arrhythmia, and growing
AF increases risk of stroke

~5 M people with AF in U.S., expected to more than double by 2050
5x greater risk of stroke with AF

AF-related strokes are debilitating

**Stroke**

#1 cause of adult disability worldwide

**AF-related Stroke**

1.5X higher disability

2X higher mortality

70% result in death or permanent disability

*at 6 months post-stroke

**compared with stroke patients without AF

* Aphasia
* Visual Impairment
* Hemiparesis
* Unable to Walk Unassisted
* Cognitive Deficits
* Depression
* Social Disability
* Bladder Incontinence
* Employed Post-Stroke

Assess stroke risk with CHA\textsubscript{2}DS\textsubscript{2}-VASc score

- Score 1: Annual stroke risk 1%, oral anticoagulants or aspirin may be considered
- Score $\geq$2: Annual stroke risk 2%-15%, oral anticoagulants are recommended

Balance stroke risk reduction benefit vs. bleeding risk
Anticoagulant Therapy Carries Risk of Intracerebral Hemorrhage or Death

Spontaneous intraparenchymal bleed

Hemorrhagic transformation
Validated Scoring Systems to Assess Stroke Risks

### CHA₂DS₂-VASc Score (Stroke Risk)³

<table>
<thead>
<tr>
<th>Condition</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>C Congestive heart failure</td>
<td>1</td>
</tr>
<tr>
<td>H Hypertension (SBP&gt;160)</td>
<td>1</td>
</tr>
<tr>
<td>A₂ Age ≥ 75 years</td>
<td>2</td>
</tr>
<tr>
<td>D Diabetes mellitus</td>
<td>1</td>
</tr>
<tr>
<td>S₂ Prior stroke, TIA or thromboembolism</td>
<td>2</td>
</tr>
<tr>
<td>V Vascular disease (PAD, MI)</td>
<td>1</td>
</tr>
<tr>
<td>A Age 65-74 years</td>
<td>1</td>
</tr>
<tr>
<td>Sc Sex category (Female)</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL POINTS</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Yearly Stroke Risk (%)

<table>
<thead>
<tr>
<th>Score</th>
<th>No Warfarin</th>
<th>With Aspirin²</th>
<th>With Warfarin²</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1.3</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>2.2</td>
<td>1.8</td>
<td>0.8</td>
</tr>
<tr>
<td>3</td>
<td>3.2</td>
<td>2.6</td>
<td>1.1</td>
</tr>
<tr>
<td>4</td>
<td>4.0</td>
<td>3.2</td>
<td>1.4</td>
</tr>
<tr>
<td>5</td>
<td>6.7</td>
<td>5.4</td>
<td>2.3</td>
</tr>
<tr>
<td>6</td>
<td>9.8</td>
<td>7.8</td>
<td>3.4</td>
</tr>
</tbody>
</table>

**HAS-BLED Score (Bleeding risk with warfarin)**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>H Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>A Abnormal renal/liver function (1 pt each)</td>
<td>1 or 2</td>
</tr>
<tr>
<td>S Hemorrhagic Stroke</td>
<td>1</td>
</tr>
<tr>
<td>B Bleeding history or disposition</td>
<td>1</td>
</tr>
<tr>
<td>L Labile INRs</td>
<td>1</td>
</tr>
<tr>
<td>E Elderly</td>
<td>1</td>
</tr>
<tr>
<td>D Current drugs (medication) or alcohol use</td>
<td>1 or 2</td>
</tr>
</tbody>
</table>

**Score**

<table>
<thead>
<tr>
<th>Score</th>
<th>Yearly Major Bleeding Risk %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.13</td>
</tr>
<tr>
<td>1</td>
<td>1.02</td>
</tr>
<tr>
<td>2</td>
<td>1.88</td>
</tr>
<tr>
<td>3</td>
<td>3.74</td>
</tr>
<tr>
<td>4</td>
<td>8.70</td>
</tr>
<tr>
<td>5+</td>
<td>Not well validated</td>
</tr>
</tbody>
</table>

## Bleeding Risk Increases Over Patients’ Lifetime

<table>
<thead>
<tr>
<th>HAS-BLED Score</th>
<th>Annual % Bleed Risk*</th>
<th>10-Year Bleeding Risk (%)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.9</td>
<td>8.6</td>
</tr>
<tr>
<td>1</td>
<td>3.4</td>
<td>29.2</td>
</tr>
<tr>
<td>2</td>
<td>4.1</td>
<td>34.2</td>
</tr>
<tr>
<td>3</td>
<td>5.8</td>
<td>45.0</td>
</tr>
<tr>
<td>4</td>
<td>8.9</td>
<td>60.6</td>
</tr>
<tr>
<td>5</td>
<td>9.1</td>
<td>61.5</td>
</tr>
</tbody>
</table>

** Assumes constant risk despite increasing age and bleeding risk is independent from bleeding risk in previous years

* Lip. JACC (2011)
Warfarin is an effective means of stroke reduction in patients with AF but can present challenges:

- Many patients spend a significant amount of time outside of the therapeutic range.
- Warfarin tops the list for emergency hospitalizations for adverse drug events in older Americans

2. Budnitz, MD, MPH. et al. Annals of Internal Medicine. 2007:147(11); 229
Oral Anticoagulation is Standard of Care, but Compliance a Challenge

Use of OACs in AF Patients peaks at ~50%, use declines with increasing risk

1. Hsu, J et al. JAMA Cardiol. Published online March 16, 2016. doi:10.1001/jamacardio.2015.0374
Despite NOAC Adoption and Ability to Switch NOACs, Adherence to Anticoagulation Remains a Challenge

~30% of NOAC patients stop taking any drug at 2 years

### Challenge: Adherence and Major bleed rates with Novel Oral Anticoagulants (NOACs)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Study Drug Discontinuation Rate</th>
<th>Major Bleeding (rate/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rivaroxaban&lt;sup&gt;1&lt;/sup&gt;</td>
<td>24%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Apixaban&lt;sup&gt;2&lt;/sup&gt;</td>
<td>25%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Dabigatran&lt;sup&gt;3&lt;/sup&gt; (150 mg)</td>
<td>21%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Edoxaban&lt;sup&gt;4&lt;/sup&gt; (60 mg / 30 mg)</td>
<td>33% / 34%</td>
<td>2.8% / 1.6%</td>
</tr>
<tr>
<td>Warfarin&lt;sup&gt;1-4&lt;/sup&gt;</td>
<td>17 – 28%</td>
<td>3.1 – 3.6%</td>
</tr>
</tbody>
</table>

For those that remain adherent, there is an annual compounding bleeding risk.

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1Connolly, S. NEJM 2009; 361:1139-1151 – 2 yrs follow-up (Corrected)  
2Patel, M. NEJM 2011; 365:883-891 – 1.9 yrs follow-up, ITT  
3Granger, C NEJM 2011; 365:981-992 – 1.8 yrs follow-up,  

Results from different clinical investigations are not directly comparable. Information provided for educational purposes only.
Non-Valvular Atrial Fibrillation (NVAF), Stroke, and Current Treatment Options

• AF is a Growing Problem Associated with Greater Morbidity and Mortality
  – 5x increased risk of stroke
  – 90% of clots formed in LA come from LAA

• Current treatments with warfarin or NOACS are effective, but many patients stop taking the medications
  – ~1 in 4 patients discontinue blood thinners after 2 years

• Anti-coagulation bleeding risk compounds over time; may not be viable as a long-term solution for some patients
Connection Between NVAF-Related Stroke and the Left Atrial Appendage

AF Creates Environment for Thrombus Formation in Left Atrium

- Stasis-related LA thrombus is a predictor of TIA\(^1\) and ischemic stroke\(^2\).
- In non-valvular AF, >90% of stroke-causing clots that come from the left atrium are formed in the LAA\(^3\).

PROTECT AF: WATCHMAN Disabling Stroke Reduction Superior to Warfarin

<table>
<thead>
<tr>
<th>PROTECT AF</th>
<th>Event Rate (per 100 pt-yrs)</th>
<th>Rate Ratio (95% CrI)</th>
<th>Posterior Probabilities, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WATCHMAN N=463</td>
<td>Warfarin N=244</td>
<td></td>
</tr>
<tr>
<td>Stroke (all)</td>
<td>1.5</td>
<td>2.2</td>
<td>0.68 (0.42, 1.37)</td>
</tr>
<tr>
<td>Disabling</td>
<td>0.5</td>
<td>1.2</td>
<td>0.37 (0.15, 1.00)</td>
</tr>
<tr>
<td>Non-disabling</td>
<td>1.0</td>
<td>1.0</td>
<td>1.05 (0.54, 2.80)</td>
</tr>
</tbody>
</table>

Disabling stroke defined as Modified Rankin Score 3-6

Bayesian – Posterior prob for NI must be ≥97.5%; Posterior Prob for Superiority must be >95%
WATCHMAN Major Bleeding Reduction Superior to Warfarin 6-months Post Procedure

Freedom of Major Bleeding Over 3 Adjunctive Pharmacotherapy Intervals

72% >6 months post-procedure

Patient Populations

Non-Valvular A-Fib Population

High Risk for Stroke (CHA$_2$DS$_2$-VASC ≥ 2)

Tolerant to OAC

Balance stroke risk reduction benefit vs. bleeding risk

Patients w/ appropriate rationale to seek a non-pharmacologic alternative to warfarin
- History of bleeding
- Fall risks / previous trauma
- Non-compliant / Labile INR’s
- Lifestyle

Contraindicated
But what if I need both ablation and ligation?

• Alternatives therapies exist and work!
• Surgical procedures can be performed which can address both issues
• Also, not every patient is a candidate for Watchman (too big, too large)—surgery can also address these individuals
Boulder Heart
Atrial Fibrillation

Bryan Mahan, M.D.
MANAGEMENT OPTIONS

MEDICAL

• RHYTHM CONTROL
• RATE CONTROL
• ANTICOAGULATION

INTERVENTIONAL

• CATHETER
  • PULMONARY VEIN ABLATION
  • AV NODE ABLATION
  • WATCHMAN
  • OTHER
• SURGICAL(non-pharmacologic)
  • COX-MAZE IV
  • LAA CLOSURE
  • HYBRID
A Healthy Heart
NORMAL SINUS RYTHM
ATRIAL FIBRILLATION
FRACTURED INSULATION
“A SHORT IN THE SYSTEM”
WHEN DO YOU OFFER SURGERY FOR ATRIAL FIBRILLATION

• 1. Most commonly done if patient is coming to heart surgery for something else (coronary artery bypass, aortic valve replacement, mitral valve repair, etc) and has a history of atrial fibrillation

• 2. Has failed medical therapy and catheter ablations, may be considered an option

• 3. Eliminate the left atrial appendage, an alternative to Watchman
SURGICAL OPTIONS FOR ATRIAL FIBRILLATION

1. ELIMINATE LEFT ATRIAL APPENDAGE

2. THORACOSCOPIC HYBRID MAZE

3. COX-MAZE 4
LEFT ATRIAL APPENDAGE
OVER 90% OF STROKES ORIGINATE IN LAA
PURPOSE OF ALL “MAZE” SURGERY
CREATE A PATHWAY FOR NORMAL ELECTRICAL IMPULSE BETWEEN UPPER AND LOWER CHAMBERS OF THE HEART
MAZE
HYBRID MAZE - THORACOSCOPIC
THORACOSCOPIC APPROACH
HYBRID COX-MAZE SURGICAL ABLATION

DEEP AF Epicardial Lesion set
COX-MAZE IV SURGERY

• GOLD STANDARD FOR SUCCESS, GREATER THAN 93% AT 1 YEAR
• REQUIRES HEART-LUNG MACHINE, STERNOTOMY OR MINIMALLY INVASIVE APPROACH
• USUALLY DONE WHEN HAVING HEART SURGERY FOR SOMETHING ELSE (CABG, VALVE SURGERY, ETC.)
• CAN BE DONE ALONE IN SPECIFIC SITUATIONS
COX-MAZE IV

Graph showing percent free from AF over time (years).
COX-MAZE IV SURGERY

- SYMPTOMATIC IMPROVEMENT
- 95% LONG TERM SUCCESS
- IMPROVE LONG TERM SURVIVAL IN PATIENTS UNDERGOING OTHER HEART SURGERY
- ELIMINATE NEED FOR ANTICOAGULATION
- THROMBOEMBOLIC RISK DECREASED BY RESECTION OF LAA
AF

• ? MARKER FOR LONG TERM INCREASE IN MORTALITY OVER THOSE WHO DON’T DEVELOP AF

• Recent data documenting improved survival in patients having heart surgery when atrial fibrillation is addressed at the time of surgery as opposed to leaving it alone
Boulder Heart
AFIB Clinic

Vitale Battaglini, FNP, MBA, MSN
<table>
<thead>
<tr>
<th>Our Passions</th>
<th>Our Approach</th>
<th>Our Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Our Community</td>
<td>• Whole patient care</td>
<td>• Best possible outcomes (our 1st priority)</td>
</tr>
<tr>
<td>• Evidence-based care</td>
<td>• Multispecialty team approach</td>
<td>• Fewer ER visits</td>
</tr>
<tr>
<td>• Quality of life</td>
<td>• Collaborative decision-making</td>
<td>• Aggressive stroke prevention</td>
</tr>
<tr>
<td>• Education and shared decision-making</td>
<td>• Full spectrum of care</td>
<td>• Streamlined, efficient access to care</td>
</tr>
<tr>
<td>• Cutting edge technology and resources</td>
<td>• Emphasis on comprehensive evaluation, individualized care planning, listening, education, and support</td>
<td>• Lower costs for patients and families</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Supportive, connected care</td>
</tr>
</tbody>
</table>
Thank You!

AFIB Clinic 303-443-AFIB
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