Atrial Fibrillation
Etiologies and Treatment

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Learner Centered Learning Goal
Pathophysiology

- Defined by the absence of coordinated atrial systole
- Results from multiple reentrant electrical waves that move randomly about the atria
- Enhanced automaticity in left atria -> electrical remodeling with shortening of the atrial refractory period -> atrial fibrillation
EKG Characteristics

- Absence of P-waves
- Undulating baseline
- Rhythm is “irregularly irregular”
- Atrial Rate = 350 – 500 bpm
- Other:
  - LVH
  - Bundle Branch Blocks
  - Acute or prior MI
Epidemiology

- One of the most common arrhythmias encountered in clinical practice
- Approximately 1% of the population, 2.5 million patients in the U.S., have AFib
- Can be considered a disease of aging
  - Estimated prevalence will double by 2050
  - More than half of patients will be > 80 yo
Epidemiology

- Race: Whites > Blacks
- Gender: Men >> Women
- Age:
  - Incidence exponentially increases with age
  - Uncommon in pediatric population
Etiologies

*P*ulmonary (pneumonia, PE, malignancy)
*I*schemia (cardiovascular ischemia)
*R*heumatic Heart Disease
*A*trial Myxoma
*T*hyroid (hyperthyroidism)
*E*thanol/Electrolyte Imbalance (low K or Mg)
*S*timulants/Surgery/Sepsis
Co-morbidities

- Can occur alone (in 10-15% of patients)
- More commonly associated with:
  - CHF
  - HTN
  - Ischemic heart disease
  - Cardiomyopathy
Why We Care

- **STROKE PREVENTION!**
  - Framingham heart study shows a 5.0 fold increase in likelihood of stroke
  - Also shows a 1.5 to 2.0 fold higher risk of death in AFib patients by thromboembolism

- **Other reasons:**
  - Hemodynamic dysfunction
  - Cardiomyopathy
  - Patients can be symptomatic (fatigue, palpitations, dyspnea, chest pain, or syncope)
Therapeutic Goals

1. Prevention of thromboembolism
2. Rate Control
3. Rhythm control
Stroke Prevention

- 15-25% of all strokes in U.S. can be attributed to Atrial Fibrillation
- Accounts for 35% of strokes in those > 75 yo
- ASA or Warfarin?
  - Multitude of studies demonstrating benefit of warfarin to reduce ischemic strokes
<table>
<thead>
<tr>
<th>Study (Reference)</th>
<th>Year Published</th>
<th>Participants, n</th>
</tr>
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<tbody>
<tr>
<td>Large published trials</td>
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<td>AFASAK (1)</td>
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<td>1007</td>
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<td>677</td>
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<td>Small trials or pilot trials</td>
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<td>Harenberg et al. (12)</td>
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<td>75</td>
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<td>LASAF (13)</td>
<td>1999</td>
<td>285</td>
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<tr>
<td>Trials that included subgroups of</td>
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<td>patients with atrial fibrillation</td>
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<td>ESPS II (14)</td>
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<td>UK-TIA (16)</td>
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<td>SAFT</td>
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* AFASAK = Copenhagen Atrial Fibrillation, Aspirin, and Anticoagulation Study; BAATAF = Boston Area Anticoagulation Trial for Atrial Fibrillation; CAFA = Canadian Atrial Fibrillation Anticoagulation Study; EAF = European Atrial Fibrillation Trial; ESPS II = European Stroke Prevention Study II; FACCS = French Aspirin Coumarin Collaborative Study; LSAF = Low-Dose Aspirin, Stroke, and Atrial Fibrillation Pilot Study; MWNAF = Minidose Warfarin in Nonhemorrhagic Atrial Fibrillation; PATAF = Prevention of Arterial Thromboembolism in Atrial Fibrillation; SAFT = Stroke in Atrial Fibrillation Study; SPAF = Stroke Prevention in Atrial Fibrillation Study; SPINAF = Stroke Prevention in Nonhemorrhagic Atrial Fibrillation; UK-TIA = United Kingdom TIA Study.

# Efficacy of Warfarin and ASA in Stroke Prevention

## Table 1. Antithrombotic Therapies for Stroke Prevention in Atrial Fibrillation: Key Results of Meta-Analysis of 16 Randomized Trials*

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Trials</th>
<th>Participants</th>
<th>Relative Risk Reduction (95% CI)</th>
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<td>2900</td>
<td>62 (48 to 72)</td>
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<tr>
<td>Aspirin compared with placebo</td>
<td>6</td>
<td>3119</td>
<td>22 (2 to 38)</td>
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<td>Adjusted-dose warfarin compared with aspirin</td>
<td>5</td>
<td>2837</td>
<td>36 (14 to 52)</td>
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<td>Adjusted-dose warfarin compared with low-dose warfarin</td>
<td>3</td>
<td>893</td>
<td>38 (−20 to 68)</td>
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<tr>
<td>Aspirin compared with low-dose warfarin</td>
<td>2</td>
<td>934</td>
<td>15 (−42 to 49)</td>
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</tbody>
</table>

* Adapted from Hart and colleagues (6). Stroke includes both ischemic and hemorrhagic stroke.

Conclusions

- Adjusted dose warfarin shows best relative risk reduction when compared with ASA or placebo
- Greater risk of bleeding/intracranial hemorrhage associated with warfarin
  - Must maintain INR between 2.0 – 3.0
  - Keep HTN under control
Risk Stratification

- Who should be put on chronic anticoagulation? Everyone with AFib?
- Absolute risk (AR) of stroke increases with increasing age and co-morbid conditions.
- Article in JAMA 2001 combined 2 previous classification schemes to form the CHADS2 score.

CHADS2 Score

C – CHF or reduced LV EF (1 point)
H – HTN (1 point)
A – age > 75 (1 point)
D – diabetes mellitus (1 point)
S – previous stroke or TIA (2 points)
CHADS2 Score

- Absolute risk of stroke increases by 1.5 for each point with score of 3 giving AR of 5.9 and score of 6 an AR of 18.2
- Score of 0: at low risk and may be treated with ASA alone or observation
- Score of 1-2: can weigh benefits/risks of warfarin vs ASA to decide
- Score of > 3: at greatest risk and should be treated with chronic adjusted warfarin unless there is a contraindication
Rate vs. Rhythm Control

- Initial goals in the management of AFib should be anticoagulation if needed and rate control with beta-blockers or calcium channel blockers.
- Restoration of sinus rhythm should be pursued only after the above two goals have been addressed.
Rhythm Control

- In theory converting someone to normal sinus rhythm (NSR) should:
  - Improve cardiac hemodynamics
  - Prevent LV dysfunction
  - Maintain proper cardiac output
  - Reduce risk of thromboembolism ->
    reduce risk of death
AFFIRM Trial

- Study published in 2004 in *Circulation*
- 4060 patients aged > 65 yo
- 2 randomized groups
  - Rhythm control group (cardioversion plus AADs to maintain NSR)
  - Rate control group
- Results: rhythm control showed no evidence in preventing the incidence of strokes and did not improve mortality. Therefore, any beneficial effects of AADs are offset by their adverse side effects.

Rate Control Medications

- Beta-blockers slow the sinus rate and decrease AV nodal conduction
  - Atenolol, metoprolol, esmolol, and propranolol
- Ca\(^{2+}\) blockers reduce AV nodal conduction and control the ventricular response
  - Diltiazem and verapamil
- Digoxin (rarely used) is mainly given to those with CHF and AFib
Conversion to Sinus Rhythm

- Refer to your friendly neighborhood cardiologist or electrophysiologist
- Acute conversion recommended if there is impending hemodynamic collapse or acute cardiac ischemia
- Elective electro-cardioversion
  - If AFib is present < 48 hours, cardioversion can be completed w/o anticoagulation
  - If AFib is present > 48 hours, warfarin therapy with INR 2-3 for 3-4 weeks prior to cardioversion is necessary
  - Continue anticoagulation for 4-6 weeks after sinus rhythm is restored
Cardioversion

- Chemical Cardioversion
  - Class III anti-arrhythmics (dofetilide, ibutilide, or amiodarone)
  - Class Ic (flecainide or propanenone)
  - Sotalol or Quinidine can also be considered

- Radiofrequency Ablation

- Surgery – MAZE procedure
References

  http://www.emedicine.com/emerg/topic46.htm
  http://www.emedicine.com/med/topic184.htm
References