Atrial fibrillation

author: J. Heuser --JHeuser 06:08, 28 November 2005 (UTC)
Atrial Fibrillation Prevalence

• Most common sustained cardiac arrhythmia
  ¹
• Most common cause for arrhythmia-related hospitalization
• Estimated > 2.3 million US adults have AF, 160,000 new patients a year
  ²
• Prevalence of AF increases with age and with an aging population
  ³

The Probability of Developing AF Increases With Age

What Causes Afib?

• Aging, lifestyle, and co-morbidities
  – Natural process – 3 billion heart beats in a lifetime
  – 70% have cardiac co-morbidities (few with lone AF)
    • Heart failure
    • Coronary artery disease (CAD)
    • Hypertension
      • Hypertrophy, Cardiomyopathy, enlarged atria
  – Infection/inflammation - pericarditis

• Trauma
  – Post Open Heart Surgery: 30% CABG pts. get Afib

• Genetics – not a strong factor
  – Familial AFib associated with structural malformations
    (connexin) – possibly ion channel mutations
What is Atrial Fibrillation?
Abnormal rhythm in AF and intracellular potentials

ECG tracing of a normal heart rhythm.

In atrial fibrillation, the tracing shows tiny, irregular "fibrillation" waves between heartbeats. The rhythm is irregular and erratic.
Types of Atrial Fibrillation

AF Category: Defining Characteristics

First detected: only one diagnosed episode

Paroxysmal: recurrent episodes that self-terminate in less than 7 days

Persistent: recurrent episodes that last more than 7 days

Permanent: an ongoing long-term episode
The Patient’s Experience of AF

- Approximately 1 in 3 patients report no disruption to their lives.
- At least 1 in 10 may have no symptoms and are first diagnosed by ECG.
- Others experience irregular palpitations, breathlessness, chest pains, or dizziness.

What are the Consequences of AFib?

- Stasis of blood flow and clot formation in atria often leads to a 5-fold increase in the risk of stroke\(^1\) and cognitive dysfunction\(^3\)
- Ventricular tachycardia due to rapid discharge of atrial muscle leads to cardiomyopathy, heart failure\(^2\) and a 2 fold increase in CV death
- Reduced exercise tolerance and poor quality of life\(^4\)
- Arrhythmia-associated symptoms (fatigue, dizziness, palpitations, dyspnea)
- AFib begets AFib!
  - Structural remodeling may change connections between myocytes (syncytium) causing variable conduction
  - Electrical changes in the expression of ion channels on the myocytes responsible for conducting excitation can result in regions of hyper excitability – esp. around pulmonary veins
1 Corley SD et al. *Circulation* 2004;109:1509-1513
4 Singh S et al. *JACC* 2006; 48:721-730
Thrombus Forms in the Atria and Embolizes to the Brain
AF Increases Stroke Risk by Nearly 500%
Drugs for Treatment of AFib

• Highest priority treatment: anticoagulation
  – Aspirin
  – Warfarin (vitamin K inhibitor) inhibits synthesis of major clotting proteins in the liver
    • Slow action and variable PK – difficult to manage
    • Monthly blood test to adjust dose
  – Factor Xa inhibitors reduce formation of thrombin
    – major controlling enzyme in blood clotting
      Rivaroxaban
    • As or more efficacious in incidence of stroke in AF
    • Easy to manage, predictable PK, and no monthly tests
Coagulation Cascade

Clotting proteins
Vit K dependent
synthesis in liver

Warfarin (coumadin)

Rivaroxaban
# Recommendations for Stroke Prevention: patients with Paroxysmal or persistent AFib

Singer et al. *Chest*. 2004; 126:429S-456S.

<table>
<thead>
<tr>
<th>Patient Features</th>
<th>Antithrombotic Therapy</th>
<th>Grade of Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower Risk:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age less than 65 years</td>
<td>Aspirin (325 mg daily)</td>
<td>1B</td>
</tr>
<tr>
<td>No other risk factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intermediate Risk:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age 65 to 75 years</td>
<td>Oral anticoagulation (target INR 2.5; range 2.0 - 3.0)</td>
<td>1A</td>
</tr>
<tr>
<td>No other risk factors</td>
<td>&lt;or&gt; Aspirin (325 mg/d)</td>
<td></td>
</tr>
<tr>
<td><strong>High Risk (having any of the following):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior ischemic stroke, TIA, or systemic embolism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age &gt; 75 years</td>
<td>Oral anticoagulation (target INR 2.5; range 2.0 - 3.0)</td>
<td>1A</td>
</tr>
<tr>
<td>LV systolic dysfunction (mod or severe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Clinical Practice Study: Anticoagulation Therapy Reduces Mortality in AF Patients

*Adjusted for age, sex, risk factors, and likelihood of receiving warfarin