Atrial fibrillation in athletes

Vassil Traykov, MD

Dept. of Invasive Electrophysiology and Pacing
Clinic of Cardiology,
Tokuda Hospital - Sofia
Disclosures: none
• Evidence for increased incidence of atrial fibrillation in athletes

• Pathophysiology of atrial fibrillation in endurance athletes

• Clinical presentation of atrial fibrillation in athletes and treatment options

• Assessment of eligibility
• Evidence for increased incidence of lone atrial fibrillation in athletes

• Pathophysiology of atrial fibrillation in endurance athletes

• Clinical presentation of atrial fibrillation in athletes and treatment options

• Assessment of eligibility
Evidence for increased lone AF incidence in athletes

<table>
<thead>
<tr>
<th>Studies</th>
<th>Age</th>
<th>Type of sports</th>
<th>No. of patients</th>
<th>Prevalence or OR for AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karjalainen et al, 1998</td>
<td>47±5 vs. 49±5</td>
<td>Orienteering</td>
<td>262/373</td>
<td>5.5 (95% CI 1.3-24.4, p=0.012)</td>
</tr>
<tr>
<td>Mont et al, 2002</td>
<td>44±13 vs. 49±11</td>
<td>Endurance sports &gt; 3h/week for at least 2 years</td>
<td>70 of 1160 screened</td>
<td>63% vs 15% in non-sportsmen, p=0.05</td>
</tr>
<tr>
<td>Elosua et al, 2005</td>
<td>41±13 vs. 44±11</td>
<td>Endurance sports &gt; 1500 lifetime hours</td>
<td>51/109</td>
<td>2.87 (95% CI 1.20-6.91)</td>
</tr>
<tr>
<td>Molina et al, 2008</td>
<td>39±9 vs. 50±13</td>
<td>Marathon running</td>
<td>252/305</td>
<td>8.8 (95% CI 1.2-61.2)</td>
</tr>
<tr>
<td>Baldesberger et al., 2008</td>
<td>67±7 vs. 66±6</td>
<td>Cycling vs. Golf</td>
<td>134/62</td>
<td>10% in cyclists vs. 0% in golfers, p=0.028</td>
</tr>
<tr>
<td>Mont et al., 2008</td>
<td>48±11</td>
<td>Endurance sports</td>
<td>107/107</td>
<td>7.31 (95% CI 2.33-22.9)</td>
</tr>
<tr>
<td>Wilhelm et al, 2011</td>
<td>42±7</td>
<td>Running</td>
<td>70</td>
<td>6.7%</td>
</tr>
<tr>
<td>Pelliccia</td>
<td>24±6</td>
<td>Various training programs</td>
<td>1777</td>
<td>0.2%</td>
</tr>
</tbody>
</table>
Evidence for increased lone AF incidence in athletes

N=655/895

Abdulla et al, Europace 2009
Evidence for increased lone AF incidence in athletes

How much is enough?

N=70 nonelite athletes

Wilhelm et al, Am J Cardiol 2011
Evidence for increased lone AF incidence in athletes

How much is enough?

Physical activity, height, and left atrial size are independent risk factors for lone atrial fibrillation in middle-aged healthy individuals

Lluis Mont1*, David Tamborero1, Roberto Eloua3, Irma Molina1, Blanca Coll-Vinent2, Marta Sitges1, Bàrbara Vidal1, Andrea Scalise1, Alejandro Tejeira1, Antonio Berruezo1, and Josep Brugada1 on behalf of the GIRAFA (Grup Integrat de Recerca en Fibril.lació Auricular) Investigators

N=107

<table>
<thead>
<tr>
<th>Cumulated physical activity</th>
<th>OR (95% CI) for lone AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2077 h</td>
<td>1</td>
</tr>
<tr>
<td>2078 – 9318 h</td>
<td>5.6 (1.59-19.75), p=0.0075</td>
</tr>
<tr>
<td>≥ 9319 h</td>
<td>15.11 (3.75-60.83), p=0.0001</td>
</tr>
</tbody>
</table>
• Evidence for increased incidence of atrial fibrillation in athletes

• Pathophysiology of atrial fibrillation in endurance athletes

• Clinical presentation of atrial fibrillation in athletes and treatment options

• Assessment of eligibility
Pathophysiology of AF in endurance athletes

Enhanced vagal tone

Concept of vagus mediated AF

• Predominantly affects males between 30 and 50 years
  • Usually occurs at night and during meals
    • Rarely occurs during exercise
    • Often is preceded by bradycardia
Pathophysiology of AF in endurance athletes

Enhanced vagal tone

Wilhelm et al, Am J Cardiol 2011

Baldesberger et al, Eur Heart Journal 2008
Pathophysiology of AF in endurance athletes

Exercise-induced structural atrial changes

**Fibrosis**

- Elevated markers of myocardial fibrosis (*Lidnsay and Dunn, Br J Sports Medicine 2007; 41: 447*)

- Zones of delayed myocardial enhancement assessed by MRI (*Breukmann et al., Radiology 2009; 251:50-7*)

**Inflammation**

- C-reactive protein elevation (*Circulation 2001; 104: 2886-91*)

- IL-6 elevation (*Am J Cardiol 2005; 95:764–7*)
Pathophysiology of AF in endurance athletes

Atrial remodelling

Wilhelm et al, Am J Cardiol 2011

Mont et al, Europace 2008
• Evidence for increased incidence of atrial fibrillation in athletes

• Pathophysiology of atrial fibrillation in endurance athletes

• Clinical presentation of atrial fibrillation in athletes and treatment options

• Assessment of eligibility
Clinical presentation and treatment options

Typical clinical profile of AF in athletes

• Middle-aged male involved previously and currently in regular, high-endurance sports practice

• Usually paroxysmal occurring at night or after meals

• Progression to persistent AF not uncommon
Clinical presentation and treatment options

Management

Sport activity reduction

Rate control:
Beta blockers
Target HR difficult to reach

Rhythm control:
Class IC
Caution with IC flutter and 1:1 AV conduction

Pill-in-the-pocket approach

Catheter ablation
Clinical presentation and treatment options

Management

- Catheter ablation

Calvo et al, Europace 2010
Clinical presentation and treatment options

Management

- Catheter ablation

Koopman et al, Europace 2011
• Evidence for increased incidence of atrial fibrillation in athletes

• Pathophysiology of atrial fibrillation in endurance athletes

• Clinical presentation of atrial fibrillation in athletes and treatment options

• Assessment of eligibility
Assessment of eligibility
Assessment of eligibility

1. Athletes with asymptomatic atrial fibrillation in the absence of structural heart disease who maintain a ventricular rate that increases and slows appropriately and is comparable to that of a normal sinus response in relation to the level of activity, while receiving no therapy or therapy with AV nodal blocking drugs, can participate in all competitive sports. Note that the use of beta-blockers is prohibited in some competitive sports.

2. Athletes who have atrial fibrillation in the presence of structural heart disease who maintain a ventricular rate comparable to that of an appropriate sinus tachycardia during physical activity while receiving no therapy or therapy with AV nodal-blocking drugs can participate in sports consistent with the limitations of the structural heart disease.

3. Athletes who require anticoagulation should not participate in sports with danger of bodily collision.

4. Athletes without structural heart disease who have elimination of atrial fibrillation by an ablation technique, including surgery, may participate in all competitive sports after four to six weeks without a recurrence or after an electrophysiologic study has confirmed non-inducibility.
Assessment of eligibility

Position Paper

Recommendations for participation in leisure-time physical activity and competitive sports in patients with arrhythmias and potentially arrhythmogenic conditions
Part I: Supraventricular arrhythmias and pacemakers
Hein Heidbüchel\textsuperscript{a}, Nicole Panhuyzen-Goedkoop\textsuperscript{b,c}, Domenico Corrado\textsuperscript{d}, Ellen Hoffmann\textsuperscript{e}, Allessandro Biffi\textsuperscript{f}, Pietro Delise\textsuperscript{g}, Carina Blomstrom-Lundqvist\textsuperscript{h}, Luc Vanhees\textsuperscript{i}, Per IvarHoff\textsuperscript{j}, Uwe Dorwarth\textsuperscript{e} and Antonio Pelliccia\textsuperscript{f} on behalf of the Study Group on Sports Cardiology of the European Association for Cardiovascular Prevention and Rehabilitation

European Journal of Cardiovascular Prevention and Rehabilitation, 2005
Assessment of eligibility

<table>
<thead>
<tr>
<th>AF secondary to reversible cause</th>
<th>Eligible for all sports when cause corrected and stable sinus rhythm for &gt; 3 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>First onset or very sporadic paroxysms</td>
<td>All sports when in stable sinus rhythm for more than 3 months. Pill-in-the-pocket appropriate for some. Ablation is still investigative in athletes - all sports if asymptomatic for &gt; 3 months</td>
</tr>
<tr>
<td>Paroxysmal or permanent, without major cardiac disease</td>
<td>All sports when proven rate control with absence of haemodynamic impairment</td>
</tr>
</tbody>
</table>
1. Atrial fibrillation is more common among endurance athletes and people who exercise regularly in comparison to the general population.

2. Enhanced vagal tone is the mechanism that can best explain the increased AF incidence in this population.

3. AF in endurance athletes is most frequently paroxysmal.

4. Medical therapy is quite limited due to side effects, contraindications or regulations.

5. Catheter ablation provides a viable treatment option with efficacy similar to that in the general population.
Thank you!