Athletes with Valvular Heart Disease

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Cardiac Auscultation in athletes

- Systolic
- Short
- Soft
- Single
- Small
- Sweet
- Sensitive
Prevalence of VHD

A study on Olympic Athletes
2352 athletes evaluated from 2004 to 2014

MVP (61%)

[Category Name] (26%)

Pelliccia, Adami, Europrevent 2015
Case 1 - 40 yo soccer

40 yo soccer player

Family Hx of Htn and CAD

Asymptomatic

PE: Mid-systolic click + mild systolic murmur

BP = 140 / 90 mmHg
Case 1 - 40 yo soccer

**Relevant measurements**

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LV diameter</td>
<td>45mm</td>
</tr>
<tr>
<td>LV wall thickness</td>
<td>12mm</td>
</tr>
<tr>
<td>LA size</td>
<td>38mm</td>
</tr>
<tr>
<td>Aortic Root</td>
<td>34mm</td>
</tr>
<tr>
<td>EF</td>
<td>66%</td>
</tr>
</tbody>
</table>
Case 1 - 40 yo soccer

Echo

*Diam. Ao ascend 4.2 cm*
Case 1 - 40 yo soccer

Doppler evaluation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV Vmax</td>
<td>2.3 m/s</td>
</tr>
<tr>
<td>Peak gradient</td>
<td>21 mmHg</td>
</tr>
<tr>
<td>Mean gradient</td>
<td>10 mmHg</td>
</tr>
<tr>
<td>AR</td>
<td>++ / +++</td>
</tr>
<tr>
<td>PASP</td>
<td>29 mmHg</td>
</tr>
</tbody>
</table>

AV VTI:
- V max: 227 cm/s
- V media: 144 cm/s

PG max: 21 mmHg
PG medio: 10 mmHg
VTI: 44.1 cm
indice Vel. Ao: 0.7
40 yo soccer player with BAV

Sport eligibility?

1 - Sport competition allowed.

2 - Sport competition restricted (only leisure time).
Bicuspid aortic valve

Valvular lesion
Aortic Involvement
Type of sport
1 – Valvular lesion

Valvular lesion

Stenosis

Regurgitation
### STENOSIS

<table>
<thead>
<tr>
<th></th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak velocity</td>
<td>&gt;3 m/s</td>
<td>&gt;4 m/s</td>
</tr>
<tr>
<td>Mean gradient</td>
<td>30 mmHg</td>
<td>40 mmHg</td>
</tr>
<tr>
<td>AVA</td>
<td>&lt; 1.5 cm²</td>
<td>&lt; 1.0 cm²</td>
</tr>
<tr>
<td>DVI</td>
<td>&gt;0.25</td>
<td>&lt;0.25</td>
</tr>
</tbody>
</table>

### REGURGITATION

<table>
<thead>
<tr>
<th></th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vena contracta</td>
<td>3 – 5</td>
<td>≥6</td>
</tr>
<tr>
<td>PHT</td>
<td>&gt;200</td>
<td>&lt;200</td>
</tr>
<tr>
<td>LV cavity size</td>
<td>normal</td>
<td>Large</td>
</tr>
<tr>
<td>LV size index</td>
<td>&lt;35 mm/m²</td>
<td>&gt;35 mm/m²</td>
</tr>
</tbody>
</table>
1 – Valvular lesion

- 642 patients with BAV (mean age 35y)
- Follow-up for 9 years
- Low mortality rate (<3%)
- Primary cardiac events occurred in 25% of patients

RF
- Age > 30 years
- Significant stenosis
- Significant regurgitation

Tzemos et al. JAMA 2008
2 – Aortic involvement
2 – Aortic involvement
2 – Aortic involvement

416 BAV pts followed-up for 16 years

Michelena HI et al; JAMA 2011
Aortic Root Dimension in 2,317 athletes

99th percentile

Pelliccia et al J Am Coll Cardiol 2010
2 – Aortic involvement in BAV

Age 40
Body surface area 1,9
Gender 1 (male)
Expected aortic dimension 34 mm
Observed dimension 42 mm
Z score 3.1

- 40 - 42 mild dilation
- 43 – 44 moderate dilation
- > 45 severe dilation

- 2.0 – 3.0 mild dilation
- 3.0 – 4.0 moderate dilation
- > 4.0 severe dilation
3 – Type of sport

- Consider the Hemodynamic impact on Left Ventricle
- Consider the effect of blood pressure on thoracic aorta
- Consider the risk of body collision
40 yo soccer player with BAV

Sport eligibility?

1- Sport competition allowed.
Mild to moderate valvular disease.
Stage 1 hypertension
Significant dilation of the aortic root.

2- Sport competition restricted (only leisure time).
Sport activity at risk.
Clinical case

45 yo runner

Negative Family Hx; low CV risk profile

Palpitations

Systolic murmur 2/6 + mid-systolic click

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45 yo runner

Echo

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<td>60mm</td>
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<tr>
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<td>12mm</td>
</tr>
<tr>
<td>LA size</td>
<td>42mm</td>
</tr>
<tr>
<td>EF</td>
<td>65%</td>
</tr>
<tr>
<td>PASP</td>
<td>25mmHg</td>
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</tbody>
</table>
45 yo runner
45 yo runner

Exercise Test
45 yo runner

24h Holter ECG

- 511 PVCs
- 10 V Couplets
- 1 NSVT
45 yo runner

Sport eligibility

- 45 yo runner
- MVP
- Mild-moderate MR
- Complex VAs
MVP as a cause of Sudden Death

Maron BJ et al. 2006
MVP = 2.4% SCD
Young competitive athletes

Basso et al. 2015
MVP = 7% SCD
Young adults
MVP: Malignant Phenotype

Malignant phenotype:
- Bileaflet
- Female gender
- Frequent PVCs

Myocardial scar in patients with MVP
45 yo runner

CMR
45 yo runner

Sport eligibility?

1 - Sport competition allowed.

2 - Sport competition restricted (only leisure time).
Recommendations

Arrhythmic MVP

- If associated with: Syncope, family hx of SCD, complex VA or SVA, long QT, significant MR
  - No competitive sports

- No specific recommendation for MVP
  - Athletes with NSVT and structural disease
  - Only Class IA sports
Thank You

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